INTERMEDIATE

Paper 11

FINANCIAL MANAGEMENT AND BUSINESS DATA ANALYTICS

Study Notes

SYLLABUS 2022

The Institute of Cost Accountants of India

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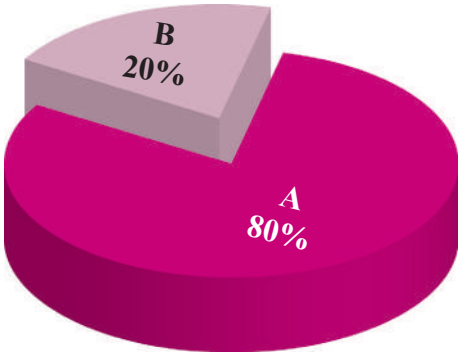
PAPER 11 : FINANCIAL MANAGEMENT AND BUSINESS DATA ANALYTICS

Syllabus Structure:

The syllabus comprises the following topics and study weightage:

Module No.	Module Description	Weight
	Section A: Financial Management	**80%**
1	Fundamentals of Financial Management	**5%**
2	Institutions and Instruments in Financial Markets	**10%**
3	Tools for Financial Analyses	**15%**
4	Sources of Finance and Cost of Capital	**10%**
5	Capital Budgeting	**15%**
6	Working Capital Management	**15%**
7	Financing Decision of a Firm	**10%**
	Section B: Business Data Analytics	**20%**
8	Introduction to Data Science for Business Decision-making	**5%**
9	Data Processing, Organisation, Cleaning and Validation	**5%**
10	Data Presentation: Visualisation and Graphical Presentation	**5%**
11	Data Analysis and Modelling	**5%**



Learning Environment – Paper 11

Subject Title	**FINANCIAL MANAGEMENT AND BUSINESS DATA ANALYTICS**
Subject Code	**FMDA**
Paper No.	**11**
Course Description	The subject Financial Management provides the fundamental concepts of finance and also introduces the larger domain of financial markets and institutions – the main providers of business finance. It also focuses on important tools for financial analyses. The subject offers a detail discussion of theories and methods associated with capital structure decisions, working capital management and capital budgeting decisions with adequate examples of real-life decision situations. The subject Business Data Analytics provides an overview of application of data science in business decisions and offers a detail discussion on the techniques of data preparation, data presentation, data analysis and building financial models.
CMA Course Learning Objectives (CMLOs)	1. Interpret and appreciate emerging national and global concerns affecting organizations and be in a state of readiness for business management. a. Identify emerging national and global forces responsible for enhanced/varied business challenges. b. Assess how far these forces pose threats to the status-quo and creating new opportunities. c. Find out ways and means to convert challenges into opportunities 2. Acquire skill sets for critical thinking, analyses and evaluations, comprehension, syntheses, and applications for optimization of sustainable goals. a. Be equipped with the appropriate tools for analyses of business risks and hurdles. b. Learn to apply tools and systems for evaluation of decision alternatives with a 360-degree approach. c. Develop solutions through critical thinking to optimize sustainable goals. 3. Develop an understanding of strategic, financial, cost and risk-enabled performance management in a dynamic business environment. a. Study the impacts of dynamic business environment on existing business strategies. b. Learn to adopt, adapt and innovate financial, cost and operating strategies to cope up with the dynamic business environment. c. Come up with strategies and tactics that create sustainable competitive advantages. 4. Learn to design the optimal approach for management of legal, institutional, regulatory and ESG frameworks, stakeholders' dynamics; monitoring, control, and reporting with application-oriented knowledge. a. Develop an understanding of the legal, institutional and regulatory and ESG frameworks within which a firm operates. b. Learn to articulate optimal responses to the changes in the above frameworks. c. Appreciate stakeholders' dynamics and expectations, and develop appropriate reporting mechanisms to address their concerns. 5. Prepare to adopt an integrated cross functional approach for decision management and execution with cost leadership, optimized value creations and deliveries. a. Acquire knowledge of cross functional tools for decision management.

	b. Take an industry specific approach towards cost optimization, and control to achieve sustainable cost leadership. c. Attain exclusive knowledge of data science and engineering to analyze and create value.
Subject Learning Objectives [SLOB(s)]	**A. Financial Management** 1. To obtain in-depth knowledge on different fundamental concepts of finance and understand the role of financial management in dynamic business environment. (CMLO 3a, b) 2. To obtain an overview of financial institutions and their role in business, financial markets and the instruments traded therein through which a business procure capital for short term, medium term and long term. (CMLO 1a, b) 3. To acquire application-oriented knowledge of various tools for financial analysis in order to assist the management in planning and decision making. (CMLO 2a, b, 3b) 4. To develop critical thinking and problem-solving competencies so that students can assist the management in selecting a suitable capital structure that caters to a balanced approach towards risk, return and value. (CMLO 2b, 3c) 5. To develop critical thinking and problem-solving competencies so that students can assist the management in ensuring optimum management of working capital and capital expenditure in existing as well as new projects. (CMLO 5a, b) **B. Business Data Analytics** 1. To develop a detail understanding of the fundamental concepts of data science and its expected role in business decisions. (CMLO 5a, c) 2. To equip oneself with application-oriented knowledge in data preparation, data presentation and finally data analysis and modelling to facilitate quality business decisions. (CMLO 5a, c)
Subject Learning Outcome [SLOC(s)] and Application Skill [APS]	**A. Financial Management** **SLOC(s)** 1. Students will be able to compare various financial instruments and guide management in selecting the most suitable one to be availed by the management for procuring funds. 2. They will be able to apply appropriate analytical tools to identify the cause(s) behind any business problem. 3. Students will attain abilities to guide the management in identifying the most suitable capital structure with due considerations for risks, costs, and return. 4. They will be able to assist leadership team in following the appropriate polices and processes for managing various components of working capital with a risk-based approach to ensure optimum utilization of short-term funds. 5. They will be able to guide the management in selecting the best alternatives for sourcing and deploying long term funds. **APS** 1. Students will be able to frame and articulate policies and procedures for short- and long-term fund management and prepare analytical statements with root cause analyses of risks and challenges for optimising capital allocation. 2. Students will attain necessary skills to prepare comparative reports and analyses for evaluating alternative capital structures and funding from various sources for optimisation of financial costs.

	3. They will acquire necessary skill to appraise long term projects and provide the best comparative view while considering a capital budgeting decision. **B. Business Data Analytics** **SLOC(s)** 1. They will be able to apply contemporary data analysis tools encompassing big data analytics, sophisticated programming and econometric modelling in solving real business problems. **APS** 1. Students will attain application-oriented skills for data analyses, interpret results and draw inferences from the outcome. 2. Students will attain capabilities to build automated financial models that will provide results for sensitivity analyses for changes in decision parameters.

Module wise Mapping of SLOB(s)

Module No.	Topics	Additional Resources (Research articles, books, case studies, blogs)	SLOB Mapped
A. Financial Management			
1	**Fundamentals of Financial Management**	Van Horne James C. and Wachowicz John M., Jr. Fundamentals of Financial Management, Prentice Hall, Latest Edition. Khan, M Y and P K Jain, Financial Management- Text, Problems and Cases, McGraw-Hill Publishing Co., New Delhi, 2019. Chandra Prasanna, Financial Management, Theory and Practice, McGraw Hill., 2019.	To obtain in-depth knowledge on different fundamental concepts of finance and understand the role of financial management in dynamic business environment.
2	**Institutions and Instruments in Financial Markets**	The Economist Guide to Financial Markets: Why They Exist and How They Work, Marc Levinson, The Economist.	To obtain an overview of financial institutions and their role in business, financial markets and the instruments traded therein through which a business procure capital for short term, medium term and long term.
3	**Tools for Financial Analyses**	Financial Statement Analysis: A Practitioner's Guide, Martin S. Fridson, Fernando Alvarez, Publisher: Wiley. Altman, E. I. 2000. Predicting Financial Distress of Companies; Revisiting the Z-score and Zeta Models. Journal of Banking and Finance 1(2); 1968 - 2000.	To acquire application-oriented knowledge of various tools for financial analysis in order to assist the management in planning and decision making.

4	**Sources of Finance and Cost of Capital**	Regulatory Risk and the Cost of Capital Determinants and Implications for Rate Regulation, Burkhard Pedell, Springer Link (https://link.springer.com/book/10.1007/3-540-30802-4).	To develop critical thinking and problem-solving competencies so that students can assist the management in selecting a suitable capital structure that caters to a balanced approach towards risk, return and value.
5	**Capital Budgeting**	Capital Budgeting Theory and Practice 2002 Edition by Pamela P. Peterson, Frank J. Fabozzi, John Wiley.	To develop critical thinking and problem-solving competencies so that students can assist the management in ensuring optimum management of working capital and capital expenditure in existing as well as new projects.
6	**Working Capital Management**	V.K. Bhalla, Working Capital Management, Publisher: S. Chand. Working Capital Management: Strategies and Techniques, Hrishikes Bhattacharya, PHI Learning; 3rd edition.	
7	**Financing Decisions of a Firm**	Capital Structure and Corporate Financing Decisions: Theory, Evidence, and Practice, H. Kent Baker, Gerald S. Martin, Wiley, (Print ISBN: 9780470569528 |Online ISBN:9781118266250 |DOI:10.1002/9781118266250). Capital Structure Decisions: Evaluating Risk and Uncertainty, Yamini Agarwal, Wiley (ISBN: 978-1-118-20316-3).	To develop critical thinking and problem-solving competencies so that students can assist the management in selecting a suitable capital structure that caters to a balanced approach towards risk, return and value.
B. Business Data Analytics			
8	**Introduction to Data Science for Business Decision-Making**	1. Davy Cielen, Arno D B Meysman, and Mohamed Ali. Introducing Data Science. Manning Publications Co USA 2. Cathy O'Neil, Rachell Schutt. Doing data science. O'Reilley 3. Joel Grus. Data science from scratch. O'Reilley	To develop a detail understanding of the fundamental concepts of data science and its expected role in business decisions.

9	**Data Processing, Organization, Cleaning and Validation**	1. Davy Cielen, Arno D B Meysman, and Mohamed Ali. Introducing Data Science. Manning Publications Co USA 2. Cathy O'Neil, Rachell Schutt. Doing data science. O'Reilley 3. Joel Grus. Data science from scratch. O'Reilley	To equip oneself with application-oriented knowledge in data preparation, data presentation and finally data analysis and modelling to facilitate quality business decisions.
10	**Data Presentation: Visualization and Graphical Presentation**	1. Davy Cielen, Arno D B Meysman, and Mohamed Ali. Introducing Data Science. Manning Publications Co USA 2. Cathy O'Neil, Rachell Schutt. Doing data science. O'Reilley 3. Joel Grus. Data science from scratch. O'Reilley	
11	**Data Analysis and Modelling**	1. Davy Cielen, Arno D B Meysman, and Mohamed Ali. Introducing Data Science. Manning Publications Co USA 2. Cathy O'Neil, Rachell Schutt. Doing data science. O'Reilley 3. Joel Grus. Data science from scratch. O'Reilley	To equip oneself with application-oriented knowledge in data preparation, data presentation and finally data analysis and modelling to facilitate quality business decisions.

Relevance of Data Analytics in Financial Management Decision-making

The popularity of 'data analytics' is on the rise. Whereas, 'financial management' and 'corporate finance' is maintaining the positions of popularity. If we look at the average interest over time, 'financial management' is the most sought-after search word in India as well as worldwide.

In recent years, the role of financial analysis is being taken over by a new wave of digital transformation, which includes advanced analytics, in corporate finance. These technologies are spawning disruptive new business models and transforming the procedures that serve as the basis for corporate performance management.

A successful bonding of data analytics and financial management may culminate into the production of in-depth analyses to answer business-specific issues and anticipate potential future financial scenarios. It may help to develop a corporate plan based on trustworthy, verifiable findings rather than intuition. Data analytics is the science and art of integrating data in a logical and relevant manner in order to anticipate an enterprise's financial position - profitability, cash flow, and company value.

Data analytics enables firms to obtain visibility and a deeper understanding of revenue, cost, profitability, and cash flow, as well as to identify areas requiring attention to influence good business results more quickly than would be feasible otherwise.

In such a scenario, it has become almost imperative for the finance managers to have an understanding of data analytics. And, this is the primary reason behind introducing the modules on 'Business Data Analytics' in this Paper.

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SECTION-A

Financial Management

Fundamentals of Financial Management

1

This Module Includes

1.1 Introduction to Financial Management

1.2 Time Value of Money

1.3 Risk and Return

Fundamentals of Financial Management

SLOB Mapped against the Module:

To obtain in-depth knowledge on different fundamental concepts of finance and understand the role of financial management in dynamic business environment.

Module Learning Objectives:

After studying this module, the students will be able to –

- Describe "financial management" in terms of the three major decision areas that confront the financial manager;
- Identify the goal of the firm and understand why shareholders value/wealth maximization is preferred over other goals;
- Understand the concept of time value of money;
- Apply the time value of money in solving the problems;
- Analyse different types of risk and returns associated with investments;
- Equip themselves with detail understanding of finding out the cost of equity capital using the Capital Asset Pricing Model.

Introduction to Financial Management

1.1

1.1.1 Fundamentals

Finance is called "The science of money". It studies the principles and the methods of obtaining control of money from those who have saved it, and of administering it by those into whose control it passes. Finance is a branch of economics till 1890. Economics is defined as study of the efficient use of scarce resources.

The decisions made by business firm in production, marketing, finance and personnel matters form the subject matters of economics. Finance is the process of conversion of accumulated funds to productive use. It is so intermingled with other economic forces that there is difficulty in appreciating the role of it plays.

Howard and Upton in their book Introduction to Business Finance define Finance "as that administrative area or set of administrative functions in an organisation which relate with the arrangement of cash and credit so that the organisation may have the means to carry out its objectives as satisfactorily as possible".

In the words of Parhter and Wert, "Business finance deals primarily with raising, administering and disbursing funds by privately owned business units operating in nonfinancial fields of industry".

Corporate finance is concerned with budgeting, financial forecasting, cash management, credit administration, investment analysis and fund procurement of the business concern and the business concern needs to adopt modern technology and application suitable to the global environment.

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

Howard and Upton define Financial Management "as an application of general managerial principles to the area of financial decision-making".

Weston and Brigham define Financial Management "as an area of financial decision making, harmonizing individual motives and enterprise goal".

According to Van Horne, "Financial management is concerned with the acquisition, financing and management of assets with some overall goal in mind."

From the above definitions, two aspects of financial management are quite apparent - (i) procurement of funds and (ii) effective utilisation of funds. Procurement of funds indicates determining the sources of funds, deciding on the methods of raising funds etc. Effective utilisation of funds implies the investment decisions, capital budgeting decisions, working capital management decisions etc.

1.1.2 Objectives of Financial Management

Financial management as the name suggests is management of finance. It deals with planning and mobilization of funds required by the firm. There is only one thing which matters for everyone right from the owners to the promoters and that is money. Managing of finance is nothing but managing of money.

The main objectives of financial management may be classified into: (i) Profit maximization (minimization of loss) and (ii) Value/Wealth maximization.

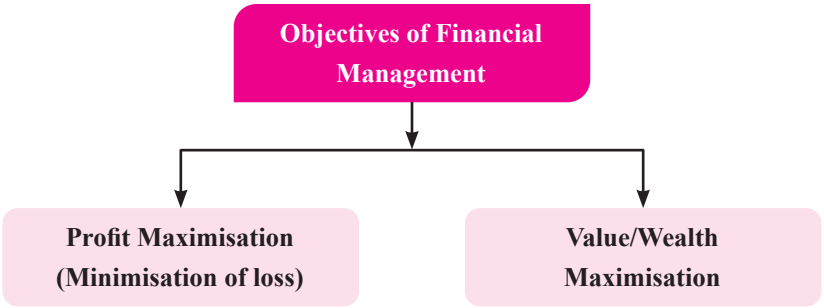

Figure 1.1: Main objectives of Financial Management

(i) Profit Maximization: In the economic theory, the behaviour of a firm is analysed in terms of profit maximization. It implies that a firm either produces maximum output for a given amount of input or uses minimum input for producing a given output. So, profit is considered to be the main driving force in business. A firm should manage all aspects of the business in such a way that revenues are maximised and costs are minimised to obtain maximum profit. Arguments in favour and against of profit maximisation are discussed in subsequent section of this chapter.

(ii) Value/ Wealth Maximization: The earlier objective of profit maximization is now replaced by value/ wealth maximization. Since profit maximization is a limited one it cannot be the sole objective of a firm. Value creation is the driving force behind financial management. Creating wealth for shareholders by increasing the value for their investment is the key goal of financial management today. Maximising the market value of the firm can be calculated by using the formula

$$MV = MV_E + MV_D$$

Where,

MV = Market value of the firm

MV_E = Market value of equity shares

MV_D = Market value of debt; if any

When the book values and market values of debts are the same, value or wealth maximization essentially reflects maximisation of market value per equity share.

Arguments in favour and against of profit maximisation are discussed in subsequent section of this chapter.

Another objective of financial management is to trade-off between risk and return. For this, the firm has to make efficient use of economic resources mainly capital.

1.1.3 Scope and Functions of Financial Management

A. Scope of Financial Management

Financial management is concerned with managing financial resources in the most optimal manner.

Modern financial management focuses three important decisions of a firm. These three decisions are discussed below:

(i) Investment Decision: Investment decision of a firm includes two main aspects- where to invest and how much to invest or the amount of investment. This maximizes the wealth of a firm. There are two basic issues involved in investment decisions:

(a) Evaluation of alternative investment avenues so as to select the best option.

(b) Monitoring and implementation of the selected investment option.

Firms need to focus on optimum utilisation of funds with limited resources. The project with a higher return should be selected for investment. Capital Budgeting decisions helps in selecting the project with higher profitability and feasibility. For short-term investment decisions or the working capital management decisions the firm should ensure that there is neither excessive nor inadequate working capital.

(ii) Financing Decision: The objective of a financing decision of a firm should be to find out the optimum combination of debt – equity, where cost of capital will be minimum and return will be maximum. Financing decision involves decision regarding the financing pattern of the firm. There are mainly two sources of raising funds- internal source and external source. Internal source includes the owned fund of the firm i.e the share capital. Whereas the external source includes the borrowed funds i.e loans from banks and other financial institutions, issuing debentures etc. Risk involved in borrowed funds is higher than the risk involved in owned funds. This is because borrowed funds entail a fixed payment commitment like interest, but the owned funds (equity capital) do not include any such fixed commitment except preference shares. So, reasonable care should be exercised while deciding upon the capital structure.

(iii) Dividend Decision: Dividend decision of a firm includes determining how much to distribute as dividend and how much to retain for future expansion programme. The objective of dividend policy is to maximise the market value of the equity shares. If the shareholders' expectations are not fulfilled, ultimately it will have a negative impact on the market value of shares. On the other hand, if a firm fails to grasp or rather predict the reinvestment opportunities then it will have an impact on the future growth of the firm. So, for deciding on the dividend policy, a firm should strike a proper balance between the shareholders' (equity) expectation and reinvestment opportunities.

So, the scope of financial management is striking a proper balance between all the three decisions of investment, financing and dividend to ensure achieving objective of the firm.

B. Functions of Financial Management

The functions of financial management involve acquiring funds for meeting short term and long-term requirements of the firm, deployment of funds, control over the use of funds and to trade-off between risk and return.

The modern approach to the financial management is concerned with the solution of major problems like investment financing and dividend decisions of the financial operations of a business enterprise. Thus, the functions of financial management can broadly be classified into three major decisions, namely: (a) Investment decisions. (b) Financing decisions. (c) Dividend decisions.

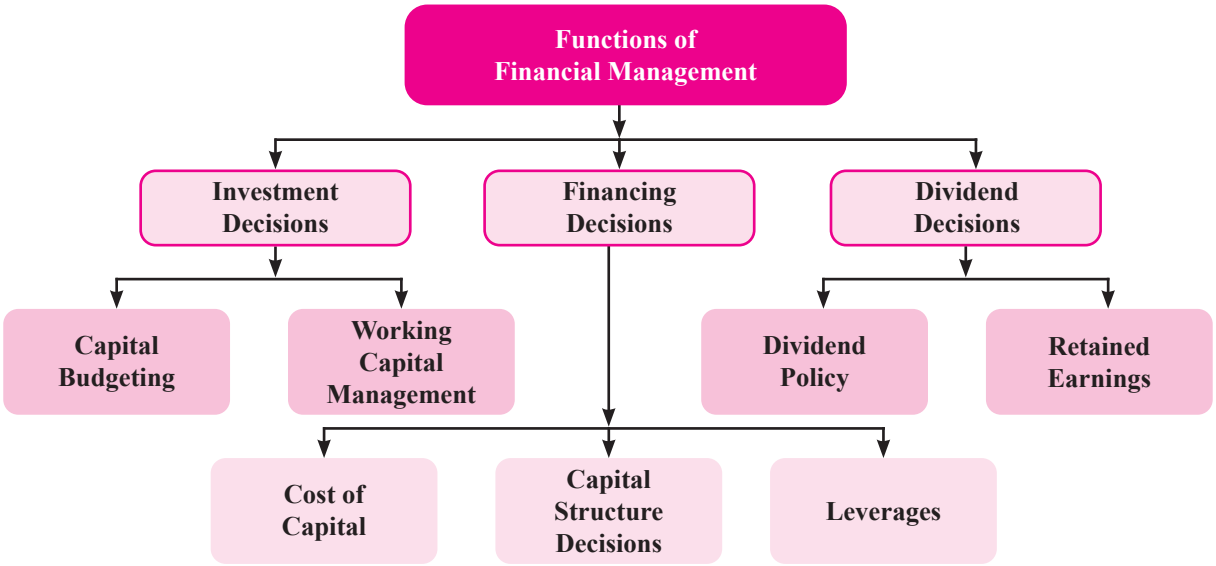

Figure 1.2: Functions of Financial Management

Based on the above decisions, functions of financial management are discussed below:

(i) Determining Financial Needs

One of the most important functions of the financial management is to ensure availability of adequate financing. Financial needs have to be assessed for different purposes. Money may be required for initial promotional expenses, fixed capital and working capital needs. Promotional expenditure includes expenditure incurred in the process of company formation. Fixed assets need depend upon the nature of the business enterprise – whether it is a manufacturing, non-manufacturing or merchandising enterprise. Current asset needs depend upon the size of the working capital required by an enterprise.

(ii) Determining Sources of Fund

The finance manager has to choose sources of funds. He may issue different types of securities and debentures. He may borrow from a number of financial institutions and the public. When a firm is new and small and little known in financial circles, the finance manager faces a great challenge in raising funds. Even when he has a choice in selecting sources of funds, that choice should be exercised with great care and caution.

(iii) Financial Analysis

The Finance Manager has to interpret different statements. He has to use a large number of ratios to analyse the financial status and activities of his firm. He is required to measure its liquidity, determine its profitability, and assets overall performance in financial terms. The finance manager should be crystal clear in his mind about the purposes for which liquidity, profitability and performance are to be measured.

(iv) Optimal Capital Structure

The finance manager has to establish an optimum capital structure and ensure the maximum rate of return on investment. The ratio between equity and other liabilities carrying fixed charges has to be defined. In the process, he has to consider the operating and financial leverages of his firm. The operating activities leverage exists because of operating expenses, while financial leverage exists because of the amount of debt involved in a firm's capital structure.

(v) Cost-Volume-Profit Analysis

The finance manager has to ensure that the income of the firm should cover its variable costs. Moreover, a firm will have to generate an adequate income to cover its fixed costs as well. The Finance Manager has to find out the break-even-point-that is, the point at which total costs are matched by total sales or total revenue. He has to try to shift the activity of the firm as far as possible from the break-even point to ensure company's survival against seasonal fluctuations.

(vi) Profit Planning and Control

Profit planning ensures attainment of stability and growth. Profit planning and control is a dual function which enables management to determine costs it has incurred, and revenues it has earned, during a particular period, and provides shareholders and potential investors with information about the earning strength of the corporation. Profit planning and control are important be, in actual practice, they are directly related to taxation. Profit planning and control are an inescapable responsibility of the management.

(vii) Fixed Assets Management

Fixed assets are financed by long term funds. Finance manager has to ensure that these assets should yield the reasonable returns proportionate to the investment. Moreover, in view of the fact that fixed assets are maintained over a long period of time, the assets exposed to changes in their value, and these changes may adversely affect the position of a firm.

(viii) Capital Budgeting

Capital budgeting forecasts returns on proposed long-term investments and compares profitability of different investments and their cost of capital. It results in capital expenditure investment. The various proposal assets ranked on the basis of such criteria as urgency, liquidity, profitability and risk sensitivity. The financial analyser should be thoroughly familiar with such financial techniques as pay back, internal rate of return, discounted cash flow and net present value among others because risk increases when investment is stretched over a long period of time. The financial analyst should be able to blend risk with returns so as to get current evaluation of potential investments.

(ix) Corporate Taxation

Corporate taxation is an important function of the financial management, for the former has a serious impact on the financial planning of a firm. Since the company is a separate legal entity, it is subject to an income-tax structure which is distinct from that which is applied to personal income.

(x) Working Capital Management

Working capital is the excess of current assets over current liabilities. This is an important area in the financial management because it is compared to the nervous system of the human body. Current assets consist of cash, inventory, receivables. Current liabilities consist of payables and bank overdraft. A prudent finance manager has to formulate a policy in such a way that there is a balance between profitability and liquidity.

(xi) Dividend Policies

A firm may try to improve its internal financing so that it may avail itself of benefits of future expansion. However, the interests of a firm and its stockholders are complementary, for the financial management is interested in maximizing the value of the firm, and the real interest of stockholders always lies in the maximization of this value of the firm; and this is the ultimate goal of financial management. The dividend policy of a firm depends on a number of financial considerations, the most critical among them being profitability. Thus, there are different dividend policy patterns which a firm may choose to adopt, depending upon their suitability for the firm and its stockholders.

(xii) Mergers and Acquisitions

Firms may expand externally through co-operative arrangements, by acquiring other concerns or by entering into mergers. Acquisitions consist of either the purchase or lease of a smaller firm by a bigger organisation. mergers may be accomplished with a minimum cash outlay, though these involve major problems of valuation and control. The process of valuing a firm and its securities is difficult, complex and prone to errors. The finance manager should, therefore, go through a valuation process very carefully. The most difficult interest to value in a corporation is that of the equity stockholder because he is the residual owner

1.1.4 Profit Optimization and Value Maximization Principle

Profit maximization or optimization and value/wealth maximization principles of the financial management are basically concerned with procurement and use of funds. Over the time, objectives of the firm have been changed from the profit maximization to value/wealth maximisation. In this section, arguments in favour and against of these two objectives of the firm are discussed.

A. Profit Maximization: Profit maximization is one of the leading goals for all firms as it is reflected in the income statement. If the net operating profits tend to increase consecutively, the firm portrays efficient performance and if the net operating profits tend to decrease consecutively, the firm shows poor financial performance.

Profit maximization or optimisation is the main objectives of business because:

(i) Profit acts as a measure of efficiency and

(ii) It serves as a protection against risk.

Arguments in favour of profit maximization:

(i) When profit earning is the main aim of business the ultimate objective should be profit maximization.

(ii) Future is uncertain. A firm should earn more and more profit to meet the future contingencies.

(iii) The main source of finance for growth of a business is profit. Hence, profit maximization is required.

(iv) Profit maximization is justified on the grounds of rationality as profits act as a measure of efficiency and economic prosperity.

Arguments against profit maximization:

(i) It leads to exploitation of workers and consumers.

(ii) It ignores the risk factors associated with profit.

(iii) Profit in itself is a vague concept and means differently to different people.

(iv) It is narrow a concept at the cost of social and moral obligations. Thus, profit maximization as an objective of Financial Management has been considered inadequate.

As it is a short-run concept, so, profit maximization objective many a time fails to exercise any pressure on the management for increasing the future growth rate of the firm

B. Value/Wealth Maximization:

> Increasing shareholder value over time is the bottom line of every move we make. — ROBERTO GOIZUETA Former CEO, The Coca-Cola Company

Value/Wealth Maximization is considered as the appropriate objective of an enterprise. When the firms maximize the shareholder's value/wealth, the individual shareholder can use this wealth to maximize his individual utility. Value/Wealth Maximization is the single substitute for a shareholder's utility.

A shareholder's wealth or value is shown by:

Shareholder's value/wealth = No. of shares owned × Current market price per equity share

Higher the share price per share, the greater will be the shareholder's wealth.

Arguments in favour of Value/Wealth Maximization:

(i) Due to wealth maximization, the short-term money lenders get their payments in time.

(ii) The long-time lenders too get a fixed rate of interest on their investments.

(iii) The employees share in the wealth gets increased.

(iv) The various resources are put to economical and efficient use.

Argument against Value/Wealth Maximization:

(i) It is socially undesirable.

(ii) It is not a descriptive idea.

(iii) Only stock holders' wealth maximization does not lead to firm's wealth maximization.

(iv) The objective of wealth maximization is endangered when ownership and management are separated. In spite of the arguments against wealth maximization, it is the most appropriative objective of a firm.

From the above discussion, wealth maximization is a long-term sustainable objective of a firm. Wealth maximization objective of the firm is a better and broader objective compared to the profit maximization objective. Wealth maximization objective considers the following which, profit maximization doesn't.

There is a conflict goal between the two.

Why value/wealth maximization objective considers superior than profit maximization, we may put forward some arguments.

These are:

(i) Wealth maximization considers the cash inflows and not the profit figure.

(ii) This objective is the long-term objective of a firm.

(iii) Wealth maximization considers the risk factor, which profit maximization doesn't.

(iv) Wealth maximization objective considers the time value of money, so the cash inflows at different points of time are discounted to arrive at present value of cash inflows.

(v) This objective takes into account both the qualitative and quantitative aspects i.e cash inflows represent the quantitative aspect and the net present value represents the qualitative aspect, whereas profit maximization objective considers only the quantitative aspect.

(vi) A firm with wealth maximization pays regular dividend to shareholders whereas those having profit maximization may not pay regular dividend.

(vii) Wealth maximization objective is preferred by shareholders.

(viii) This objective takes into account all the factors influencing the market value of shares, which profit maximization doesn't.

1.1.5 Dynamic Role of a CFO in Emerging Business Environment

The Finance Manager or the Chief Financial Officer (CFO) plays a dynamic role in a modern company's development.

Until around the first half of the 1900s financial managers primarily raised funds and managed their firms' cash positions – and that was pretty much it. In the 1950s, the increasing acceptance of present value concepts encouraged financial managers to expand their responsibilities and to become concerned with the selection of capital investment projects.

The head of finance i.e., CFO is considered to be importantly of the CEO in most organisations and performs a strategic role. The responsibilities of CFO include:

(i) Estimating the total requirements of funds for a given period;

(ii) Raising funds through various sources, both national and international, keeping in mind the cost effectiveness;

(iii) Investing the funds in both long term as well as short term capital needs;

(iv) Funding day-to-day working capital requirements of business;

(v) Collecting on time from debtors and paying to creditors on time;

(vi) Managing funds and treasury operations;

(vii) Ensuring a satisfactory return to all the stakeholders;

(viii) Paying interest on borrowings;

(ix) Repaying lenders on due dates;

(x) Maximizing the wealth of the shareholders over the long term;

(xi) Interfacing with the capital markets;

(xii) Awareness to all the latest developments in the financial markets;

(xiii) Increasing the firm's competitive financial strength in the market and

(xiv) Adhering to the requirements of corporate governance.

Today, external factors have an increasing impact on the finance manager or CFO. These are

- Heightened corporate competition
- Technological change
- Volatility in inflation and interest rates
- Worldwide economic uncertainty
- Fluctuating exchange
- Tax law changes Environmental issues, and Ethical issues

As a result, finance is required to play an ever more vital strategic role within the company. The finance manager has emerged as a team player in the overall effort of a company to create value.

The finance manager or CFO is, therefore, concerned with all financial activities of planning, raising, allocating and controlling the funds in an efficient manner. In addition, profit planning is another important function of the finance manager.

This can be done by decision making in respect of the following areas:

(i) Investment decisions for obtaining maximum profitability after taking the time value of the money into account.

(ii) Financing decisions through a balanced capital structure of Debt-Equity Ratio, sources of finance, EBIT/ EPS computations and Interest Coverage Ratio etc.

(iii) Dividend decisions, issue of bonus shares and retention of profits with objective of maximization of market value of the equity share.

(iv) Best utilization of fixed assets.

(v) Efficient working capital management (inventory, debtors, cash marketable securities and current liabilities).

(vi) Taking the cost of capital, risk, return and control aspects into account.

(vii) Tax administration and tax planning.

(viii) Pricing, volume of output, product-mix and cost-volume-profit analysis (CVP Analysis).

(ix) Cost control.

(x) Analyse the trends in the stock market and their impact on the price of company's share and share buyback.

Besides, the CFO should comply the regulatory requirements in formulation of financial strategies.

The principal elements of this regulatory framework are: -

(i) Different provisions of the Companies Act, 2013.

(ii) Provisions, guidelines, rules of the Securities and Exchange Board of India Act 1992.

(iii) Provisions of Foreign Exchange Management Act, 1999.

If you become a finance manager, your ability to adapt to change, raise funds, invest in assets, and manage wisely will affect the success of your firm and, ultimately, the overall economy as well. In an economy, efficient allocation of resources is vital to optimal growth in that economy; it is also vital to ensuring that individuals obtain satisfaction of their highest levels of personal wants. Thus, through efficiently acquiring, financing, and managing assets,

the financial manager contributes to the firm and to the vitality and growth of the economy as a whole.

Today's finance manager must have the flexibility to adapt to the changing external environment if his or her firm is to survive. The successful finance manager of tomorrow will need to supplement the traditional metrics of performance with new methods that encourage a greater role for uncertainty and multiple assumptions. These new methods will seek to value the flexibility inherent in initiatives – that is, the way in which taking one step offers you the option to stop or continue down one or more paths. In short, a correct decision may involve doing something today that in itself has small value, but gives you the option to do something of greater value in the future.

Time Value of Money

1.2

1.2.1 Rationale

Most financial decisions, personal as well as business, involve time value of money considerations. Money of the financial problems involves cash flows occurring at different points of the time. For evaluating such cash flows an explicit consideration of the time value of money is required.

Money has time value. A rupee today is more valuable than a rupee a year hence.

So, the time value of money is an individual's preference for possession of a given amount of money now, rather than the same amount at some future date.

Mainly there are three reasons may be attributed to the individual's time preference for money.

(i) **Risk:** We are not certain about future cash receipts. In an inflationary period, a rupee today represents a greater real Purchasing Power than a rupee a year hence. So, an individual prefers receiving cash now.

(ii) **Preference for consumption:** Individuals, in general, prefer current consumption to future consumption.

(iii) **Investment opportunities:** Capital can be employed productively to generate positive returns. An investment of one rupee today would grow to (1+r) a year hence (r is the rate of return earned on the investments).

1.2.2 Techniques

There are two methods of estimating time value of money which are shown below figure.

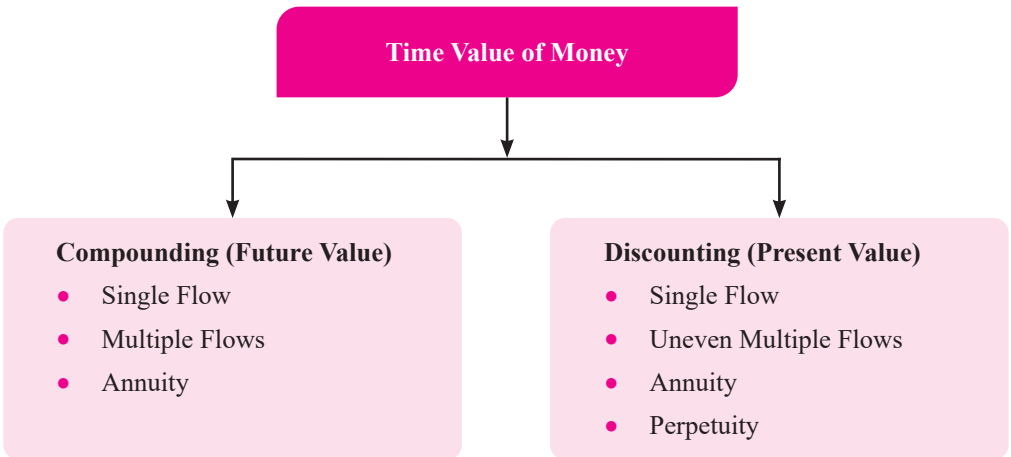

Figure 1.3: Techniques of Time Value of Money

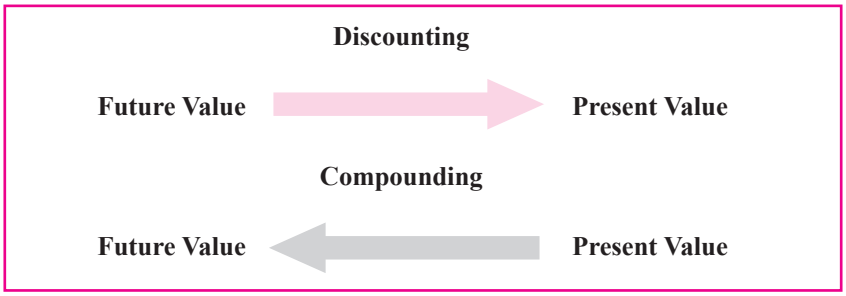

Figure 1.4: Comparison between Compounding and Discounting

A. Compounding Technique:

Compounding is the process of finding future values of cash flows by applying the concept of compound interest.

We can calculate the future values (FV) of all the cash flows at the end of the time period at a given rate of interest.

Future value = Present value + Interest

Compounding technique can be used to the following cases:

(a) Single Flow

(b) Multiple Flows

(c) Annuity

B. Discounting Technique

Discounting is the process of determining present values of a series of future cash flows. The compound interest rate used for discounting cash flows is also called the discount rate.

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.

Discounting technique can be used to the following circumstances.

(a) Single Flow

(b) Un-even Multiple Flows

(c) Annuity

(d) Perpetuity

1.2.3 Future Value and Present Value of a Single Cash Flow

(i) Future Value of a Single Flow

Suppose an investor have ₹ 1,000 today and he deposits it with a financial institution, this pays 10 % interest compounded annually, for a period of 3 years. The deposit would grow as follows:

(₹)

First year	Principal at the beginning	1,000
	Interest for the year (1,000 × 0.10)	100
	Principal at the end	1,100

Second year	Principal at the beginning	1,100
	Interest for the year (1,100×0.10)	110
	Principal at the end	1,210
Third year	Principal at the beginning	1,210
	Interest for the year 1,210×0.10)	121
	Principal at the end	1,331

The general formula for the future value of single flow:

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

Where FV = Future value n years hence

PV = Amount invested today

r = Interest rate per period

n = Number of periods of investments

To find out the future value (FV) of a single cash flow, we can use the MS Excel's built-in function.

The FV is given below:

FV (RATE, NPER, PMT, PV, TYPE)

RATE is the discount or the interest rate for a period.

NPER is the number of periods.

PMT is the equal payment (annuity) each period

PV is the present value

TYPE indicates the timing of cash flow, occurring either at the beginning or at the end of the period.

Illustration 1

If a person invests ₹ 1,50,000 in an investment which pays 12% rate of interest, what will be the future value of the invested amount at the end of 10 years?

Solution:

The future value (FV) of the invested amount at the end of 10 years will be

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

$$FV = ₹ 1,50,000 (1 + 0.12)^{10}$$

$$FV = ₹ 1,50,000 \times 3.106$$

$$FV = ₹ 4,65,900$$

Doubling Period

Investor wants to know how long would take to double the investment amount at a given rate of interest. If we look at the future value interest factor table, we find that when the interest rate is 12% it takes about 6 years to double the amount. When the interest rate is 6%, it takes about 12 years to double the amount, so on and so forth.

There is a thumb rule of 72 that helps to find out the doubling period. According to this rule of thumb, the doubling period is obtained by dividing 72 by the interest rate.

However, an accurate way of calculating the doubling period is the Rule of "69".

$$\text{Under this Rule, doubling period} = 0.35 + \frac{69}{\text{Interest Rate}}$$

Illustration 2

How long it will take for ₹ 20,000 to double at a compound rate of 8% per annum (approximately)?

Solution:

The rule of 72 is

The rule of 72 is

$r = \frac{72}{n}$

Where,
r = rate of interest or return
n = number of investment years

$$\text{No. of years} = \frac{72}{\text{Annual rate of Interest}}$$

$$\text{No. of years (n)} = \frac{72}{8}$$

No. of years (n) = 9 years

Future value of single and multiple cash flows can be calculated by using the following formulae:

Table 1.1 Future Value of Single and Multiple Cash Flows

Annually single cash flow	$FV = PV(1+r)^n$ Or, $FV = PV\ (FVIF_{r,n})$	PV = Present value FV = Future value r = Interest rate n = Number of years $FVIF_{r,n}$ = Future Value Interest Factor
Multiple times say m no. of times compounding done	$FV = PV\left(1+\frac{r}{m}\right)^{mn}$	PV = Present value FV = Future value r = Interest rate n = Number of years m = Number of times compounding done say quarterly then m = 4, half-yearly m = 6 and so on.

Cash flows of different amounts over years i.e. a series of payments	$FV = PV_1 \times (1+r)^1 + PV_2 \times (1+r)^2$ $+\ldots.+PV_n \times (1+r)^n$ i.e. $\sum_{t=1}^{n} A_t (1+r)^t$	PV = Present value FV = Future value r = Interest rate n = Number of years t = 1, 2, 3, 4…. A_t = Cash flow occuring at time t

(ii) Present Value of a Single Flow

Present Value can be calculated by using the following formulas:

1.	Annually single cash flow	$PV = FV\left\{\frac{1}{(1+r)^n}\right\}$ or, $PV = FV(1+r)^{-n}$ or, $PV = FV(PVIF_{r,n})$	PV = Present value FV = future value r = discount n = no of years $PVIF_{r,n}$ = Present Value Interest Factor
2.	Multiple times, say m no of times discounting done	$PV = FV\left\{\frac{1}{\left(1+\frac{r}{m}\right)^{mn}}\right\}$	PV = Present value FV = future value r = discount rate n = no of years m = no of times discounting done say quarterly then m = 4, half-yearly m = 6 and so on.
3.	Cash flows of different amounts over years	$PV = \frac{FV_1}{(1+r)^1} + \frac{FV_2}{(1+r)^2} + \ldots. + \frac{FV_n}{(1+r)^n}$ i.e $\sum_{t=1}^{n} \frac{A_t}{(1+r)^t}$	PV = Present value FV = future value r = discount rate n = duration of the cash flow stream t = indicates years of extending from one year to n years A = cash flow occuring at time t

The process of discounting, used for finding present value, is simply the reverse of compounding. The present value formula can be readily obtained by manipulating the compounding formula:

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

Dividing both sides of above Eq. by $(1+r)^n$ we get

$$PV = FV\left\{\frac{1}{(1+r)^n}\right\}$$

$\left(\frac{1}{1+r)^n}\right)$ in above equation called the discounting factor or the present value interest ($PVIF_{i,n}$), the value of ($PVIF_{i,n}$) for several combinations of i and n.

To find out the present value (FV) of a single cash flow, we can use the MS Excel's built-in function. The PV is given below:

PV (RATE, NPER, PMT, FV, TYPE)

RATE is the discount or the interest rate for a period.

NPER is the number of periods.

PMT is the equal payment (annuity) each period

FV is the Future value

TYPE indicates the timing of cash flow, occurring either at the beginning or at the end of the period.

Illustration 3

Suppose someone promise to give you ₹ 1,000 three years hence. What is the present value of this amount if the interest rate is 10%?

Solution:

The present value can be calculated by discounting ₹ 1,000, to the present point of time, as follows:

Value of three years hence = ₹ 1,000

Value two years hence = ₹ 1,000 × Value one year hence $= ₹\ 1{,}000 \times \frac{1}{(1+0.10)}$

Value one year hence $= ₹\ 1{,}000 \times \frac{1}{(1+0.10)^2}$

Value now (present value) $= ₹\ 1{,}000 \times \frac{1}{(1+0.10)^3} = ₹\ 1{,}000 \times 0.751 = ₹\ 751$

1.2.4 Annuity and Perpetuity

(A) Annuity

An annuity is a series of equal payments or receipts occurring over a specified number of periods. The time period between two successive payments is called payment period or rent period. The word annuity in broader sense includes payments which can be annual, semi-annual, quarterly or any other length of time. For example, when a company set aside a fixed sum each year to meet a future obligation, it is using annuity.

Future Value of Ordinary Annuity

In an ordinary annuity, payments or receipts occur at the end of each period. In a ten-year ordinary annuity, the last payment is made at the end of the tenth year.

Future Value of Ordinary Annuity can be calculated by using the following formula:

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

Or

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

Where,

FVA_n = Future value of an annuity which is the sum of the compound amounts of all payments and a duration of n periods

A = Amount of each instalment or constant periodic flow

r = Interest rate per period

n = Number of periods

$\frac{\left[(1+r)^n - 1\right]}{r}$ is known as the future value interest factor of an annuity ($FVIFA_{r,n}$)

Illustration 4

Apex Ltd. has an obligation to redeem ₹ 50 crore bonds 6 years hence. How much should the company deposit annually in a sinking fund account wherein it earns 12% interest, to accumulate ₹ 50 crore in 6 years' time?

Solution:

The future value interest factor for a 6-year annuity, given an interest rate 12% is:

$$FVIFA_{n=6,\ r=12\%} = \frac{(1+0.12^6)-1}{0.12} = 8.115$$

The annul sinking fund deposit should be:

$$= \frac{₹\ 5,00,00,000}{8.115}$$

= ₹ 61,61,429.00

Present Value of Ordinary Annuity

Present Value of Ordinary Annuity can be calculated by using the following formula:

$$PVA_n = A\ [\{1 - (1/1+ r)^n\}/r]$$

where,

PVAn = Present value of an annuity which is the sum of the compound amounts of all payments and a duration of n periods

A = Amount of each instalment or constant periodic flow

r = Discount rate

n = Number of periods

$[\{1- (1/1+r)^n\}/r]$ is called present value interest factor.

(B) Perpetuity:

Perpetuity is an annuity that occurs indefinitely. The stream of cash flows continues for an infinite amount of time. Fixed coupon payments on permanently invested (irredeemable) sums of money are prime examples of perpetuities. Scholarships paid perpetually from an endowment fund. The value of the perpetuity is finite because receipts that are anticipated far in the future have extremely low present value.

By definition, in a perpetuity, time period, n, is so large (i.e., mathematically n approaches infinity) that tends to become zero and the formula for a perpetuity simply becomes

Present value of a perpetuity may be written as follows:

$P_{\infty} = A \times PVIF\ A_{r,\infty}$

Where,

P_{∞} = Present value of a perpetuity

A = Constant annual payment

$PVIF\ A_{r,\infty}$ = Present value interest factor of perpetuity

Here, the present value interest factor of perpetuity is simply 1 divided by the interest rate expressed in decimal form. So, the present value of a perpetuity is simply equal to the constant annual payment divided by the interest rate.

$$\text{So, } P_{\infty} = \frac{1}{r}$$

Or,

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

1.2.5 Compound Annual Growth Rate (CAGR)

Compound Annual Growth Rate (CAGR) is the annual growth of investments over a specific period of time.

In other words, it is a measure of how much an investor earned from the investments every year during a given interval.

This is one of the most accurate methods of calculating the rise or fall of your investment returns over time.

Steps involved in calculating the CAGR of an investment:

Step 1: Divide the value of an investment at the end of the period by its value at the beginning of that period.

Step 2: Raise the result to an exponent of one divided by the number of years.

Step 3: Subtract one from the subsequent result.

Step 4: Multiply by 100 to convert the answer into a percentage.

The Compound Annual Growth Rate (CAGR) formula is:

$$CAGR = \left[\left(\frac{EV}{BV}\right)^{1/n} - 1\right] \times 100$$

Where, EV= Ending balance is the value of the investment at the end of the investment period.

BV= Beginning balance is the value of the investment at the beginning of the investment period.

N = Number of years amount invested.

CAGR may be used in the following cases:

(i) Calculating and communicating the average returns of investment funds.

(ii) Demonstrating and comparing the performance of investment advisors.

(iii) Comparing the historical returns of stocks with bonds or with a savings account.

(iv) Forecasting future values based on the CAGR of a data series.

(v) Analyzing and communicating the behavior, over a series of years, of different business measures such as sales, market share, costs, customer satisfaction, and performance.

For example, X Ltd. had revenues of ₹ 100 crore in 2010 which increased to ₹ 1,000 crore in 2020. What was the compounded annual growth rate?

Solution:

The Compounded Annual Growth Rate (CGAR) can be calculated as follows:

$$\text{CAGR} = \left[\left(\frac{EV}{BV}\right)^{1/n} - 1\right] \times 100$$

$$= \left[\left(\frac{1,000}{100}\right)^{1/10} - 1\right] \times 100$$

$$= \left[(10)^{1/10} - 1\right] \times 100$$

$$= (1.26 - 1) \times 100$$

$$= 26\%$$

1.2.6 Practical Applications

An important use of present value concepts is in determining the payments required for an instalment-type loan.

The distinguishing feature of this loan is that it is repaid in equal periodic payments that include both interest and principal. These payments can be made monthly, quarterly, semi-annually, or annually. Instalment payments are prevalent in mortgage loans, auto loans, consumer loans, and certain business loans.

The future value of an annuity can be applied in different scenarios by different organisations and individuals such as:

(i) One may able to know the accumulated fund at the certain period (i.e., Deposit in Public Provident Fund)

(ii) How much should one person save annually if his or her savings earn a compound return (i.e., annual savings to buy a house after certain period, deposit in sinking fund).

(iii) The present value of an annuity can be applied in case of loan amortisation by a borrower.

Illustration 5

Find the present value of ₹ 1,000 receivable 6 years hence if the rate of discount is 10%.

Solution:

₹ 1,000 × $PVIF_{10\%, 6}$ = ₹1,000 × 0.5645 = ₹564.5

Illustration 6

Find the present value of ₹ 1,000 receivable 20 years hence if the discount rate is 8%.

Solution:

We obtain the answer as follows:

$$₹1{,}000 \times \left(\frac{1}{1.08}\right)^{20}$$

$$= ₹1{,}000 \times \left(\frac{1}{1.08}\right)^{10} \times \left(\frac{1}{1.08}\right)^{10}$$

$$= ₹1{,}000 \times PVIF_{8\%,10} \times PVIF_{8\%,10}$$

$$= ₹1{,}000 \times 0.463 \times 0.463$$

$$= ₹214$$

Illustration 7

An individual deposited ₹ 1,00,000 in a bank @ 12% compound interest per annum. How much he would receive after 20 years ?

Given, $FVIF_{12, 20} = 9.646$

Solution:

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

Or, $FV = PV\ (FVIF_{r, n})$,

Where,

PV = Present value or sum invested ₹100,000

FV = Future value

r = Interest rate i.e 12% or 0.12

n = Number of years i.e., 20

$FV = PV\ (FVIF_{r, n})$

FV = ₹100,000 × 9.646

FV = ₹9,64,600

Illustration 8

Mr. X is depositing ₹ 20,000 in a recurring bank deposit which pays 9% p.a. compounded interest. How much amount Mr. A will get at the end of 5th Year.

Solution:

Formula for calculating future value of annuity

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

where,

FVA_n = Future value of an annuity which is the sum of the compound amounts of all payments and a duration of n periods

A = Amount of each instalment or constant periodic flow

r = Interest rate per period

n = Number of periods

= ₹ 20,000 ×1 [{(1+0.09)5-1}/0.09]

= ₹ 1,19,694

Illustration 9

A Person is required to pay annual payments of ₹ 8,000 in his Deposit Account that pays 10% interest per year. Find out the future value of annuity at the end of 5 years.

Solution:

At the end of	Amount Deposited (₹)	Term of the deposit (Years)	Future Value (₹)
1st year	8,000	4	8,000 × 1.464 = 11,713
2nd year	8,000	3	8,000 × 1.331 = 10,648
3rd year	8,000	2	8,000 × 1.210 = 9,680
4th year	8,000	1	8,000 × 1.110 = 8,800
5th year	8,000	-	8,000 × 1.000 = 8,000
Future Value of annuity at the end of 5 years			48,841

Alternatively, the future of annuity can be obtained by using the following formula:

Formula for calculating future value of annuity

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

where,

FVA_n = Future value of an annuity which is the sum of the compound amounts of all payments and a duration of n periods

A = Amount of each instalment or constant periodic flow

r = Interest rate per period

n = Number of periods

= ₹8,000 × 6.1051 = ₹48,841

Future Value of Annuity at the end of 5 years = ₹48,841.

Illustration 10

Ascertain the future value and compound interest of an amount of ₹ 75,000 at 8% compounded semi-annually for 5 years.

Solution:

Amount Invested = ₹ 75,000

Rate of Interest = 8%

No. of Compounds = 2 × 5 = 10 times

Rate of Interest for half year = 8%/2 = 4%

Compound Value or Future Value = $P (1+i)^n$

Where,

P = Principal Amount

i = Rate of Interest (in the given case half year interest)

n = No. of years (no. of compounds)

= ₹75,000 $(1+4\%)^{10}$

= ₹75,000 × 1.4802

= ₹1,11,018

Compound Value = ₹1,11,018

Compound Interest = Compound Value – Principal Amount

= ₹1,11,018 – ₹75,000 = ₹36, 018.

Illustration 11

An investor expects a perpetual sum of ₹ 5,000 annually from his investment. What is the present value of the perpetuity if interest rate is 10%?

Solution:

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

$$PV = \frac{A}{i} = ₹\ 50{,}000$$

Risk and Return

1.3

Return and risk are the two critical factors in investment decisions. They are closely linked. If high risk is involved, the required return on the project should also be high. So, the level of risk is measured first and then the level of return.

1.3.1 Various Connotations of Return

Return is the motivating force and the principal reward in the investment process and it is the key method available to investors in comparing alternative investments. Returns may have different meanings depending upon the investors' perceptions.

Return on a typical investment consists of two components. The basic component is the periodic cash receipts and (or income) on the investment, either in the form of interest or dividends. The second component is the change in the price of the – commonly known as capital gain or loss.

Realised return is after the fact return -return that was earned or could have been earned. Realised return is called historical return.

Expected return is the return from an asset that investors anticipate they will earn over future period. It may or may not occur.

The term **yield** is often used in connection this component of return. Yield refers to the income component in relation to some price for a security.

Some investors may measure return by using financial ratios- **Return on Investment** (ROI), **Return on Equity** (ROE) etc. Further, investors may assign more values to cash flows rather than to distant returns such as **Internal Rate of Return** (IRR).

1.3.2 Ex–ante and Ex–post Return

Ex-ante Return:

Ex-ante refers to future events. Ex-ante return is the prediction of returns that investor can get from a security or a portfolio.

(i) It helps investor to predict future return and to take right decision from investment.

(ii) Ex-ante predictions help companies to attract investors and raise capital.

(iii) It helps company to effectively plan inflation, deflation, or serious situations like a recession.

Ex-post Return:

Ex-post means after the event. Ex-post returns are the returns that investor has already got from investment, i.e., historical return.

(i) It is useful for prediction of future trend, price.

(ii) It helps in predicting returns from a security based on actual returns from it over years.

(iii) Companies can use historical data to predict future earnings

(iv) Government and other agencies can use actual results from the past data.

1.3.3 Types of Risk

According **Horne and Wachowicz**, risk is the variability of returns from those that are expected. The greater the variability, the riskier the security is said to be.

Risk in an investment asset may be divided into: (i) Systematic Risk and (ii) Unsystematic Risk.

- **Systematic Risk:** It represents that portion of Total Risk which is attributable to factors that affect the market as a whole. Economic, political and siciological changes are sources of systematic risk. Beta is a measure of Systematic Risk.
- **Unsystematic Risk**: It is the position of total risk that is unique to a firm or industry.

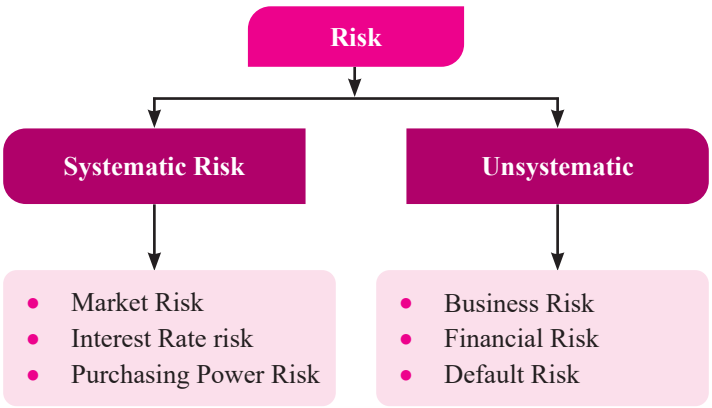

Figure 1.5: Types of Risk

A. Systematic Risk:

It represents that portion of total risk which is attributable to factors that affect the market as a whole. It arises out of external and uncontrollable factors, which are not specific to a security or industry to which such security belongs. It is that part of risk caused by factors that affect the price of all the securities. Beta is a measure of Systematic Risk. It cannot be eliminated by diversification. Systematic risks are discussed below:

(i) Market Risk: These are risks that are triggered due to social, political and economic events. For example, when CBDT issued a draft circular on how to treat income from trading in shares, whether as Capital Receipts or Business Receipts, the stock prices fell down sharply, across all sectors. These risks arise due to changes in demand and supply, expectations of the investors, information flow, investor's risk perception, etc. consequent to the social, political or economic events.

(ii) Interest Rate Risk: Uncertainty of future market values and extent of income in the future, due to fluctuations in the general level of interest, is known as Interest Rate Risk. These are risks arising due to fluctuating rates of interest and cost of corporate debt. The cost of corporate debt depends on the interest rates prevailing, maturity periods, credit worthiness of the borrowers, monetary and credit policy of RBI, etc.

iii) Purchasing Power Risk: Purchasing Power Risk is the erosion in the value of money due to the effects of inflation.

B. Unsystematic Risk

These are risks that emanate from known and controllable factors, which are unique and / or related to a particular security or industry. These risks can be eliminated by diversification of portfolio.

(i) Business Risk: It is the volatility in revenues and profits of particular Company due to its market conditions, product mix, competition, etc. It may arise due to external reasons or (Government policies specific to that kind of industry) internal reasons (labour efficiency, management, etc.)

(ii) Financial Risk: These are risks that are associated with the Capital Structure of a Company. A Company with no Debt Financing, has no financial risk. Higher the Financial Leverage, higher the Financial Risk. These may also arise due to short term liquidity problems, shortage in working capital due to funds tied in working capital and receivables, etc.

(iii) Default Risk: These arise due to default in meeting the financial obligations on time. Non-payment of financial dues on time increases the insolvency and bankruptcy costs.

1.3.4 Calculation of Return and Risk

Determination of the acceptability of the investment proposals of a firm involves a trade-off between risks and returns. So, risk -return analysis is used for capital budgeting decisions, purchase of shares, bonds and any readily identifiable capital or financial investments.

Calculation or Measurement of Return:

Returns across time or from different securities can be measured and compared using the total return concept.

The total return of a security for a given holding period relates all the cash flows received by an investor during any designated time period to the amount of money invested.

(i) Total Return

Total return is calculated as:

$$\text{Total Return} = \frac{\text{Cash payments received + Price change over the period}}{\text{Purchase price of the asset}}$$

The total return is used to measure of return for a specified period of time. Further, this return can be split in two components: dividend and capital gains. The percentage (%) of return can be expressed in mathematical terms.

Assume, P0 is the initial price, D1 is the dividend in the period 1, and P1 is the price at the end of period 1, and the total return for one period as follows:

$$\text{Total Return (\%)} = \frac{\text{Dividend + Capital Gain}}{\text{Initial Investment}}$$

$$= \frac{D_1 + (P_1 - P_0)}{P_0}$$

$$= \frac{D_1}{P_0} + \frac{(P_1 - P_0)}{P_0}$$

However, investing in a particular stock for ten years or a different stock in each ten years could result in 10 total returns which must be calculated separately by using statistical tools.

Illustration 12

The current market price of a share is ₹ 600. An investor buys 100 shares. After one year he sells these shares at a price of ₹ 720 and also receives the dividend of ₹ 30 per share. Find the total return (%) of the investor.

Solution:

Initial investment = ₹ 600 × 100 = ₹ 60,000

Dividend earned = ₹ 30 × 100 = ₹ 3,000

Capital Gains = ₹ (720-600) × 100 = ₹ 12,000

Total return = ₹ 3,000 + ₹ 12,000 = ₹ 15,000

Total return (%) = [(₹ 3,000 + ₹ 12,000) / ₹ 60,000] × 100 = 25%

(ii) Average Annual Return

There are two commonly methods used in calculating average annual returns: (a) Arithmetic Mean and (b) Geometric Mean.

When an investor wants to know the central tendency of a series of returns, the arithmetic mean is the appropriate measure. It represents the typical performance for a single period.

If you want to calculate the average compound rate of growth that has actually occurred over multiple periods, the arithmetic mean is not appropriate. Then geometric mean is used.

(iii) Expected Rate of Return

The expected return is simply a weighted average of the possible returns, with the weights being the probabilities of occurrence. The expected rate of return can be calculated by using the formula given below:

$$E(R) = R_1 \times P_1 + R_2 \times P_2 + R_3 \times P_3 + R_4 \times P_4 + \text{---------} + R_n \times P_n$$

R is the rate of returns and

P is the probability

The following table shows how to calculate expected rate of return:

Expected Rate of Return

Economic Conditions (1)	Rate of Return (%) (2)	Probability (3)	Expected Rate of Return (4) = (2)×(3)
Growth	18.0	0.25	4.5
Expansion	11.0	0.25	2.75
Stagnation	1.0	0.25	0.25
Decline	-5.0	0.25	-1.25
Expected Rate of Return			6.25

(iv) Expected Return on Portfolio

The expected return on a portfolio is the weighted average of the expected returns on the assets comprising the portfolio. When a portfolio consists of two securities, its expected return would be:

$E(R_p) = w_A E(R_A) + (1-w_B) E(R_B)$

where,

$E(R_p)$ = Expected Return of the Portfolio

W_A = Weight or Proportion of a portfolio invested in Security A

$E(R_A)$ = Expected Return on Security A

$1-W_B$ = Proportion of a portfolio invested in Security B

$E(R_B)$ = Expected Return on Security B

When a portfolio consists of n number of securities, the expected return of portfolio would be:

$E(R_p) = \sum w_n E(R_n)$

where,

$E(R_p)$ = Expected Return of the Portfolio

W_n = Weights of proportion of portfolio invested in Security n

$E(R_n)$ = Expected Return on Security n

Calculation or Measurement of Risk:

Risk may be defined as the variability of returns from an investment. Since it indicates variation in expected return, therefore statistical techniques may be used to measure risks.

Generally, the following methods are used to measure risk of an investment.

(i) Subjective Estimates: Risk analysis is 'generic' and may be applied to any situation and any form of decision-making, from determining policy and strategy, through all levels of planning to tactical decision making.

In different situations, risk may be expressed as low, moderate and high. When variations of returns will not be wide, it may be called low level of risk; when forecast returns are likely to vary widely, it may state as high-risk level and variability of returns is likely to moderate in nature then it may represent as moderate level of risk. This method of risk assessment has its own limitations.

(ii) Standard Deviation and Variance: The standard deviation is a measure of how each possible outcome deviates from the expected value. It measures the risk in absolute terms. The higher the value of dispersion, the higher is the risk associated with the Portfolio and vice-versa. Generally, Standard Deviation of a specified security or portfolio is considered to be the Total Risk associated with that security or portfolio.

Standard Deviation is generally considered as the total risk of a particular security. It can be measured as follows:

$\sigma = \sqrt{\text{Variance}} = \sqrt{\sum_i^n (x - \bar{x})^2 P_i}$

Where,

x = Expected rate of return = E(R)

x_i = i^{th} rate of return from an investment proposal

p_i = Probability of occurrence of the i^{th} rate of return

n = Number of outcomes

Illustration 13

X Ltd. has forecasted returns on its share with the following probability distribution:

Return (%)	Probability
-20	0.05
-10	0.05
-5	0.10
5	0.10
10	0.15
18	0.25
20	0.25
30	0.05

Find out the following: (a) Expected Rate of Return (b) Variance (c) Standard Deviation

Solution:

(a) Expected Rate of Return

Expected Return can be calculated by using the following formula:

$E(R) = R_1 \times P_1 + R_2 \times P_2 + R_3 \times P_3 + R_4 \times P_4 + \ldots\ldots\ldots\ldots + R_n \times P_n$

$= (-20 \times 0.05) + (-10 \times 0.05) + (-5 \times 0.10) + (5 \times 0.10) + (10 \times 0.15) + (18 \times 0.25) + (20 \times 0.25) + (30 \times 0.05) = 11\%$

(b) Variance of Return

Variance can be calculated by using the following formula

$\sigma^2 = [R_1\text{-}E(R)]^2 \times p_1 + [R_2\text{-}E(R)]^2 \times p_2 + [R_3\text{-}E(R)]^2 \times p_3 + [R_4\text{-}E(R)]^2 \times p_4 \ldots\ldots\ldots\ldots [R_n\text{-}E(R)]^2 \times p_n$

$= (-20\text{-}11)^2 \times 0.05 + (-10\text{-}11)^2 \times 0.05 + (-5\text{-}11)^2 \times 0.10 + (5\text{-}11)^2 \times 0.10 + (10\text{-}11)^2 \times 0.15 + (18\text{-}11)^2 \times 0.25 + (20 - 11)^2 \times 0.25 + (30 - 11)^2 \times 0.05$

$= 150\%$

(c) Standard Deviation of Return

$\sigma = \sqrt{150} = 12.25$

(i) Coefficient of Variation: Variance or standard deviation are the absolute measure of risk. Standard deviation can sometimes be misleading in comparing the risk.

The standard deviation when compared with the expected returns is known as the coefficient of variation

$$\text{Coefficient of Variation (CV)} = \frac{\text{Standard Deviation}}{\text{Expected Value}}$$

Thus, the coefficient of variation is a measure of relative dispersion (risk) – a measure of risk "per unit of expected return." The larger the CV, the larger the relative risk of the investment.

Illustration 14

Consider, two securities, A and B, whose normal probability distributions of one-year returns have the following characteristics:

	Security A	Security B
Expected return, [E(R)]	0.08	0.24
Standard deviation, (σ)	0.06	0.08
Coefficient of variation, (CV)	0.75	0.33

Comment on the above information.

Solution:

From the above information it is found that the standard deviation of Security B is larger than that of Security A. So, Security B is the riskier investment opportunity with standard deviation as risk measurement tool.

However, relative to the size of expected return, Security A has greater variation. So, Security A is higher risky investment than Security B.

(ii) Beta: The sensitivity of a security to market movements is called beta (β). When an investor wants to invest his money in a portfolio of securities, beta is the proper measure of risk. Beta measures systematic risk i.e., that which affects the market as a whole and hence cannot be eliminated through diversification.

Beta depends on the following factor:

(i) Standard Deviation (Risk) of the Security or Portfolio.

(ii) Standard Deviation (Risk) of the Market.

(iii) Correlation between the Security and Market.

According to the Capital Asset Pricing Model, the required rate of return is equivalent to the risk-free return plus risk premium.

$$E(R_p) = R_F + \{ \beta_p \times (R_M - R_F)\}$$

Where,

$E(R_p)$= Expected Return on Portfolio

R_F = Risk Free Rate of Interest/ Return

β_P = Portfolio Beta or Risk Factor

R_M = Expected Return on Market Portfolio

Beta is measured as follows:

$$\beta = \frac{Cov\ (A.M.)}{\sigma_M^2}$$

$Cov_{(A,M)}$= Covariance of returns on an individual company's security (A) with returns for market as a whole (M).

σ_M^2 = Variance of market returns

We know,

$Cov_{(A,M)} = r_{(A,M)} \times \sigma_A \times \sigma_M$

$r_{(A,M)}$ = Coefficient of correlation between A and M

σ_A = Standard deviation of returns of security A

σ_M = Standard deviation of market rate of returns

$$\beta = \frac{r_{(AM)} \times \sigma_A \times \sigma_M}{\sigma_M^2}$$

If the value of changes in different ranges, accordingly, risk of the security would be changes. Inferences are shown below:

Inferences

Beta Value is	Security is
Less than 1	Less risky than the market portfolio.
Equal to 1	As risky as the market portfolio. Normal Beta security. When security beta = 1 then if market move up by 10% security will move up by 10%. If market fell by 10% security also tend to fall by 10%.
More than 1	More risk than the market portfolio. Termed as Aggressive Security/High beta Security. A Security beta 2 will tend to move twice as much as the market. If market went up by 10% security tends to rise by 20%. If market fall by 10% Security tends to fall by 20%.
Less than 0	Negative Beta. It indicates negative (inverse) relationship between security return and market return. If market goes up security will fall and vice versa. Normally gold is supposed to have negative beta.
Equal to 0	Means there is no systematic risk and share price has no relationship with market. Risk free security is assumed to be zero.

Illustration 15

From the following data, compute the beta of Security X.

$\sigma_X = 12\%$; $\sigma_M = 9\%$; $r_{(X,M)} = +0.72$

Solution:

$$\text{Beta } (\beta) = \frac{r_{(AM)} \times \sigma_A \times \sigma_M}{\sigma_M^2}$$

$$\frac{0.72 \times 12 \times 9}{9^2} = \frac{77.76}{81} = 0.96$$

Illustration 16

The stock price and dividend history of X Ltd. are given below:

Year	Closing Share Price (₹)	Dividend per Share (₹)
2018	312	5.50
2019	389	6.75
2020	234	4.60
2021	345	5.90
2022	367	3.78
2023	389	4.10
2024	412	5.98

Using the above data, compute the following:

(i) Annual rates of return

(ii) Expected average rate of return

(iii) Variance

(iv) Standard deviation

Solution:

(i) Computation of annual rates of return

Year	Closing Share Price (₹) (St)	Dividend per Share (₹) (Dt)	Annual rate of return [(St/St-1)-1) + Dt
2018	312	5.50	-
2019	389	6.75	7.00
2020	234	4.60	4.20
2021	345	5.90	6.37
2022	367	3.78	3.84
2023	389	4.10	4.15
2024	412	5.98	6.03
Total			**31.58**

(ii) Average rate of return = Arithmetic mean of annual rates of return

Total Annual Returns = 31.58

So, Average return = 31.58/6 = 5.27%

(iii) Calculation of Variance

Year	Annual Return (R_t)	Average Return (%) (R_m)	(R_t- R_m)	($R_t - R_m$)^2
2018	7.00	5.27	1.73	2.89
2019	4.20	5.27	-1.07	1.14
2020	6.37	5.27	1.10	1.22
2021	3.84	5.27	-1.43	2.03
2022	4.15	5.27	-1.11	1.23
2023	6.03	5.27	0.77	0.59
Total				**9.20**

$$\text{Variance} = \frac{1}{n-1}\sum_{i}^{n}(R_i - R_m)^2$$

$$= \frac{9.20}{6-1}$$

$$= 1.84$$

(iv) Standard Deviation (σ) $= \sqrt{\text{Variance}}$

$$= \sqrt{1.84}$$

$$= 1.35$$

1.3.5 Capital Asset Pricing Model

William F. Sharpe and John Linter developed the Capital Asset Pricing Model (CAPM). The model is based on the portfolio theory developed by Harry Markowitz. The model emphasises the risk factor in portfolio theory which is a combination of two risks, systematic risk and unsystematic risk. The model suggests that a security's return is directly related to its systematic risk which cannot be neutralized through diversification.

CAPM explains the behavior of security prices and provides a mechanism whereby investors could assess the impact of a proposed securities are determined in such a way that the risk premium or excess return are proportional to systematic risk, which is indicated by the beta coefficient.

A. Features of CAPM:

(i) CAPM explains the relationship between the Expected Return, Non-Diversifiable Risk (Systematic Risk) and the valuation of securities.

(ii) CAPM is based on the premise that the diversifiable risk of a security is eliminated when more and more securities are added to the Portfolio.

(iii) All securities do not have same level of systematic risk and therefore, the required rate of return goes with the level of systematic risk. It considers the required rate of return of a security on the basis of its (Systematic Risk) contribution to the total risk.

(iv) Systematic Risk can be measured by Beta, which is a function of the following:

(a) Total Risk Associated with the Market Return,

(b) Total Risk Associated with the Individual Securities Return,

(c) Correlation between the two.

B. Assumptions:

(i) With reference to Investors:

(a) Investment goals of investors are rational. They desire higher return for any acceptable level of risk and lower risk for any desired level of return.

(b) Their objective is to maximize the utility of terminal wealth.

(c) Their choice is based on the risk and return of a security.

(d) They have homogenous expectations of risk and return over an identical time horizon.

(ii) With reference to Market:

(a) Information is freely and simultaneously available to all investors.

(b) Capital Market is not dominated by any individual investors.

(c) Investors can borrow and lend unlimited amount at the risk-free rate.

(d) No taxes, transaction costs, restrictions on short-term rates or other market imperfections.

(e) Total asset quantity is fixed, and all assets are marketable and divisible.

We can use CAPM to understand the basic risk-return trade-offs involved in various types of investment decisions.

Using Beta as the measure of non-diversifiable risk, the CAPM is used to define the required rate of return on a security.

$$\mathbf{E(R_S) = R_F + \{ \beta_S \times (R_M - R_F)\}}$$

Where,

$E(R_S)$ = Expected Return on the Security or Investment

R_F = Risk Free Rate of Interest/ Return

β_S = Security Beta or Risk Premium

R_M = Expected Return on all securities or Market Return

Illustration 17

The following information is given:

Security Beta: 1.2

Risk-free rate: 4%

Expected market return: 12%

Calculate expected rate of return on the security.

Solution:

$$E(R_S) = R_F + \{ \beta_S \times (R_M - R_F)\}$$

Substituting these data into the CAPM equation, we get

$$E(R_S) = 4\% + [1.20 \times (12\% - 4\%)$$

$$= 4\% + 9.6\% = 13.6\%.$$

Solved Case 1

Compute the future values of (1) an initial ₹ 100 compounded annually for 10 years at 10% and (2) an annuity of ₹ 100 for 10 years at 10%.

Solution:

The future value of an investment compounded annually = $F_n = P(1+i)^n = P \times FIVF_{i,n} = F_{10} = ₹100$

$(1+0.10)^{10} = ₹100\ (2.5937) = ₹259.4$

The future value of an annuity = $A \times FVIFA_{in} = ₹100 \times 15.937 = ₹1593.7$

Solved Case 2

A note (secured premium note) is available for ₹ 1,400. It offer, including one immediate payment, 10 annual payments of ₹ 210. Compute the rate of return (yield) on the note.

Solution:

$$V = \sum_{t=1}^{n} \frac{C_t}{(1+r)^t}$$

$\Rightarrow$ ₹1,400 $= ₹210\ (1 + PVIFA_{r,9})$

$\Rightarrow$ $(1 + PVIFA_{r,9}) = ₹1,400/₹210 = 6.67$

$(1 + PVIFA_{r,9}) = 6.67 - 1 = 5.67$

From the future value table, the closet values are 5.7590 (0.10) and 5.3282 (0.11). By interpolation, r = 10.2%.

Solved Case 3

The shares of ABC Ltd. are currently selling for ₹ 100 on which the expected dividend is ₹ 4. Compute the total return on the shares if the earnings or dividends are likely to grow at (a) 5 % (b) 10 % and (c) 0 (zero) % (no growth).

Solution:

$$r = (D_1/P_0) + g$$

(a) Rate of growth, 5%:

$= (₹4/₹100) + 0.05 = 0.04 + 0.05 = 9\%$

(b) Rate of growth, 10%:

$r = (₹4/₹100) + 0.10 = 14\%$

(c) Rate of growth, 0 (zero) % (no growth):

$r = ₹(4/100) = 4\ \%.$

Solved Case 4

ABC Ltd. is considering a proposal to buy a machine for ₹ 30,000. The expected cash flows after taxes from the machine for a period of 3 consecutive years are ₹ 20,000 each. After the expiry of the useful life of the machine, the seller has guaranteed its repurchase at ₹ 2,000. The firm's cost of capital is 10% and the risk adjusted discount rate is 18%. Should the company accept the proposal of purchasing the machine?

Solution:

Year	CFAT (₹)	PV factor (0.18)	Total PV (₹)
1-3	20,000	2.174	43,480
3	2,000	0.751	1,502
		(As per PVIF Table)	44,982
Less cash outlays			30,000
NPV			14,982

Yes, the company should accept the proposal.

Solved Case 5

The Hypothetical Ltd is examining two mutually exclusive proposals. The management of the company uses certainty equivalents (CE) approach to evaluate new investment proposals. From the following information pertaining to these projects, advise the company as to which project should be taken up by it.

Year	Proposal A		Proposal B	
	CFAT (₹)	CE	CFAT (₹)	CE
0	(25,000)	1.0	(25,000)	1.0
1	15,000	0.8	9,000	0.9
2	15,000	0.7	18,000	0.8
3	15,000	0.6	12,000	0.7
4	15,000	0.5	16,000	0.4

The firm's cost of capital is 12%, and risk-free borrowing rate is 6%.

Solution:

NPV under CE method: Project A

Year	Expected CFAT (₹)	Certainty Equivalent (CE)	Adjusted CFAT (₹)	PV factor (0.06)	Total PV (₹)
0	(25,000)	1.0	(25,000)	1.000	(25,000)
1	15,000	0.8	12,000	0.943	11,316
2	15,000	0.7	10,500	0.890	9,345
3	15,000	0.6	9,000	0.840	7,560
4	15,000	0.5	7,500	0.792	5,940

NPV under CE method: project B

Year	Expected CFAT (₹)	Certainty Equivalent (CE)	Adjusted CFAT (₹)	PV factor (0.06)	Total PV (₹)
0	(25,000)	1.0	(25,000)	1.000	(25,000)
1	9,000	0.9	8,100	0.943	7,638
2	18,000	0.8	14,400	0.890	12,816
3	12,000	0.7	8,400	0.840	7,056
4	16,000	0.4	6,400	0.792	5,069

The company should take up Project A.

Exercise

A. Theoretical Questions:

⊙ Multiple Choice Questions

1. Time value of money explains that
   (a) a unit of money received today is worth more than a unit received in future
   (b) a unit of money received today is worth less than a unit received in future
   (c) a unit of money received today and at some other time in future is equal
   (d) none of the above
2. Time value of money facilitates comparison of cash flows occurring at different time periods by
   (a) compounding all cash flows to a common point of time
   (b) discounting all cash flows to a common point of time
   (c) using either (a) or (b)
   (d) neither (a) nor (b).
3. If the nominal rate of interest is 10 per cent per annum and frequency of compounding is 4 i.e. quarterly compounding, the effective rate of interest will be
   (a) 10.25% per annum
   (b) 10.38% per annum
   (c) 10% per annum
   (d) none of the above
4. Relationship between annual effective rate of interest and annual nominal rate of interest is, if frequency of compounding is more than 1,
   (a) Effective Rate < Nominal rate
   (b) Effective Rate > Nominal rate
   (c) Effective Rate = Nominal rate
   (d) none of the above
5. If annual effective rate of interest is 10.25 % per annum and nominal rate of return is 10% per annum what is the frequency of compounding
   (a) 1
   (b) 3
   (c) 2
   (d) 4
6. A student takes a loan of ₹ 50,000 from SBI. The rate of interest being charged by SBI is 10% per annum. What would be the amount of equal annual instalment if he wishes to pay it back in five instalments and first instalment, he will pay at the end of year 5?

(a) ₹ 11,000

(b) ₹ 19,310

(c) ₹ 15,000

(d) None of the above

7. How much amount should an investor invest now in order to receive five annuities starting from the end of this year of ₹ 10,000 if the rate of interest offered by bank is 10 % per annum?

(a) ₹ 40,000

(b) ₹ 45,000

(c) ₹ 37,910

(d) none of the above

8. A bank offers 12% compound interests payable quarterly. If you deposit ₹ 2,000 now, how much it will grow at the end of 5 years?

(a) ₹ 3,050

(b) ₹ 3,430

(c) ₹ 3,612

(d) ₹ 3,722

9. A company wants to repay a loan of ₹ 5,00,000, 10 years from today. What amount should it invest each year for 10 years if the funds can earn 8% per annum. The first investment will be made at the beginning of this year.

(a) ₹ 50,000

(b) ₹ 31,950

(c) ₹ 40,000

(d) ₹ 32,950

10. Risk of two securities having different expected return can be compared with

(a) standard deviation of securities

(b) variance of securities

(c) coefficient of variation

(d) mean

11. A portfolio consists of two securities and the expected return on two securities is 12% and 16% respectively. Calculate return of portfolio if first security accounts for 40% of portfolio.

(a) 14%

(b) 14.4%

(c) 16%

(d) 12%

12. If the rate of interest is 12%, what are the doubling periods as per the rule 72 and the rule of 69 respectively?

    (a) 5 Years and 5.2 Years

    (b) 5.8 Years and 5.3 Years

    (c) 6 Years and 6.1 Years

    (d) 6.5 Years and 6.6 Years

13. To create a minimum variance portfolio, in what proportion should the two securities be mixed if the following information is given S1 = 10%, S2 = 12%, P12 = 0.6?

    (a) 0.72 and 0.28

    (b) 0.70 and 0.30

    (c) 0.60 and 0.40

    (d) 0.50 and 0.40

14. A portfolio consisting of two risky securities can be made risk less i.e., Sp = 0, if

    (a) the securities are perfectly positively correlated

    (b) the securities are perfectly negatively correlated

    (c) if the correlation ranges between 0 to 1

    (d) if the correlation ranges between -1 to +1

15. Efficient portfolios are those portfolios, which offer (for a given level of risk)

    (a) maximum return

    (b) minimum return

    (c) average return

    (d) positive return

16. CAPM accounts for -

    (a) systematic risk

    (b) unsystematic risk

    (c) both of the above

    (d) moderate risk

17. Calculate the future value of ₹1,000 invested in State Bank Cash Certificate scheme for 2 years @5.5% p.a., compounded semi- annually.

    (a) ₹ 1,114.62

    (b) ₹ 1,104.62

    (c) ₹ 1,401.51

    (d) ₹ 1,141.51

18. MAYANK Ltd. employs 12% as nominal required rate of return to evaluate its new investment projects. In the recent meeting of the Board of Directors, it has been decided to protect the interest of shareholders against purchasing power loss due to inflation. The expected inflation rate in the economy is 5%. What is the real discount rate?

    (a) 6.67%

    (b) 6%

    (c) 5%

    (d) 6.5

19. Which of the following is the main objective of financial management?

    (a) Revenue Maximisation

    (b) Profit Maximisation

    (c) Wealth Maximisation

    (d) Cost Minimisation

20. Which one of the following activities is outside the purview of financing decision in financial management?

    (a) Identification of the source of funds

    (b) Measurement of the cost of funds

    (c) Deciding on the time of raising the funds

    (d) Deciding on the utilization of the funds

21. *"Shareholders' wealth"* in a firm is reflected by:

    (a) the number of people employed in the firm.

    (b) the book value of the firm's assets less the book value of its liabilities.

    (c) the amount of salary paid to its employees.

    (d) the market price per share of the firm

22. Objective of Financial Management is

    (a) Management of Liquidity

    (b) Maximization of Profit

    (c) Maximization of Shareholders' Wealth

    (d) Management of Fixed Assets

23. The traditional view of financial management looks at :

    (a) Arrangement of short-term and long-term funds from financial institutions.

    (b) Mobilisation of funds through financial instruments

    (c) Orientation of Finance function with Accounting function

    (d) All of the above

24. Calculate the future value of ₹ 1,000 invested in State Bank Cash Certificate scheme for 2 years @ 5.5% p.a., compounded semi-annually.

    (a) ₹ 1,114.62

    (b) ₹ 1,104.62

    (c) ₹ 1,401.51

    (d) ₹ 1,141.51.

25. From the following select one factor which is application of fund.

    (a) Issue of share capital

    (b) Decrease in working capital

    (c) Increase in working capital

    (d) None of the above

26. Which of the following are sources of funds?

    (a) Issue of bonus shares

    (b) Issue of shares against the purchase of fixed assets

    (c) Conversion of debentures into shares

    (d) None of the above

27. A risk associated with project and way considered by well diversified stockholder is classified as

    (a) expected risk

    (b) beta risk

    (c) industry risk

    (d) returning risk

28. Which of the following are treated as long term investments?

    (a) Non-current investments

    (b) Trade Investments

    (c) Sinking fund investments

    (d) All of the above

29. Investment decision is concerned with :

    (a) Selection of asset in which funds will be invested by a firm

    (b) Capital- mix or capital structure of a firm

    (c) Distribution of profits of a firm to the shareholders

    (d) None of the above

30. Profit Maximization is the main objective of business because:
    (a) Profit acts as a measure of efficiency
    (b) It serves as a protection against risk.
    (c) Both
    (d) none
31. Stock holder's wealth = _____
    (a) No. of shares owned × Current stock price per share
    (b) No. of debentures × Current stock price per share
    (c) No. of bonus shares × Current stock price per share
    (d) none
32. Working Capital Management refers to a Trade-off between ------and Profitability.
    (a) Liquidity
    (b) Risk
    (c) Both of the above
    (d) None of the above
33. Which one of the following is a medium term source?
    (a) Public Deposits
    (b) Lease Financing
    (c) Euro Debt Issue
    (d) All of the above
34. The lease period in such a contract is less than the useful life of asset. Here we are talking about ___.
    (a) Operating or Service Lease
    (b) Service Lease
    (c) Financial Lease
    (d) None of the above
35. Which one is the Benefit(s) of Factoring?
    (a) Better Cash Flows
    (b) Better Assets Management
    (c) Better Working Capital Management
    (d) All of the above
36. Find the present value of ₹ 1,000 receivable 6 years hence if the rate of discount is 10 percent.
    (a) 564.5
    (b) 554.5
    (c) 574.5
    (d) 600

37. The term _____means manipulation of accounts in a way so as to conceal vital facts and present the financial statements in a way to show a better position than what it actually is.

    (a) window dressing

    (b) creative accounting

    (c) window accounting

    (d) modified accounting

38. Collateralized borrowing and lending obligation (CBLO) is a discounted instrument available in electronic book entry for the maturity period ranging from ----------.

    (a) 1 day to 19 days

    (b) 1 day to 15 days

    (c) 1 day to 30 days

    (d) None of the above

39. IPO refers to ____; the first time a company comes to public to raise money.

    (a) Immediate Public Offer

    (b) Immediate Public Offering

    (c) Initial Public Offer

    (d) Initial Public Offering

40. SPO refers to ____, the second and subsequent time a company raises money from the public directly.

    (a) Second Public Offering

    (b) Subsequent Public Offering

    (c) Subsequent Public Offer

    (d) Secondary Public Offering

41. Liquid Liability = Current Liability – Bank Overdraft – _____

    (a) Cash Credit

    (b) Trade Credit

    (c) Both of the above

    (d) None of the above

Answers:

1	**a**	**2**	**c**	**3**	**b**	**4**	**b**	**5**	**c**	**6**	**b**
7	**c**	**8**	**c**	**9**	**b**	**10**	**c**	**11**	**b**	**12**	**c**
13	**a**	**14**	**b**	**15**	**a**	**16**	**a**	**17**	**a**	**18**	**a**
19	**c**	**20**	**d**	**21**	**d**	**22**	**c**	**23**	**d**	**24**	**a**

25	c	26	d	27	b	28	d	29	a	30	c
31	a	32	c	33	d	34	a	35	d	36	a
37	a	38	a	39	d	40	d	41	a		

State True or False

1. Time value of money signifies that the value of a unit of money remains unchanged during different time periods.
2. Time value of a unit of money is different over different periods on account of the reinvestment opportunities with the firms.
3. Cash flows accruing to the firms at different time periods are directly comparable.
4. Either compounding or discounting technique can be used, to make heterogeneous cash flows comparable.
5. Effective and nominal rate of interest remain the same irrespective of the frequency of compounding.
6. Effective rate of interest is positively correlated with frequency of compounding.
7. To arrive at the present value of cash flows, discounting is done at the rate which represents opportunity cost of funds.
8. Present value tables for annuity can be directly applied to mixed stream of cash flows.
9. To facilitate comparison of cashflows that are occurring at different time periods, the technique of either compounding all cash flows to the terminal year or discounting all cash flows to the time zero period can be adopted.
10. Return on any financial asset consists of current yield and capital yield.
11. Risk of an individual financial asset refers to variability of its returns around its mean returns.
12. Return of a portfolio is simply weighted average of returns on individual securities in the portfolio multiplied by their corresponding proportions (weights) in the portfolio.
13. For a given correlation coefficient, a minimum variance portfolio can be created, for which risk of portfolio will be less than the risk of any security in the portfolio.
14. Correlation among the securities in the portfolio has nothing to do with the risk of portfolio.
15. If a portfolio consists of two securities, which are perfectly positively correlated, the risk of portfolio will simply be the weighted average of the standard deviations of individual securities.
16. A portfolio consisting of two risky securities can be made riskless, if the securities are perfectly negatively correlated.
17. Efficient frontier consists of those portfolios which offer maximum risk for a given level of expected returns.
18. In CAPM, Beta represents total risk, i.e., systematic and unsystematic risk.
19. The point of tangency between the efficient frontier and risk-return indifference curve provides optimal portfolio for the investor concerned.
20. Security market line (SML) and Capital market line (CML) are the same.

Answers:

1	2	3	4	5	6	7	8	9	10
F	T	F	T	F	T	T	F	T	T
11	12	13	14	15	16	17	18	19	20
T	T	T	F	T	T	F	F	T	F

Fill in the Blanks

1. The main objectives of financial management may be classified into: _____.
2. Higher the stock price per share, the greater will be the _____.
3. _____ is the annual growth of investments over a specific period of time.
4. _____ objective is preferred by shareholders.
5. _____ is an annuity that occurs indefinitely.
6. _____ is after the fact return -return that was earned or could have been earned.
7. _____ represents that portion of Total Risk which is attributable to factors that affect the market as a whole.
8. _____ is the erosion in the value of money due to the effects of inflation.
9. In finance, _____ is the risk that a given security or asset cannot be traded quickly enough in the market to prevent a loss (or make the required profit).

Answers:

1	Profit maximization and Value/Wealth maximization.	2	shareholder's wealth
4	Compound Annual Growth Rate (CAGR)	4	Wealth maximization
5	Perpetuity	6	Realised return
7	Systematic Risk	8	Purchasing Power Risk
9	liquidity risk		

Short Essay Type Questions

1. Define financial management and state its objectives.
2. Narrate the scope of financial management.
3. Explain the functions of financial management.
4. What do you understand by risk and return?
5. What are the different measures of return? Compare them.
6. What is the Capital Asset Pricing Model?
7. Write short notes on Future Value and Present Value of a Single Cash Flow.

8. What do you mean by Ex–ante and Ex–post Return?
9. Distinguish between Profit Optimization and Value Maximization Principles.
10. What is Compound Annual Growth Rate (CAGR)?
11. What do you mean by Annuity and Perpetuity?

⊙ Essay Type Questions

1. Explain the concept of time value of money with appropriate example.
2. Discuss the three broad areas of financial decision making.
3. Discuss in brief the dynamic role of CFO of a MNC.
4. 'The basic rationale for the objective of Shareholder Wealth Maximization is that it reflects the most efficient use of society's economic resources and thus leads to a maximization of society's economic wealth' (Ezra Solomon). Comment critically

B. Numerical Questions:

⊙ Comprehensive Numerical Problems

1. Mrs. P deposited ₹ 1,00,000 on January 2024 in a fixed deposit scheme with a nationalised bank for five years. The maturity value of the fixed deposit is ₹ 2,00,000. Compute the rate of interest compounded annually.
2. A company has issued debentures of ₹ 50 lakh to be repaid after 7 years. How much should the company invest in a sinking fund earning 12 % in order to be able to repay debentures?
3. XYZ Ltd. has borrowed ₹ 5,00,000 to be repaid in five equal annual payments (interest and principal both). The rate of interest is 16%. Compute the amount of each payment.
4. The ABC Ltd. company expects to receive ₹ 1,00,000 for a period of 10 years from a new project it has just undertaken. Assuming a 10 % rate of interest, how much would be the present value of this annuity?
5. A life insurance company offers a 10-year single premium plan. According to the policy conditions, the investor has to pay ₹ 1,00,000 at the beginning of first year and he will receive a pension of ₹ 16,000 at the beginning of the second year onwards. What will be the yield generated by the investor?
6. Share of a company is traded at ₹ 60. An investor expects the company to pay dividend of ₹ 3 per share, from one year now. The expected price one year now is ₹ 78.50.
   (a) What is the expected dividend yield, rate of price change and holding period yield?
   (b) If the beta of the share is 1.5, risk free rate is 6 % and the market risk premium is 10%, then calculate the required rate of return.

Answer:

1	14.86%	2	₹ 4.96 lakh
3	₹ 1,52,704.39	4	₹ 6,14,500
5	9.60%	6	(a) 5%, 30.83% and 35.83%; (b) 21%

Unsolved Case(s)

1. You want to borrow ₹ 30 lakh to buy a flat. You approach a bank which charges 13% interest. You can pay ₹4 lakh per year towards loan amortisation. What should be loan amortization period? .
2. Mr. X is the Chief Financial Officer (CFO) of ABC Ltd. in Kolkata. His company has performed in line with expectations over the past year. He is currently preparing a financial blue print for the next five years. First, he tried to forecast sales for the next five years. This is so because fixed and working capital needs depend on sales. Therefore, these two items are estimated. He also collected data on possible profits in the coming years. In this way, one can know how much money the company will provide. The remaining funds are arranged externally by the company. He is also considering seeking funding from outside the company. Identify the concept referred to in the above case and write any two points of importance of the financial concept, so identified.
3. After completing her MBA, Mrs. R. Sharma took over the family food processing business manufacturing pickles, jams and squashes. Started by her grandmother, the company was doing well, but had very high fixed operating costs and poor cash flow. Now, she wants to modernize and diversify it. She approached a financial consultant, who told her that approximately ₹ 50 lakh would be required for modernization and expansion programme. He also informed her that the stock market was going through a bullish phase.
   (a) After considering the above discussion, name the source of finance Mrs. Sharma should not choose for financing the modernization and expansion of her food processing business. Give one reason in support of your answer.
   (b) Explain two other factors she should keep in mind while taking this decision.
4. Given the uneven streams of cash flows shown in the following table:

Cash Flow Stream

End of Year	A (₹)	B (₹)
1	50,000	10,000
2	40,000	20,000
3	30,000	30,000
4	20,000	40,000
5	10,000	50,000
Total	**1,50,000**	**1,50,000**

Answer the following:

(a) Find the present value of each stream, using a 10% discount rate.

(b) Compare the calculated present values, and discuss them in light of the fact that the undiscounted total cash flows amount to ₹ 150,000 in each case.

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Institutions and Instruments in Financial Markets

2

This Module Includes

2.1 Financial Institutions

2.2 Capital Market

2.3 Money Market

Institutions and Instruments in Financial Markets

SLOB Mapped against the Module:

To obtain an overview of financial institutions and their role in business, financial markets and the instruments traded therein through which a business procure capital for short term, medium term and long term.

Module Learning Objectives:

After studying this module, the students will be able to –

- Provide a basic concept, structure, function of different financial institutions like Reserve Bank of India, Commercial Banks, NBFCs, Insurance Companies;
- Understand the concept of Pensions Funds;
- Explain the function of Alternative Investment Funds (AIF): Angles, Venture Capital, Private Equity and Hedge Funds;
- Know about SEBI Regulations (including AIF Circulars);
- Discuss the concept and functions of Capital Market;
- Explain Primary and secondary markets and its instruments;
- Provide an introduction to Compulsory / Optionally convertible financial instruments, Deep discount bonds;
- Know about Euro Bond and Masala Bond;
- Explain Rolling Settlement, Clearing House Operations;
- Explain Dematerialization, Re-materialization and Depository System;
- Discuss on Initial Public Offering (IPO), Follow on Public Offer (FPO), Book Building, Green-shoe Option;
- Explain the concept of Offer for Sale, Private Placement and Preferential allotment;
- Know the issues relating Insider trading;
- Explain the concept of Credit Rating - Credit Rating Methods and Rating Agencies in India;
- Discuss the concept and functions of Money Market;
- Explain the nature and types Call money, Treasury Bills, Commercial Bills, Commercial Paper, Certificate of Deposits;
- Equip themselves with detail understanding of the concept of Repo and Reverse Repo;
- Understand the concept of Promissory Notes and Government Securities.

Financial Institutions

2.1

Functional approach, financial markets facilitate the flow of funds in order to finance investments by corporations, governments and individuals. Financial institutions arhe financial system plays the key role in the economy by stimulating economic growth, influencing economic performance of the actors, affecting economic welfare.

According to the **structural approach**, the financial system of an economy consists of three main components:

(a) Financial markets;

(b) Financial intermediaries Institutions;

(c) Financial regulators.

Each of the components plays a specific role in the economy.

According to the **functional approach, financial markets** facilitate the flow of funds in order to finance investments by corporations, governments and individuals. **Financial institutions** are the key players in the financial markets as they perform the function of intermediation and thus determine the flow of funds. The **financial regulators** perform the role of monitoring and regulating the participants in the financial system.

Financial Institutions

Financial Institutions are the business organisations that act as mobilisers of savings, and as purveyors of credit or finance. They also provide various financial services to the community. The financial institutions are classified into banking institutions and non-banking institutions.

(i) Banking Financial Institutions

Banking institutions are those institutions, which participate in the economy's payment system, i.e., they provide transaction services. Their deposit liabilities constitute a major part of the national money supply and they can, as a whole, create deposits or credit, which is money.

(ii) Non-Banking Financial Institutions

Non-banking financial institutions are those institutions which act as mere purveyors of credit and they will not create credit, e.g., LIC, UTI, IDBI.

According to Sayers, banking institutions are 'creators' of credit and NBFIs are mere "purveyors" of credit.

The financial institutions are also classified into financial intermediaries and non-financial intermediaries.

(a) **Financial Intermediaries** Financial intermediaries are those institutions which are intermediate between savers and investors; they lend money as well as mobilize savings, their liabilities are towards the ultimate savers, while their assets are from the investors or borrowers.

(b) **Non-financial Intermediaries** Non-financial intermediaries are those institutions which do the loan business but their resources are not directly obtained from the savers. Many non-banking institutions also act as intermediaries and when they do so they are known as non-banking financial intermediaries, e.g. LIC, GIC, IDBI, IFCI, NABARD.

2.1.1 Reserve Bank of India

The Reserve Bank of India (RBI) is the nation's central bank. Since 1935, RBI began operations, and stood at the centre of India's financial system, with a fundamental commitment to maintaining the nation's monetary and financial stability. From ensuring stability of interest and exchange rates to providing liquidity and an adequate supply of currency and credit for the real sector; from ensuring bank penetration and safety of depositors' funds to promoting and developing financial institutions and markets, and maintaining the stability of the financial system through continued macro-financial surveillance, the Reserve Bank plays a crucial role in the economy. Decisions adopted by RBI touch the daily life of all Indians and help chart the country's current and future economic and financial course.

Table 2.1 RBI at a Glance

RBI at a Glance
• Managed by Central Board of Directors
• India's monetary authority to supervise financial system and issuer of currency
• Manager of foreign exchange reserves
• Banker and debt manager to government
• Supervisor of payment system
• Banker to banks
• Maintaining financial stability
• Developmental functions
• Research, data and knowledge sharing

A. Structure, Organisation and Governance of RBI

The Reserve Bank is wholly owned by the Government of India. The Central Board of Directors oversees the Reserve Bank's business. The Central Board has primary authority for the oversight of the Reserve Bank. It delegates specific functions through its committees and sub-committees Central Board includes the Governor, Deputy Governors and a few Directors (of relevant local boards). The Central Board of Directors includes:

Official Directors

- 1 Governor
- 4 Deputy Governors at a maximum

Non-official Directors

- 4 Directors – nominated by the Central Government to represent each local board
- 10 Directors nominated by the Central Government with expertise in various segments of the economy
- 2 representatives of the Central Government

Holding of Meetings of the Board

- 6 meetings – at a minimum – each year
- 1 meeting – at a minimum – each quarter

Committee of Central Board: Oversees the current business of the central bank and typically meets every week, on Wednesdays. The agenda focuses on current operations, including approval of the weekly statement of accounts related to the issue of Banking Departments.

Board of Financial Supervision: Regulates and supervises commercial banks, Non-Banking Finance Companies (NBFCs), development finance institutions, urban co-operative banks and primary dealers.

Board of Payment and Settlement Systems: Regulates and supervises the payment and settlement systems.

Sub-Committees of the Central Board: Includes those on Inspection and Audit; Staff; and Building. Focus of each sub-committee is on specific areas of operations.

Local Boards: In Chennai, Kolkata, Mumbai and New Delhi, representing the country's four regions. Local Board members, appointed by the Central Government for four-year terms, represent regional and economic interests and the interests of co-operative and indigenous banks.

B. Management and Structure

The Governor is the Reserve Bank's Chief Executive. The Governor supervises and directs the affairs and business of the Reserve Bank. The management team also includes Deputy Governors and Executive Directors.

The RBI has the following Departments and sub-departments:

Main Activities/Functions of RBI

The Reserve Bank is the umbrella network for numerous activities, all related to the nation's financial sector, encompassing and extending beyond the functions of a typical central bank. Main activities or functions of Reserve Bank are:

(i) Monetary Authority

(ii) Issuer of Currency

(iii) Banker and Debt Manager to Government

(iv) Banker to Banks

(v) Regulator of the Banking System

(vi) Foreign Exchange Management

(vii) Regulator and Supervisor of the Payment and Settlement Systems

(viii) Maintaining Financial Stability

(ix) Financial Inclusion and Developmental Role

(i) Monetary Authority

The Reserve Bank of India controls the credit and formulates monetary policy. Monetary policy refers to the use of instruments under the control of the central bank to regulate the availability, cost and use of money and credit.

The main objectives of monetary policy in India are:

- Maintaining price stability
- Ensuring adequate flow of credit to the productive sectors of the economy to support economic growth
- Financial stability

The relative emphasis among the objectives varies from time to time, depending on evolving macroeconomic developments.

The Reserve Bank's Monetary Policy Department (MPD) formulates monetary policy. The Financial Markets Department (FMD) handles day-to-day liquidity management operations. There are several direct and indirect instruments that are used in the formulation and implementation of monetary policy.

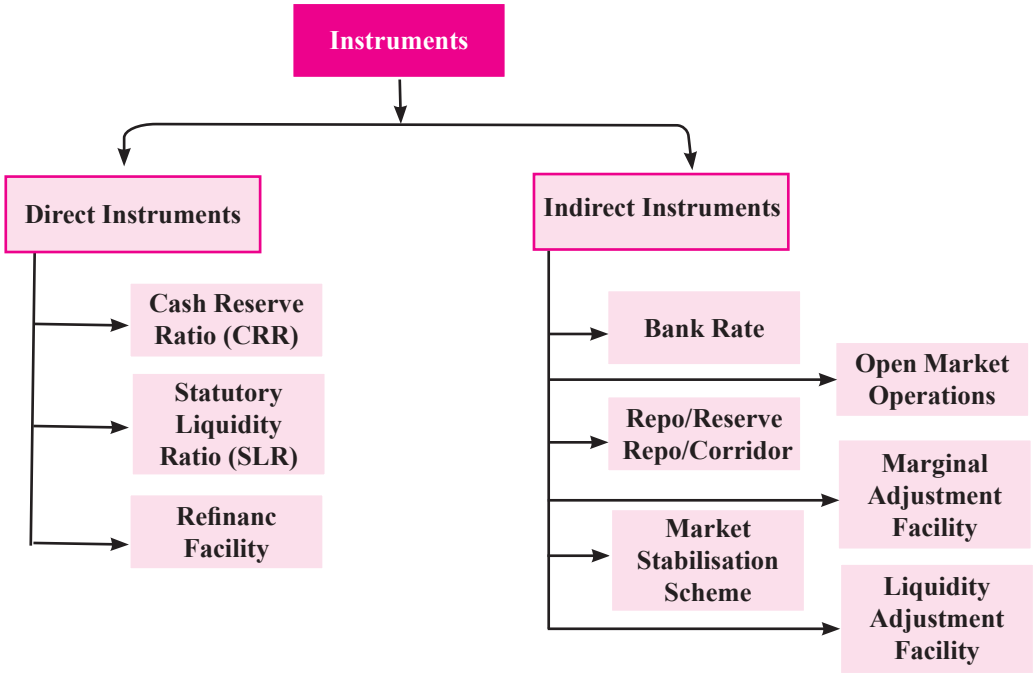

Figure 2.1(a): Different types of Instrument

The instruments are discussed in detail hereunder:

(I) Direct Instruments

(a) **Cash Reserve Ratio (CRR):** The share of **net demand and time liabilities** (NDTL) that banks must maintain as cash balance with the Reserve Bank. The Reserve Bank requires banks to maintain a certain amount of cash in reserve as percentage of their deposits to ensure that banks have sufficient cash to cover customer withdrawals. The adjustment of this ratio, is done as an instrument of monetary policy, depending on prevailing conditions.

(b) **Statutory Liquidity Ratio (SLR):** The share of net demand and time liabilities that banks must maintain in safe and liquid assets, such as government securities, cash and gold.

(c) **Refinance Facilities:** Sector-specific refinance facilities (e.g., against lending to export sector) provided to banks exchange or other commercial papers. It also signals the medium-term stance of monetary policy.

(II) Indirect Instruments

(a) **Liquidity Adjustment Facility (LAF):** Consists of daily infusion or absorption of liquidity on a (repurchase basis, through repo (liquidity injection) and reverse repo (liquidity absorption) auction operations, using government securities as collateral.

(b) **Repo Rate: T**he (fixed) interest rate at which the Reserve Bank provides overnight liquidity to banks against the collateral of government and other approved securities under the liquidity adjustment facility (LAF).

(c) **Reverse Repo Rate:** The (fixed) interest rate at which the Reserve Bank absorbs liquidity, on an overnight basis, from banks against the collateral of eligible government securities under the LAF. These rates under the Liquidity Adjustment Facility (LAF) determine the corridor for short-term money market interest rates. In turn, this is expected to trigger movement in other segments of the financial market and the real economy.

(d) **Corridor**: The MSF rate and reverse repo rate determine the corridor for the daily movement in the weighted average call money rate.

e) **Open Market Operations (OMO):** Outright sales/purchases of government securities, in addition to LAF, as a tool to determine the level of liquidity over the medium term.

(f) **Marginal Standing Facility (MSF):** was instituted under which scheduled commercial banks can borrow over night at their discretion up to one per cent of their respective NDTL at 100 basis points above the repo rate to provide a safety value against unanticipated liquidity shocks.

(g) **Bank Rate:** It is the rate at which the Reserve Bank is ready to buy or rediscount bills of exchange or other commercial papers. It also signals the medium-term stance of monetary policy. The Bank Rate is published under Section 49 of the Reserve Bank of India Act, 1934. This rate has been aligned to the MSF rate and, therefore, changes automatically as and when the MSF rate changes alongside policy repo rate changes.

(h) **Market Stabilisation Scheme (MSS):** This instrument for monetary management was introduced in 2004. Liquidity of a more enduring nature arising from large capital flows is absorbed through sale of short-dated government securities and treasury bills. The mobilized cash is held in a separate government account with the Reserve Bank. Market Stabilisation Scheme

(ii) Issuer of Currency

The Reserve Bank is the nation's sole note issuing authority. Along with the Government of India, RBI is responsible for the design and production and overall management of the nation's currency, with the goal of ensuring an adequate supply of clean and genuine notes. The Department of Currency Management at Central Office, Mumbai, in cooperation with the Issue Departments of the Reserve Bank's Regional Offices across India oversees currency management. The function includes supplying and distributing adequate quantity of currency throughout the country and ensuring the quality of banknotes in circulation by continuous supply of clean notes and timely withdrawal of soiled notes. Indirect Instrument.

(iii) Banker and Debt Manager to Government

The role as banker and debt manager to government includes several distinct functions:

(a) Undertaking banking transactions for the central and state governments to facilitate receipts and payments and maintaining their accounts.

(b) Managing the governments' domestic debt with the objective of raising the required amount of public debt in a cost-effective and timely manner.

(c) Developing the market for government securities to enable the government to raise debt at a reasonable cost, provide benchmarks for raising resources by other entities and facilitate transmission of monetary policy actions.

At the end of each day, RBI's electronic system automatically consolidates all of the government's transactions to determine the net final position. If the balance in the government's account shows a negative posi- tion, RBI extends a short-term, interest-bearing advance, called a Ways and Means Advance-WMA-the limit or amount for which is set at the beginning of each financial year in April.

(iv) Banker to Banks

As Banker to banks, the Reserve Bank provides short-term loans and advances to select banks, when necessary, to facilitate lending to specific sectors and for specific purposes.

As the banker to banks, RBI focus on:

(a) Enabling smooth, swift and seamless clearing and settlement of inter-bank obligations.

(b) Providing an efficient means of funds transfer for banks.

(c) Enabling banks to maintain their accounts with us for purpose of statutory reserve requirements and maintain transaction balances.

(d) Acting as lender of the last resort.

The Reserve Bank provides products and services for the nation's banks similar to what banks offer their own customers.

(v) Regulator of the Banking System

The Reserve Bank regulates and supervises the nation's financial system. Different departments of the Reserve Bank oversee the various entities that comprise India's financial infrastructure. RBI oversees:

(a) **Commercial Banks and All-India Development Financial Institutions:** Regulated by the Department of Banking Operations and Development, supervised by the Department of Banking Supervision.

(b) **Urban Co-operative Banks:** Regulated and supervised by the Urban Banks Department.

(c) **Regional Rural Banks (RRB), District Central Cooperative Banks and State Co-operative Banks:** Regulated by the Rural Planning and Credit Department and supervised by NABARD.

(d) **Non-Banking Financial Companies (NBFC):** Regulated and supervised by the Department of Non-Banking Supervision.

The Reserve Bank makes use of several supervisory tools:

(a) On-site inspections

(b) Off-site surveillance, making use of required reporting by the regulated entities.

(c) Thematic inspections, scrutiny and periodic meetings

(vi) Foreign Exchange Management

With the transition to a market-based system for determining the external value of the Indian rupee, the foreign exchange market in India gained importance in the early reform period. In recent years, with increasing

integration of the Indian economy with the global economy arising from greater trade and capital flows, the foreign exchange market has evolved as a key segment of the Indian financial market.

The Reserve Bank plays a key role in the regulation and development of the foreign exchange market and assumes three broad roles relating to foreign exchange:

(a) Regulating transactions related to the external sector and facilitating the development of the foreign exchange market.

(b) Ensuring smooth conduct and orderly conditions in the domestic foreign exchange market.

(c) Managing the foreign currency assets and gold reserves of the country.

(vii) Regulator and Supervisor of Payment and Settlement Systems

Payment and settlement systems play an important role in improving overall economic efficiency. They consist of all the diverse arrangements that we use to systematically transfer money - currency, paper instruments such as cheques, and various electronic channels.

The Payment and Settlement Systems Act of 2007 (PSS Act) gives the Reserve Bank oversight authority, including regulation and supervision, for the payment and settlement systems in the country. In this role, RBI focus on the development and functioning of safe, secure and efficient payment and settlement mechanisms.

The various systems used are as follows:

(i) **Retail payment systems:** Facilitating cheque clearing, electronic funds transfer, through National Electronic Funds Transfer (NEFT), settlement of card payments and bulk payments, such as electronic clearing services. Operated through local clearing houses throughout the country.

(ii) **Large Value Systems:** Facilitating settlement of inter-bank transactions from financial markets.

These include:

(a) **Real Time Gross Settlement System (RTGS):** For funds transfers

(b) **Securities Settlement System:** For the government securities market.

(c) **Foreign Exchange Clearing:** For transactions involving foreign currency.

(d) **Department of Payment and Settlement Systems:** The Reserve Bank's payment and settlement systems regulatory arm.

(e) **Department of Information Technology:** Technology support for the payment systems and for the Reserve Bank's internal IT systems.

(viii) Maintaining Financial Stability

Pursuit of financial stability has emerged as a key critical policy objective for the central banks in the wake of the recent global financial crisis. Central banks have a critical role to play in achieving this objective. Though financial stability is not an explicit objective of the Reserve Bank in terms of the Reserve Bank of India Act, 1935, it has been an explicit objective of the Reserve Bank since the early 2000s.

In 2009, the Reserve Bank set up a dedicated Financial Stability Unit mainly to, put in place a system of continuous monitoring of the macro financial system. The department's activities include:

(a) Conduct of macro-prudential surveillance of the financial system on an ongoing basis.

(b) Developing models for assessing financial stability in going forward.

(c) Preparation of half yearly financial stability reports.

(d) Development of a database of key variables which could impact financial stability, in co-ordination with the supervisory wings of the Reserve Bank.

(e) Development of a time series of a core set of financial indicators.

(f) Conduct of systemic stress tests to assess resilience.

Following the establishment of the Financial Stability Unit, the Reserve Bank started publishing periodic financial stability reports, with the first Financial Stability Report (FSR) being published in March 2010.

FSRs are now being published on a half yearly basis - in June and December every year. Internally, quarterly Systemic Risk Monitors and monthly Market Monitors are prepared to place before the Bank's Top Management a more frequent assessment of the risks to systemic stability of the economy.

(ix) Financial Inclusion and Development Role

Over the years, the Reserve Bank has added new institutions as the economy has evolved. Some of the institutions established by the RBI include:

(a) Deposit Insurance and Credit Guarantee Corporation (1962), to provide protection to bank depositors and guarantee cover to credit facilities extended to certain categories of small borrowers.

(b) Unit Trust of India (1964), the first mutual fund of the country. Industrial Development Bank of India (1964), a development finance institution for industry.

(c) National Bank for Agriculture and Rural Development (1982), for promoting rural and agricultural credit.

(d) Discount and Finance House of India (1988), a money market intermediary and a primary dealer in government securities.

(e) National Housing Bank (1989), an apex financial institution for promoting and regulating housing finance.

(f) Securities and Trading Corporation of India (1994), a primary dealer.

The Reserve Bank continues its developmental role, while specifically focusing on financial inclusion. Key tools in this on-going effort include:

- **Directed Credit for lending to Priority Sector and Weaker Sections:** The goal here is to facilitate/ enhance credit flow to employment intensive sectors such as agriculture, micro and small enterprises (MSE), as well as for affordable housing and education loans.
- **Lead Bank Scheme:** A commercial bank is designated as a lead bank in each district in the country and this bank is responsible for ensuring banking development in the district through coordinated efforts between banks and government officials. The Reserve Bank has assigned a Lead District Manager for each district who acts as a catalytic force for promoting financial inclusion and smooth working between government and banks.
- **Sector Specific Refinance:** The Reserve Bank makes available refinance to banks against their credit to the export sector. In exceptional circumstances, it can provide refinance against lending to other sectors.
- **Strengthening and Supporting Small Local Banks:** This includes regional rural banks and cooperative banks.
- **Financial Inclusion:** Expanding access to finance and promoting financial literacy are a part of our outreach efforts.

RBI's work to promote financial literacy focuses on educating people about responsible financial management. Efforts here include:

- **Information and Knowledge-sharing:** User-friendly website includes easy-to-understand tips and guidance in multiple languages, brochures, advertisements and other marketing materials educate the public about banking services.
- **Credit Counseling**: The Reserve Bank encourages commercial banks to set up financial literacy and credit counseling centres, to help people develop better financial planning skills.

2.1.2 Commercial Banks

Commercial banks are a part of an organized money market in India. Commercial banks are joint stock companies dealing in money and credit that accept demand deposits from public which are withdraw able by cheques and use these deposits for lending to others. Deposits are accepted from large group of people in forms of money and deposits are withdrawable on demand. Commercial banks mobilize savings in urban and rural areas and make them available to large and small industrial units and trading units mainly for working capital requirements. Commercial banks provide various types of financial services to customers in return of fees.

Types of Commercial Banks

Commercial banks are classified into:

(A) Scheduled Commercial Banks

A scheduled bank is so called because it has been included in the Schedule-II of the Reserve Bank of India Act,

1934. To be eligible for this inclusion, a bank must satisfy the following three conditions: -

(i) It must have a paid-up capital and reserves of an aggregate value of at least ₹ 5.00 lakh.

(ii) It must satisfy the RBI that its affairs are not conducted in a manner damaging to the interests of its depositors; and

(iii) It must be a corporation and not a partnership or a single-owner firm.

Scheduled banks enjoy certain advantages: - (i) Free / concessional remittance facilities through the offices of the RBI and its agents. (ii) Borrowings facilities from the RBI by depositing necessary documents. In return, the scheduled banks are under obligation to: -

(a) maintain an average daily balance of cash reserves with the RBI at rates stipulated by it; and

(b) submit periodical returns to the RBI under various provisions of the Reserve Bank of India Act, 1934 and the Banking Regulation Act, 1949 (as amended from time to time).

All commercial banks such as Indian, foreign, regional rural banks and state co-operative banks are scheduled banks.

It comprises of Public Sector Banks, Regional Rural Banks, Private Sector Banks, Small Finance Banks (SFBs), Scheduled Payments Banks and Foreign Banks.

(B) Non-scheduled Banks

Non-scheduled banks are also subject to the statutory cash reserve requirement. But they are not required to keep them with the RBI; they may keep these balances with themselves. They are not entitled to borrow from the RBI for normal banking purposes, though they may approach the RBI for accommodation under abnormal circumstances.

Commercial banks may be classified as (a) Indian and (b) foreign banks.

(a) Indian banks are those banks which are incorporated in India and whose head offices are in India.

(b) Foreign banks are those banks which are incorporated outside of India and whose head offices are in outside of India.

Both types of banks will have to maintain cash reserves with the RBI at rates stipulated by it. Besides, RBI can supervise over working of foreign banks operating in India.

Commercial banks may also be classified as (a) Private and (b) Public sector bank.

(a) Private sector banks are those banks whose at least 51% shares are holding by private sectors.

(b) Public sector banks are those banks which are not private sectors.

Functions of Commercial Banks

Functions of commercial banks can be divided in two groups–banking functions (primary functions) and non-banking functions (secondary functions).

A. Banking Functions (primary functions): Most of banking functions are: –

(a) **Acceptance of Deposits from Public**: - Bank accepts following deposits from publics: -

(i) Demand deposits can be in the form of current account or savings account. These deposits are withdrawable any time by depositors by cheques. Current deposits have no interest or nominal interest. Such accounts are maintained by commercial firms and business man. Interest rate of saving deposits varies with time period. Savings accounts are maintained for encouraging savings of households.

(ii) Fixed deposits are those deposits which are withdrawable only after a specific period. It earns a higher rate of interest.

(iii) In recurring deposits, people deposit a fixed sum every month for a fixed period of time.

(b) **Advancing Loans**: It extends loans and advances out of money deposited by public to various business units and to consumers against some approved. Usually, banks grant short-term or medium-term loans to meet requirements of working capital of industrial units and trading units. Banks discourage loans for consumption purposes. Loans may be secured or unsecured. Banks do not give loan in form of cash.

They make the customer open account and transfer loan amount in the customer's account.

Banks grant loan in following ways: –

(i) **Overdraft:** - Banks grant overdraft facilities to current account holder to draw amount in excess of balance held.

(ii) **Cash Credit**: - Banks grant credit in cash to current account holder against hypothecation of goods.

(iii) **Discounting Trade Bills**: - The banks facilitate trade and commerce by discounting bills of exchange.

(iv) **Term Loan**: - Banks grant term loan to traders and to agriculturists against some collateral securities.

(v) **Consumer Credit**: - Banks grant credit to households in a limited amount to buy durable goods.

(vi) **Money at Call or Short-term Advances**: - Banks grant loan for a very short period not exceeding 7 days to dealers / brokers in stock exchange against collateral securities.

(c) **Credit Creation**:- Credit creation is another banking function of commercial bank. i.e., it manufactures money.

(d) **Use of Cheque System:** - Banks have introduced the cheque system for withdrawal of deposits.

There are two types of cheques – bearer & cross cheque. A bearer cheque is encashable immediately at the bank by its possessor. A crossed cheque is not encashable immediately.

It has to be deposited only in the payee's account. It is not negotiable.

(e) **Remittance of Funds**: - Banks provides facilities to remit funds from one place to another for their customers by issuing bank drafts, mail transfer etc.

B. Non-Banking functions (secondary functions): Non-banking functions are (a) Agency services (b) General utility services

(a) **Agency Services:** - Banks perform following functions on behalf of their customers: -

(i) It makes periodic payments of subscription, rent, insurance premium etc as per standing orders from customers.

(ii) It collects bill, cheques, demand drafts, etc on behalf of their customers.

(iii) It acts as a trustee for property of its customers.

(iv) It acts as attorney. It can help in clearing and forwarding goods of its customers.

(v) It acts as correspondents, agents of their clients.

(b) **General Utility Services**: - General utility services of commercial banks are as follows: -

(i) Lockers are provided by bank to its customers at nominal rate.

(ii) Shares, wills, other valuables documents are kept in safe custody. Banks return them when demanded by its customers.

(iii) It provides travellers cheque and ATM facilities.

(iv) Banks maintain foreign exchange department and deal in foreign exchange.

(v) Banks underwrites issue of shares and debentures of concerns.

(vi) It compiles statistics and business information relating to trade and commerce.

(vii) It accepts public provident fund deposits.

2.1.3 Non-Banking Financial Companies (NBFCs)

Definition of Non-Banking Financial Companies (NBFCs)

A non-banking financial company has been defined vide clause (b) of Section 45–1 of Chapter IIIB of the Reserve Bank of India Act, 1934, as (i) a financial institution, which is a company; (ii) a non-banking institution, which is a company and which has as its principal business the receiving of deposits under any scheme or arrangement or in any other manner or lending in any manner; (iii) such other non-banking institutions or class of such institutions, as the bank may with the previous approval of the central government and by notification in the official gazette, specify.

NBFC has been defined under Clause (xi) of Paragraph 2(1) of Non-Banking Financial Companies Acceptance of Public Deposits (Reserve Bank) Directions, 1998, as: 'non-banking financial company' means only the non-

banking institution which is a loan company or an investment company or a hire purchase finance company or an equipment leasing company or a mutual benefit finance company.

Different Types/Categories of NBFCs registered with RBI

NBFCs are categorized a) in terms of the type of liabilities into Deposit and Non-Deposit accepting NBFCs, b) non deposit taking NBFCs by their size into systemically important and other non-deposit holding companies (NBFC-NDSI and NBFC-ND) and c) by the kind of activity they conduct.

Within this broad categorization the different types of NBFCs are as follows:

(i) **Asset Finance Company (AFC)** : An AFC is a company which is a financial institution carrying on as its principal business the financing of physical assets supporting productive/economic activity, such as automobiles, tractors, lathe machines, generator sets, earth moving and material handling equipments, moving on own power and general purpose industrial machines. Principal business for this purpose is defined as aggregate of financing real/physical assets supporting economic activity and income arising therefrom is not less than 60% of its total assets and total income respectively.

(ii) **Investment Company (IC)** : IC means any company which is a financial institution carrying on as its principal business the acquisition of securities,

(iii) **Loan Company (LC):** LC means any company which is a financial institution carrying on as its principal business the providing of finance whether by making loans or advances or otherwise for any activity other than its own but does not include an Asset Finance Company.

(iv) **Infrastructure Finance Company (IFC):** IFC is a non-banking finance company (a) which deploys at least 75 per cent of its total assets in infrastructure loans, (b) has a minimum Net Owned Funds of ₹ 300 crores, (c) has a minimum credit rating of 'A 'or equivalent (d) and a CRAR of 15%.

(v) **Systemically Important Core Investment Company (CIC-ND-SI):** CIC-ND-SI is an NBFC carrying on the business of acquisition of shares and securities which satisfies the following conditions:- (a) it holds not less than 90% of its Total Assets in the form of investment in equity shares, preference shares, debt or loans in group companies; (b) its investments in the equity shares (including instruments compulsorily convertible into equity shares within a period not exceeding 10 years from the date of issue) in group companies constitutes not less than 60% of its Total Assets; (c) it does not trade in its investments in shares, debt or loans in group companies except through block sale for the purpose of dilution or disinvestment; (d) it does not carry on any other financial activity referred to in Section 45I(c) and 45I(f) of the RBI act, 1934 except investment in bank deposits, money market instruments, government securities, loans to and investments in debt issuances of group companies or guarantees issued on behalf of group companies. (e) Its asset size is ₹ 100 crores or above and (f) It accepts public funds (vi) Infrastructure Debt Fund: Non- Banking Financial Company (IDF-NBFC): IDF-NBFC is a company registered as NBFC to facilitate the flow of long-term debt into infrastructure projects. IDF-NBFC raise resources through issue of Rupee or Dollar denominated bonds of minimum 5-year maturity. Only Infrastructure Finance Companies (IFC) can sponsor IDF-NBFCs.

(vi) **Infrastructure Debt Fund: Non- Banking Financial Company (IDF-NBFC):** IDF-NBFC is a company registered as NBFC to facilitate the flow of long-term debt into infrastructure projects. IDF-NBFC raise resources through issue of Rupee or Dollar denominated bonds of minimum 5-year maturity. Only Infrastructure Finance Companies (IFC) can sponsor IDF-NBFCs.

(vii) **Non-Banking Financial Company - Micro Finance Institution (NBFC-MFI):** NBFC-MFI is a non-deposit taking NBFC having not less than 85% of its assets in the nature of qualifying assets which satisfy the following criteria:

(a) Loan disbursed by an NBFC-MFI to a borrower with a rural household annual income not exceeding ₹ 1,00,000 or urban and semi-urban household income not exceeding ₹ 1,60,000;

(b) Loan amount does not exceed ₹ 50,000 in the first cycle and ₹ 1,00,000 in subsequent cycles;

(c) Total indebtedness of the borrower does not exceed ₹ 1,00,000;

(d) Tenure of the loan not to be less than 24 months for loan amount in excess of ₹ 15,000 with prepayment without penalty;

(e) Loan to be extended without collateral;

(f) Aggregate amount of loans, given for income generation, is not less than 50 per cent of the total loans given by the MFIs;

(g) Loan is repayable on weekly, fortnightly or monthly instalments at the choice of the borrower

(viii) **Non-Banking Financial Company – Factors (NBFC-Factors):** NBFC-Factor is a non-deposit taking NBFC engaged in the principal business of factoring. The financial assets in the factoring business should constitute at least 50 percent of its total assets and its income derived from factoring business should notbe less than 50 percent of its gross income.

(ix) **Mortgage Guarantee Companies (MGC):** MGC are financial institutions for which at least 90% of thebusiness turnover is mortgage guarantee business or at least 90% of the gross income is from mortgage guarantee business and net owned fund is ₹ 100 crore.

(x) **NBFC- Non-Operative Financial Holding Company (NOFHC):** It is the financial institution through which promoter / promoter groups will be permitted to set up a new bank. It's a wholly-owned Non-Operative Financial Holding Company (NOFHC) which will hold the bank as well as all other financial services companies regulated by RBI or other financial sector regulators, to the extent permissible under the applicable regulatory prescriptions.

Differences between Banks & NBFCs

NBFCs lend and make investments and hence their activities are akin to that of banks; however, there are a few differences as given below:

(i) NBFC cannot accept demand deposits;

(ii) NBFCs do not form part of the payment and settlement system and cannot issue cheques drawn on itself;

(iii) Deposit insurance facility of Deposit Insurance and Credit Guarantee Corporation is not available to depositors of NBFCs, unlike in case of banks.

Registration requirement of NBFCs

In terms of Section 45-IA of the RBI Act, 1934, no Non-banking Financial Company can commence or carry-on business of a non-banking financial institution without a) obtaining a certificate of registration from the Bank and without having a Net Owned Funds of ₹ 25 lakhs (rupees two crores since April 1999). However, in terms of the powers given to the Bank. to obviate dual regulation, certain categories of NBFCs which are regulated by other regulators are exempted from the requirement of registration with RBI viz. Venture Capital Fund/Merchant Banking companies/Stock broking companies registered with SEBI, Insurance Company holding a valid Certificate of Registration issued by IRDA, Nidhi companies as notified under Section 620A of the Companies Act, 1956, Chit companies as defined in clause (b) of Section 2 of the Chit Funds Act, 1982, Housing Finance Companies regulated by National Housing Bank, Stock Exchange or a Mutual Benefit company.

NBFCs- Exempted from Registration

Housing Finance Companies, Merchant Banking Companies, Stock Exchanges, Companies engaged in the business of stock-broking/sub-broking, Venture Capital Fund Companies, Nidhi Companies, Insurance companies and Chit Fund Companies are NBFCs but they have been exempted from the requirement of registration under Section 45-IA of the RBI Act,1934 subject to certain conditions.

Residuary Non-Banking Company (RNBC)

Residuary Non-Banking Company is a class of NBFC which is a company and has as its principal business the receiving of deposits, under any scheme or arrangement or in any other manner and not being Investment, Asset Financing, Loan Company. These companies are required to maintain investments as per directions of RBI, in addition to liquid assets. The functioning of these companies is different from those of NBFCs in terms of method of mobilization of deposits and requirement of deployment of depositors' funds as per Directions. Besides, Prudential Norms Directions are applicable to these companies also.

2.1.4 Insurance Companies

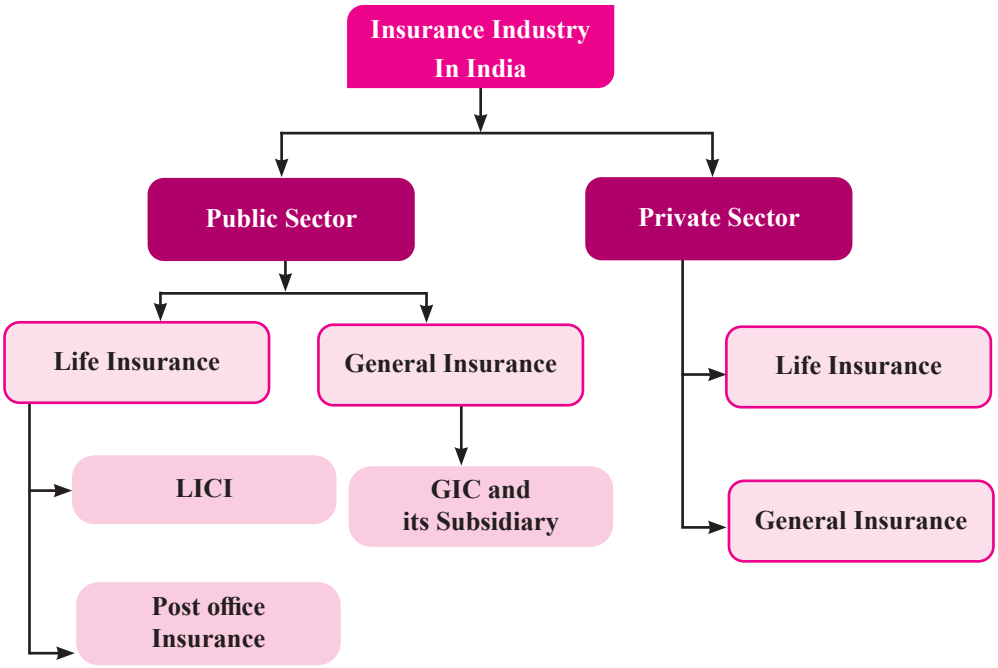

Figure 2.3: Types of Insurance Industry in India

The insurance companies are financial intermediaries as they collect and invest large amounts of premiums. They offer protection to the investors, provide means for accumulating savings, and channelise funds to the government, and other sectors.

The insurance companies are active in the following fields among other—life, health, and general, and they have begun to operate the pension schemes and mutual funds also. Insurance business consists of spreading risks over time and sharing them between persons and organisations. The major part of insurance business is life insurance, the operations of which depend on the laws of mortality.

The distinction between life and general insurance business is that with regard to the former, the claim is fixed and certain, but in the case of the latter, the claim is uncertain i.e., the amount of claim is variable and it is ascertainable only sometime after the event. Pension business is a specialised form of life assurance.

Insurance Sector Reforms

The insurance sector in India has gone through the process of reforms following these recommendations. The Insurance Regulatory & Development Authority (IRDA) Bill was passed by the Indian Parliament in December 1999. The IRDA became a statutory body in April, 2000 and has been framing regulations and registering the private sector insurance companies. The insurance sector was opened upto the private sector in August 2000.

Consequently, some Indian and foreign private companies have entered the insurance business now. There are about 31 general insurance and 24 life insurance companies operating in the private sector in India, early in 2022.

Statutory Functions of IRDA:

- Issue to the applicant a certificate of registration, renew, modify, withdraw, suspend or cancel such registration.
- Protection of the interests of the policyholders in matters concerning assigning of policy, nomination by policy holders, insurable interest, settlement of insurance claim, surrender value of policy and other terms and conditions of contracts of insurance.
- Specifying requisite qualifications, code of conduct and practical training for intermediaries or insurance intermediaries and agents.
- Specifying the code of conduct for surveyors and loss assessors.
- Promoting efficiency in the conduct of insurance business.
- Promoting and regulating professional organisations connected with insurance and reinsurance business.
- Levying fees and other charges for carrying out the purposes of the Act.
- Calling for information from, undertaking inspection of, conducting enquiries and investigations including audit of the insurers, intermediaries, insurance intermediaries and other organisations connected with the insurance business.
- Control and regulation of rates, advantages, terms and conditions that may be offered by the insurers in respect of general insurance business not so controlled and regulated by the Tariff Advisory Committee under Section 64 U of the Insurance Act 1938 (4 of 1938).
- Specifying the form and manner in which books of accounts shall be maintained and statements of accounts shall be rendered by insurers and other insurance intermediaries.
- Regulating investment of funds by insurance companies.
- Regulating maintenance of margin of solvency.
- Adjudication of disputes between insurers and intermediaries or insurance intermediaries .
- Supervising the functioning of the Tariff Advisory Committee.
- Specifying the percentage of the premium income of the insurer to finance schemes for promoting and regulating professional organisations referred to in clause (f).
- Specifying the percentage of life insurance business and general insurance business to be undertaken by the insurers in the rural and social sector.
- Exercising such other powers as may be prescribed.

2.1.5 Pension Funds

Pension Funds (PNFs) have grown rapidly to become the primary vehicle of retirement benefit or retirement saving, and retirement income in many countries. A Pension Plan (PP) is an arrangement to provide income to participants in the plan when they retire

Classification of Pension Plans - The financial intermediary, or an organisation, or an institution, or a trust that manages the assets and pays the benefits to the old and retirees is called a Pension Fund (PNF). Some pension plans are said to be insured i.e., in such cases, the sponsor pays premiums to a life insurance company in exchange for a group annuity that would pay retirement benefits to the participants.

Another classification of PPs is:

(a) Defined Benefits Pension Plan (DBPP),

(b) Defined Contribution Pension Plan (DCPP) or Money Purchase Pension Plan (MPPP),

(c) Pay-as-you-go Pension Plan (PAYGPP)

These are discussed below:

(i) Defined Benefits Pension Plan (DBPP)

Under DBPP, the final pension is pre-defined based on the final salary and the period of service. Most of the pension plans offered by public sector enterprises and the government as employer in India are of DBPP variety. This type ensures a predictable amount of pension to the employees for all the years after their retirement and it is guaranteed by the State. DBPPs involve considerable cost to the employer. The firms with DBPP typically establish a legally separate trust fund, and the trustees invest employers' contributions in shares and bonds.

(ii) Defined Contribution Pension Plan (DCPPs)

It is popular in US, do not guarantee the amount of final benefit which the employees would get after they retire. In DCPP, the employee and employer make a pre-determined contribution each year, and these funds are invested over the period of time till the retirement of employee. Whatever the value of these investments at the time of retirement, the employee will get a certain amount which he would use to purchase an annuity. From the point of view of the employer. DCPP is also known as "money purchase pension plan".

(iii) Pay-As-You-Go-Pension Plan (PAYGPP)

In most European countries, including France and Germany, pensions are paid through PAYGPP, under which the current employees pay a percentage of their income to provide for the old, and, this, along with the contribution of the State, goes as a pension that sustains the older generation. In US, there has been a trend towards a decline in DBPPs and an increase in DCPPs.

Management of Pension Funds

Some sponsors of pension plans manage their pension funds themselves, but most of the sponsors appoint a trustee to do so on their behalf. This trustee is usually a trust department of a commercial bank, or an insurance company, or a mutual fund. The trustee manager invests contributions provided by the sponsor and pays benefits to the retired persons.

Current Pension Schemes

Some of the pension schemes available in India at present are:

(i) Government Employees' Pension Scheme: The Government Employees' Pension Scheme (GEPS), which has been made mandatory from 1995. It is a subset of Employees' Provident Fund (EPF). It provides (a)

superannuation pension, (b) retirement pension, (c) permanent total disability pension, (d) widow or widower's pension, and (e) orphan pension. It is essentially a defined-contribution and defined benefit payas-you-go scheme, which is financed by diverting 8.33 per cent of the employers' existing share of PF contributions.

(ii) **BEPS and IEPS: Bank Employees Pension Scheme (BEPS),** 1993, and Insurance Employees Pension Scheme (IEPS), 1993 are for the benefit of the employees of public sector banks, and government owned insurance companies respectively. They are financed by the entire employer's portion of the PF contribution which is 10% of the basic salary. The main benefit under these schemes (after superannuation at 60 years of age or after 33 years of service) is in the form of a pension of 50% of the average basic salary during the last 10 months of employment. An additional benefit of 50% of the average of the allowances which rank for the PF but not for DA during the last 10 months of service is also provided to the employees, and this amounts to 2-4% of the employee's salary.

(iii) **Privately Administered Superannuation Fund:** So far, the private sector has been kept out in respect of setting up and running of pension funds; they have been run by the government or semi-government organisations. If any employer sets up a privately administrated superannuation fund, it is stipulated that he can accumulate funds in the form of an irrevocable trust fund during the employment period of the employee concerned, but when the pension becomes payable, suitable annuities have to be purchased from the LIC.

Alternatively, the employer can have a superannuation scheme with the LIC and pay suitable contributions for the employees in service.

LIC has introduced 4 pension plans in the recent past:

(i) Varistha Pension Bima Yojana (VPBY)

(ii) New Jeevan Akshay (NJA)

(iii) New Jeevan Dhara (NJD)

(iv) New Jeevan Suraksha (NJS)

2.1.6 Alternative Investment Funds (AIF): Angel Fund, Venture Capital Fund, Private Equity Fund and Hedge Funds

Alternative Investment Fund (AIF) means any fund established or incorporated in India which is a privately pooled investment vehicle which collects funds from sophisticated investors, whether Indian or foreign, for investing it in accordance with a defined investment policy for the benefit of its investors.

AIF does not include funds covered under the SEBI (Mutual Funds) Regulations, 1996, SEBI (Collective Investment Schemes) Regulations, 1999 or any other regulations of the SEBI to regulate fund management activities. Further, certain exemptions from registration are provided under the AIF Regulations to family trusts set up for the benefit of 'relatives' as defined under the Companies Act, 1956, employee welfare trusts or gratuity trusts set up for the benefit of employees, 'holding companies' within the meaning of Section 4 of the Companies Act, 1956 etc. [Ref. Regulation 2(1)(b) of the SEBI]

Categories of AIF

Category -I AIFs

AIFs which invest in start-up or early-stage ventures or social ventures or SMEs or infrastructure or other sectors or areas which the government or regulators consider as socially or economically desirable and shall include venture capital funds, SME Funds, social venture funds, infrastructure funds and such other Alternative Investment Funds as may be specified. [Ref. Regulation 3(4)(a)]

Category -II AIFs

AIFs which do not fall in Category I and III and which do not undertake leverage or borrowing other than to meet day-to-day operational requirements and as permitted in the SEBI (Alternative Investment Funds) Regulations, 2012. [Ref. Regulation 3(4)(b)] Various types of funds such as real estate funds, private equity funds (PE funds), funds for distressed assets, etc. are registered as Category II AIFs.

Category -III AIFs

AIFs which employ diverse or complex trading strategies and may employ leverage including through investment in listed or unlisted derivatives. [Ref. Regulation 3(4)(c)] Various types of funds such as hedge funds, PIPE Funds, etc. are registered as Category III AIFs.

Angel Fund

"Angel fund" is a sub-category of Venture Capital Fund under Category I Alternative Investment Fund that raises funds from angel investors and invests in accordance with the provisions of Chapter III-A of AIF Regulations. In case of an angel fund, it shall only raise funds by way of issue of units to angel investors.

Angel funds shall accept, up to a maximum period of 3 years, an investment of not less than ₹25 lakh from an angel investor.

"Angel investor" means any person who proposes to invest in an angel fund and satisfies one of the following conditions, namely,

(a) an individual investor who has net tangible assets of at least two crore rupees excluding value of his principal residence, and who:

(i) has early-stage investment experience, or

(ii) has experience as a serial entrepreneur, or

(iii) is a senior management professional with at least ten years of experience;

Explanation: For the purpose of this clause, 'early-stage investment experience' shall mean prior experience in investing in start-up or emerging or early-stage ventures and 'serial entrepreneur' shall mean a person who has promoted or copromoted more than one start-up venture.

(b) a body corporate with a net worth of at least ten crore rupees; or

(c) an Alternative Investment Fund registered under these regulations or a Venture Capital Fund registered underthe SEBI (Venture Capital Funds) Regulations, 1996.

Investment in Angel Funds

Section 19D of the SEBI regulations state

(1) Angel funds shall only raise funds by way of issue of units to angel investors.

(2) An angel fund shall have a corpus of at least ten crore rupees.

(3) Angel funds shall accept, up to a maximum period of three years, an investment of not less than twenty-fiv lakh rupees from an angel investor.

(4) Angel fund shall raise funds through private placement by issue of information memorandum or placement memorandum, by whatever name called.

Investment by Angel Funds

As per Section 19F of the SEBI regulations:

Angel funds shall invest only in venture capital undertakings which:

(a) have been incorporated during the preceding three years from the date of such investment;

(b) have a turnover of less than twenty-five crore rupees;

(c) are not promoted or sponsored by or related to an industrial group whose group turnover exceeds three hundred crore rupees; and

Explanation I: For the purpose of this clause, "industrial group" shall include a group of body corporates with the same promoter(s)/promoter group, a parent company and its subsidiaries, a group of body corporates in which the same person/ group of persons exercise control, and a group of body corporates comprised of associates/ subsidiaries/holding companies.

Explanation II: For the purpose of this clause, "group turnover" shall mean combined total revenue of the industrial group.

(1) are not companies with family connection with any of the angel investors who are investing in the company.

(2) Investment by an angel fund in any venture capital undertaking shall not be less than fifty lakh rupees and shall not exceed five crore rupees.

(3) Investment by an angel fund in the venture capital undertaking shall be locked-in for a period of three years.

(4) Angel funds shall not invest in associates.

(5) Angel funds shall not invest more than twenty-five per cent of the total investments under all its schemes in one venture capital undertaking:

Provided that the compliance to this sub-regulation shall be ensured by the Angel Fund at the end of its tenure.

Venture Capital Fund

Venture Capital funding is different from traditional sources of financing. Venture capitalists finance innovation and ideas which have potential for high growth but with inherent uncertainties. This makes it a high-risk, high return investment. Apart from finance, venture capitalists provide networking, management and marketing support as well. In the broadest sense, therefore, venture capital connotes risk finance as well as managerial support. In the global venture capital industry, investors and investee firms work together closely in an enabling environment that allows entrepreneurs to focus on value creating ideas and venture capitalists to drive the industry through ownership of the levers of control in return for the provision of capital, skills, information and complementary resources. This very blend of risk financing and hand holding of entrepreneurs by venture capitalists creates an environment particularly suitable for knowledge and technology-based enterprises.

As per the 2(1)(z) of the Securities and Exchange Board of India (Alternative Investment Funds) Regulations, 2012, "Venture Capital Fund" means an Alternative Investment Fund which invests primarily in unlisted securities of start-ups, emerging or early-stage venture capital undertakings mainly involved in new products, new services, technology or intellectual property right based activities or a new business model and shall include an angel fund as defined under Chapter III-A of the SEBI regulations.

Minimum investment in a Venture Capital Fund

(1) A venture capital fund may raise monies from any investor whether Indian, Foreign or non-resident Indian [by way of issue of units].

(2) No venture capital fund set up as a company or any scheme of a venture capital fund set up as a trust shall accept any investment from any investor which is less than five lakh rupees.

Private Equity Fund

As per the section 2(1)(r) of the Securities and Exchange Board of India (Alternative Investment Funds) Regulations, 2012, "private equity fund" means an Alternative Investment Fund which invests primarily in equity or equity linked instruments or partnership interests of investee companies according to the stated objective of the fund.

Hedge Funds

Hedge funds are private investment vehicles not open to the general investment public. Hedge funds face less regulation than publicly traded mutual funds, allowing them to hold substantial short positions to preserve capital during market downturns. Typically, hedge fund managers generate profit from both long as well as short positions. the private nature of hedge funds often suits both the needs of investors and managers.

Features of Hedge Fund

- Reduce risk, enhance returns and minimize the correlation with equity and bond markets.
- Flexibility in investment options.
- Variety in terms of investment returns, volatility and risk.
- consistency of returns and capital preservation.
- Managed by experienced investment professionals who are generally disciplined and diligent.
- Pension funds, endowments, insurance companies, private banks and high net worth individuals and families invest in hedge funds to minimize overall portfolio volatility and enhance returns.
- Hedge funds benefit by heavily weighting hedge fund managers' remuneration towards performance incentives.

Hedging strategies adopted in case of Hedge Funds

- **Selling short:** Selling shares without owning them, to buy them back at a future date at a lower price in the expectation that their price will drop.
- **Using arbitrage:** Seeking to exploit pricing inefficiencies between related securities.
- **Trading options or Derivatives:** Contracts whose values are based on the performance of any underlying financial asset, index or other investment.
- **Investing in anticipation of a specific event:** Merger transaction, hostile takeover, spin-off, exiting of bankruptcy proceedings, etc.
- **Investing in deeply discounted securities:** Of companies about to enter or exit financial distress or bankruptcy, often below liquidation value.

Benefits of Hedge Funds

- **Seek higher returns:** Hedge fund strategies generate positive returns in both rising and falling equity and bond markets.
- **Investment styles:** Huge variety of hedge fund investment styles - many uncorrelated with each other provides investors with a wide choice of hedge fund strategies to meet their investment objectives.
- **Long term Solution:** Hedge funds provide an ideal long-term investment solution, eliminating the need to correctly time entry and exit from markets.

- **Diversification:**

  (i) Inclusion of hedge funds in a balanced portfolio reduces overall portfolio risk and volatility and increases returns.

  (ii) Adding hedge funds to an investment portfolio provides diversification not otherwise available in traditional investing.

2.1.7 SEBI Regulations (including AIF Circulars)

The Securities and Exchange Board of India was established on April 12, 1992 in accordance with the provisions of the Securities and Exchange Board of India Act, 1992.

The Preamble of the Securities and Exchange Board of India describes the basic functions of the Securities and Exchange Board of India as **"...to protect the interests of investors in securities and to promote the development of, and to regulate the securities market and for matters connected therewith or incidental thereto".**

Role of SEBI or Steps taken by SEBI for the Development of Capital Markets in India

To introduce improved practices and greater transparency in the capital markets and for capital market development, the roles of SEBI are:

(1) SEBI has drawn up a programme for inspecting stock exchanges. Under this programme, inspections of some stock exchanges have already been carried out. The basic objective of such inspections is to improve the functioning of stock exchanges.

(2) SEBI has been authorised to conduct inspections of various mutual funds. In this respect, it has already undertaken inspection of some mutual funds. Various deficiencies of the individual mutual funds have been pointed out in the inspection reports and corrective steps undertaken to rectify these deficiencies.

(3) SEBI has introduced a number of measures to reform the primary market in order to make stronger the standards of disclosure. SEBI has introduced certain procedural norms for the issuers and intermediaries, and removed the inadequacies and systemic deficiencies in the issue procedures.

(4) The process of registration of intermediaries such as stockbrokers has been provided under the provisions of the Securities and Exchange Board of India Act, 1992.

(5) In order to encourage companies to exercise greater care for timely actions in matters relating to the public issue of capital. SEBI has advised the stock exchanges to collect from companies making public issues, a deposit of 1 % of the issue amount which could be forfeited in case of noncompliance with the provisions of the listing agreement and non-despatch of refund orders and share certificates by registered post within the prescribed time.

(6) Through an order under the Securities Contracts (Regulations) Act 1956, SEBI has directed the stock exchanges to broad base their governing boards and change the composition of their arbitration, default and disciplinary committees. The broad basing of the governing boards of the stock exchanges would help them function with greater degree of autonomy and independence or that they become truly self-regulatory organisations.

(7) Merchant banking has been statutorily brought under the regulatory framework of SEBI. The merchant bankers have to be authorised by SEBI. They will have to hold to specific capital adequacy norms and bear by a code of conduct, which specifies a high degree of responsibility towards inspectors in respect of the pricing and premium fixation of issues.

(8) SEBI issued regulations pertaining to "Insider Trading" in November 1992 prohibiting dealings, communication in matters relating to insider trading. Such regulations will help in protecting the market's integrity, and in the long run inspire investor confidence in the market.

(9) SEBI issued a separate set of guidelines for development financial institutions in September 1992 for disclosure and investment protection regarding their raising of funds from the market. As per the guidelines, there is no need for promoter's contribution. Besides, underwriting is not mandatory.

(10) SEBI has notified the regulations for mutual funds. For the first time mutual fund's are governed by a uniform set of regulations which require them to be formed as trusts and managed by a separate Asset Management Company (AMC) and supervised by a board of trustees. SEBI (Mutual fund) regulations provide for laissez-faire relationship between the various constituents of the mutual funds and thus bring about a structural change which will ensure qualitative improvement in the functioning of the mutual funds and require that the AMCs have a minimum net worth of ₹ 6 crores of which the sponsors must contribute at least 40 percent. The SEBS (Mutual Fund) Regulations also provide for an approval of the offer documents of schemes by SEBI. The regulations are intended to ensure that the mutual funds grow on healthy lines and investors' interest is protected.

(11) To bring about greater transparency in transactions, SEBI has made it mandatory for brokers to maintain separate accounts for their clients and for themselves. They must disclose the transaction price and brokerage separately in the contract notes issued to their clients. They must also have their books audited and audit reports filed with SEBI.

(12) SEBI has issued directives to the stock exchanges to ensure that contract notes are issued by brokers to clients within 24 hours of the execution of the contract. Exchanges are to see that time limits for payment of sale proceeds and deliveries by brokers and payment of margins by clients to brokers are complied with.

(13) In August 1994, guidelines were issued in respect of preferential issues for orderly development of the securities market and to protect the interest of investors.

(14) The 'Banker to the issue' has been brought under purview of SEBI for investor protection. Unit Trust of India (UTI) has also been brought under the regulatory jurisdiction of SEBI.

(15) In July 1995, the Committee set up by SEBI under the chairmanship of Y. H. Malegam to look into the disclosure of norms for public issues, recommended stricter regulations to control irregularities affecting the primary market. Following the recommendations of the Malegam Committee, SEBI issued a number of guidelines in September and October 1995 to protect the interest of investors.

(16) A series of measures to control the prices and to check other malpractices on the stock exchanges were announced by SEBI on December 21, 1995.

(17) Guidelines for reduction the entry norms for companies accessing capital market were issued by SEBI on April 16, 1996.

(18) The above discussion shows that SEBI has undertaken a number of steps to establish a fair, transparent and a strong regulatory structure for the efficient functioning of the capital market and for protecting the interest of the investors. These steps have helped in developing the capital market on healthy lines.

Since inception, SEBI issued time to time Acts, Rules, Regulations, Guidelines, Master Circulars, General Orders and Circulars

SEBI Regulations

(1) Securities and Exchange Board of India (Delisting of Equity Shares) Regulations, 2021 [Last amended on August 3, 2021]

(2) Securities and Exchange Board of India (Issue and Listing of Non-Convertible Securities) Regulations, 2021

(3) Securities and Exchange Board of India (Share Based Employee Benefits and Sweat Equity) Regulations, 2021

(4) Securities and Exchange Board of India (Underwriters) (Repeal) Regulations, 2021

(5) Securities and Exchange Board of India (Vault Managers) Regulations, 2021

(6) Securities and Exchange Board of India (Portfolio Managers) Regulations, 2020

(7) Securities and Exchange Board of India (Foreign Portfolio Investors) Regulations, 2019

(8) Securities and Exchange Board of India (Appointment of Administrator and Procedure for Refunding to the Investors) Regulations, 2018

(9) Securities and Exchange Board of India (Buy-back of Securities) Regulations 2018

(10) Securities and Exchange Board of India (Depositories and Participants) Regulations, 2018

(11) Securities and Exchange Board of India (Issue of Capital and Disclosure Requirements) Regulations 2018

(12) Securities and Exchange Board of India (Settlement Proceedings) Regulations, 2018

(13) Securities Contracts (Regulation) (Stock Exchanges and Clearing Corporations) Regulations, 2018

(14) SEBI (Procedure for Search and Seizure) Repeal Regulations, 2015

(15) Securities and Exchange Board of India (Issue and Listing of Municipal Debt Securities) Regulations, 2015

(16) Securities and Exchange Board of India (Listing Obligations and Disclosure Requirements) Regulations, 2015

(17) Securities and Exchange Board of India (Prohibition of Insider Trading) Regulations, 2015

(18) Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014

(19) Securities and Exchange Board of India (Real Estate Investment Trusts) Regulations, 2014

(20) Securities and Exchange Board of India (Research Analysts) Regulations, 2014

(21) Securities and Exchange Board of India (Investment Advisers) Regulations, 2013

(22) Securities and Exchange Board of India (Issue and Listing of Non-Convertible Redeemable Preference Shares) Regulations, 2013

(23) Securities and Exchange Board of India (Alternative Investment Funds) Regulations, 2012

(24) Securities and Exchange Board of India (Substantial Acquisition of Shares and Takeovers) Regulations, 2011

(25) Securities and Exchange Board of India {KYC (Know Your Client) Registration Agency} Regulations, 2011

(26) SEBI (Investor Protection and Education Fund) Regulations, 2009

(27) SEBI (Issue of Capital and Disclosure Requirements) Regulations, 2009

(28) Securities and Exchange Board of India (Intermediaries) Regulations, 2008

(29) Securities and Exchange Board of India (Issue and Listing of Debt Securities) Regulations, 2008

(30) Securities and Exchange Board of India (Issue and Listing of Securitised Debt Instruments and Security Receipts) Regulations, 2008

(31) SEBI (Certification of Associated Persons in the Securities Markets) Regulations, 2007

(32) SEBI (Regulatory Fee on Stock Exchanges) Regulations, 2006

(33) SEBI (Self-Regulatory Organisations) Regulations, 2004 [last amended on March 6, 2017]

(34) SEBI (Ombudsman) Regulations, 2003

(35) SEBI (Prohibition of Fraudulent and Unfair Trade Practices relating to Securities Market) Regulations, 2003

(36) SEBI (Procedure for Board Meetings) Regulations, 2001

(37) Securities and Exchange Board of India (Employees' Service) Regulations, 2001

(38) Securities and Exchange Board of India (Foreign Venture Capital Investor) Regulations, 2000

(39) Securities and Exchange Board of India (Collective Investment Scheme) Regulations, 1999

(40) Securities and Exchange Board of India (Credit Rating Agencies) Regulations, 1999

(41) SEBI (Buy Back Of Securities) Regulations, 1998 [Last amended on on March 6, 2017]

(42) Securities and Exchange Board of India (Custodian) Regulations, 1996

(43) Securities and Exchange Board of India (Mutual Funds) Regulations, 1996

(44) Securities and Exchange Board of India (Bankers to an Issue) Regulations, 1994 [

(45) Securities and Exchange Board of India (Debenture Trustees) Regulations, 1993

(46) Securities and Exchange Board of India (Registrars to an Issue and Share Transfer Agents) Regulations, 1993

(47) Securities and Exchange Board of India (Merchant Bankers) Regulations, 1992

(48) Securities and Exchange Board of India (Stock Brokers) Regulations, 1992

Capital Market

2.2

Capital market is a market for equity shares and long-term debt. In this market, the capital funds comprising of both equity and debt are issued and traded. This also includes private placement sources of debt and equity as well as organized markets like stock exchanges. Capital market includes financial instruments with more than one year maturity. It is defined as a market in which money is provided for periods longer than a year, as the raising of short-term funds takes place on other markets (e.g., the money market).

Functions of Capital Market

The capital market is an important constituent of the financial system. The functions of an efficient capital market are as follows:

- Mobilises long-term savings to finance long-term investments.
- Provide risk capital in the form of equity or quasi-equity to entrepreneurs.
- Encourage broader ownership of productive assets.
- Provide liquidity with a mechanism enabling the investor to sell financial assets.
- Lower the costs of transactions and information.
- Improve the efficiency of capital allocation through a competitive pricing mechanism.
- Enable quick valuation of financial instruments-both equity and debt.
- Provide insurance against market risk or price risk through derivative trading and default risk through investment protection fund.
- Provide operational efficiency through:
  - Simplified transaction procedures;
  - Lowering settlement timings; and
  - Lowering transaction costs.
- Develop integration among:
  - Real and financial sectors;
  - Equity and debt instruments;
  - Long-term and short-term funds;
  - Long-term and short-term interest costs;
  - Private and government sectors; and
  - Domestic and external funds.

- Direct the flow of funds into efficient channels through investment, disinvestment, and reinvestment.
- Enable wider participation by enhancing the width of the market by encouraging participation through networking institutions and associating individuals. constituents of capital market-

The following are the constituents of capital market:

- **Investment trust:** Financial institutions which collects savings from public and invest that amount in industrial securities. Example: Tata Investment Trust Pvt Ltd.
- **Specialised Financial Institutions:** These types of financial institution provide long term finance to industries. Example: Industrial Financial Corporation of India (IFCI) Ltd.
- **Insurance company:** Insurance companies collect premium from policy holders and invest the amount in different industrial securities. Example: Life Insurance Corporation Of India (LICI).
- **Securities market:** Securities is a broader term which encompasses shares, debentures, bonds etc. the market where securities transactions are held is known as securities market. Securities market can be further classified into primary or new issue market and secondary or share market.

2.2.1 Primary and Secondary Markets and its Instruments

Classification of Capital Market

Primary Market

The primary market is a market for new issues. Hence it is also known as new issue market. This refers to the long-term flow of funds from the surplus sector to the government and corporate sector through primary issues and to banks and non-bank financial intermediaries through secondary issues. Funds are mobilized in the primary market through prospectus, rights issues, and private placement.

Table 2.5 Types of Issues or Methods of rising Funds in Primary Market

Public Issue	Rights Issue	Bonus Issue	Private Placement	Bought out deals	Depository Receipts
Initial Public offering (IPO)- this is the offer of sale of securities of an unlisted company for the first time.	If a company issue share in the market to raise additional capital, the existing members are given the first preference	Bonus issues are made by the company when it has huge amount of accumulated reserves and wants to	1) Private Placement (Unlisted companies)- It is direct sale of securities to some specified individuals or financial institutions.	When the new issued shares of an unlisted company is bought large by investor or by small investors in group it is	Issue of negotiable equity instruments by Indian companies for rising capital from the international capital

Public Issue	Rights Issue	Bonus Issue	Private Placement	Bought out deals	Depository Receipts
Follow-on Public Offering (FPO)- This is the offer of sale of securities by listed company	to apply for new shares in proportion to their existing share holdings. this is known as right issue mentioned in sec 62(1) of companies act 2013.	capitalize the reserves. Bonus shares are issued on fully paid up shares only, to the existing shareholders free of cost. sec 63 of companies act states this.	2) Preferential issue- Allotment of shares to selected persons 3) Qualified institutions Placement (for listed companies) allotment of securities to qualified institutional buyers.	known as the bought out deal.	market. Example- ADRs, GDRs.

Participants in the Primary Market:

- Merchant Bankers
- Bankers to an Issue
- registrar to an Issue
- Underwriters to the issue
- Debenture Trustees
- Investment Banks
- Depositories
- Portfolio Managers
- Custodians

Procedure of selling securities:

- Direct Sale
- Through Broker
- Through Underwriter
- Through intermediary financial institutions

Secondary Market

The secondary market is a market in which existing securities are resold or traded. This market is also known as the stock market. It is a market where buying, selling of those securities which have been granted the stock exchange quotation takes place. In India, the secondary market consists of recognized stock exchanges operating under rules, by-laws and regulations duly approved by the government.

Bombay Stock Exchange (BSE) was established in 1875, it is the oldest stock exchange in India. Subsequently other stock exchanges like in Ahmedabad, Kolkata were established. At present, in India there are 7 stock exchanges operating.

1. BSE Ltd.
2. Calcutta Stock Exchange Ltd.
3. Indian Commodity Exchange Ltd.
4. Metropolitan Stock Exchange of India Ltd.
5. Multi Commodity Exchange of India Ltd.
6. National Commodity & Derivatives Exchange Ltd.
7. National Stock Exchange of India Ltd.

(Source: SEBI Website)

Functions of the Secondary Market

- To contribute to economic growth through allocation of funds to the most efficient channel through the process of disinvestment to reinvestment.
- To facilitate liquidity and marketability of the outstanding equity and debt instruments.
- To ensure a measure of safety and fair dealing to protect investors' interests.
- To induce companies to improve performance since the market price at the stock exchanges reflects the performance and this market price is readily available to investors.
- To provide instant valuation of securities caused by changes in the internal environment.

The Indian secondary market can be segregated into two:

1. **The secondary market for corporate and financial intermediaries**: The participants in this market are registered brokers - both individuals and institutions. They operate through a network of sub- brokers and sub-dealers and are connected through an electronic networking system.
2. **The secondary market for government securities and public sector undertaking bonds**: The trading in government securities is basically divided into the short-term money market instruments such as treasury bills and long-term government bonds ranging in maturity from 5 to 20 years.

The main participants in the secondary market for government securities are entities like primary dealers, banks, financial institutions, and mutual funds.

Table 2.6: Difference between Primary and Secondary Market

Basis	Primary Market	Secondary Market
Nature of Securities	It deals with new securities, i.e. securities which were not previously available, and are offered for the first time to the investors.	It is a market for old securities which have been issued already and granted stock exchange quotation.
Sale/Purchase	Securities are acquired from issuing companies themselves.	Securities are purchased and sold by the investors without any involvement of the companies.
Nature of Financing	It provides funds to new enterprises & also for expansion and diversification of the existing one and its contribution to company financing is direct.	It does not supply additional funds to company since the company is not involved in transaction.

Basis	Primary Market	Secondary Market
Liquidity	It does not lend any liquidity to the securities.	The secondary market provides facilities for the continuous purchase and sale of securities, thus lending liquidity and marketability to the securities.
Organisational difference	It is not rooted in any particular spot and has no geographical existence. it has neither any tangible form nor any administrative organisational set up.	Secondary markets have physical existence in the form of stock exchange and are located in a particular geographical area having an administrative organisation.
Requirement	Helps in creating new capital.	Helps in maintenance of existing capital.
Volume	Volume of transaction is low as compared to secondary market.	Volume of transaction is high as compared to primary market.

Similarities between Primary and Secondary Market:

1. **Listing**: One aspect of inseparable connection between them is that the securities issued in the primary market are invariably listed on a secondary market (recognized stock exchange) for dealings in them. The practice of listing of new issues on the stock market is of immense utility to the potential investors who can be sure that when they receive an allotment of new issues, they will subsequently be able to dispose them off any time in the stock exchange.
2. **Control**: The stock exchanges exercise considerable control over the organisation of new issues. The new issues of securities which seek stock quotation/listing have to comply with statutory rules as well as regulations framed by the stock exchanges. If the new issues do not conform to the prescribed stipulations, the stock exchanges would refuse listing facilities to them. This requirement obviously enables the stock exchange to exercise considerable control over the new issues market and is indicative of close relationship between the two.
3. **Mutual Interdependence**: The markets for new and old securities are, economically, an integral part of a single market- the capital market. Their mutual interdependence from the economic point of view has two dimensions. When value of share increases, the volume of new issue increases and vice-versa. The functioning of secondary market has direct influence on the activities of new issue market. If stock market performs well then it also inspires the new issue market.

Table 2.7 Basic Capital Market Instruments

A. Equity Securities	B. Debt Securities
Equity Shares	**Debentures**
Preference Shares	**Bonds**

Financial Management and Business Data Analytics

These two types of securities are traded in separate markets in stock exchanges. They are briefly outlined as under:

A. Equity Securities:

(i) **Equity Shares:** Equity share represents the form of fractional ownership in which a shareholder, as a fractional owner, undertakes the maximum entrepreneurial risk associated with a business venture. A company may issue such shares with differential rights as to voting, payment of dividend, etc.

(ii) **Preferred Stock/Preference Shares:** Preference Shareholders are entitled to a fixed dividend or dividend calculated at a fixed rate to be paid regularly before dividend is paid in respect of Equity Share. They also enjoy priority over the equity shareholders in payment of surplus. there are various types of Preference Shares viz. Cumulative and Non-Cumulative Preference Shares, Convertible and NonConvertible Preference Shares, Participating and Non-Participating Preference Shares, Redeemable and Non-Redeemable Preference Shares etc.

B. Debt Securities:

(i) **Debentures:** A Debenture is a document issued by a company under its common seal acknowledging a debt to the holders. It is a debt security issued by a company which offers to pay interest for the money it borrows for a certain period. Debenture holders are treated as creditors of the company. As per SEBI guidelines, no public or rights issue of convertible or non-convertible debentures shall be made unless a credit rating from a credit rating agency has been obtained and disclosed in the offer document.

(ii) **Bonds:** A bond is a negotiable certificate which entitles the holder for repayment of the principal sum plus interest. They are debt securities issued by a company, or government agency whereby a bond investor lends money to the issuer, and in exchange, the issuer promises to repay the loan amount on a specified maturity date. Features and the various types of Bonds have been discussed in study note 2.4 (financial market instruments) already.

Other Financial Instruments that are traded in Market

1. **Secured Premium Notes (SPNs)**

   (a) **Meaning:** Secured Premium Notes are debt instruments issued along with a detachable warrant and is redeemable after a specified period (4 to 7 Years).

   (b) **Option to Convert:** SPNs carry an option to convert into equity shares, i.e. the detachable warrant can be converted into equity shares.

   (c) **Period for Conversion:** Conversion of detachable warrant into equity shares should be done within a time period specified by the company.

2. **American Depository Receipts (ADRs):** American Depository Receipts popularly known as ADRs were introduced in the American market in 1927. ADRs are negotiable instruments, denominated in dollars, and issued by the US Depository Bank. A non-US company that seeks to list in the US, deposits its shares with a bank and receives a receipt which enables the company to issue AD₹ These ADRs serve as stock certificates and are used interchangeably with ADRs which represent ownership of deposited shares. Among the Indian ADRs listed on the US markets, are Infy (the Infosys Technologies ADR), WIT (the Wipro ADR), **t**Rdy(the Dr Reddy's Lab ADR), and Say (the Satyam Computer ADR). ADRs are listed in New York Stock Exchange (NYSE) and NASDAQ (National association of Securities Dealers automated quotations). Issue of ADR offers access to both institutional and retail market in Us.

3. **Global Depository Receipts (GDRs):** GDRs are equity instruments issued abroad by authorized overseas corporate bodies against the shares/bonds of Indian companies held with nominated domestic custodian banks. An Indian company intending to issue GDRs will issue the corresponding number of shares to an overseas depository bank. GDRs are freely transferable outside India and dividend in respect of the share represented by the GDR is paid in Indian rupees only. They are listed and traded on a foreign stock exchange. GDRs are fungible, which means the holder of GDRs can instruct the depository to convert them into underlying shares and sell them in the domestic market. GDRs re traded on Over the Counter (OTC) basis. Most of the Indian companies have their GDR issues listed on the Luxembourg Stock Exchange and the London Stock Exchange. Indian GDRs are primarily sold to institutional investors and the major demand is in the UK, US, Hongkong, Singapore, France and Switzerland. There is no such difference between ADR and GDR from legal point of view.

4. **Derivatives:** A derivative is a financial instrument, whose value depends on the values of basic underlying variable. In the sense, derivatives is a financial instrument that offers return based on the return of some other underlying asset, i.e., the return is *derived* from another instrument. Derivatives are a mechanism to hedge market, interest rate, and exchange rate risks. Derivatives is divided into two types- Financial derivatives and

Commodity derivatives. Types of Financial derivatives include: Forwards, Futures, Options, Warrants, Swaps, Swaptions. There are three types of traders in the derivatives market: Hedger, Speculator and arbitrageur.

5. **External Commercial Borrowings (ECBs):** ECBs are used by Indian companies to rise funds from foreign sources like bank, export credit agencies, foreign collaborators, foreign share holders etc. Indian companies rise funds through ECBs mainly for financing infrastructure projects.

6. **Foreign Currency Convertible Bonds (FCCBs):** Foreign currency convertible Bonds (FCCBs) are issued by Indian companies but are subscribed by non-residents. These bonds have a specified fixed interest rate and can be converted into ordinary shares at price preferred, either in part or in full.

2.2.2 Compulsory / Optionally Convertible Financial Instruments, Deep Discount

Bonds Compulsory / Optionally Convertible Financial Instruments

(i) Compulsory Convertible Debenture (CCD)

A compulsory convertible debenture (CCD) is a type of bond which must be converted into stock by a specified date. It is classified as a hybrid security, as it is neither purely a bond nor purely a stock.

(ii) Optionally Convertible Debentures (OCD)

These are the debentures that include the option to get converted into equity. the investor has the option to either convert these debentures into shares at price decided by the issuer/agreed upon at the time of issue.

Advantages of OCD:

(a) Issuer

- **Quasi-equity:** Dependence of financial institutions is reduced because of the inherent option for conversion (i.e. since these are converted into equity, they need not be repaid in the near future.)
- **High Equity Line:** It is possible to maintain equity price at a high level, by issuing odd-lot shares consequent to conversion of the debentures, and hence lower floating stocks.
- **Dispensing Ownership:** Optionally Convertible Debentures enable to achieve wide dispersal of equity ownership in small lots pursuant to conversion.
- **Marketability:** The marketability of the issue will become significantly easier, and issue expenses can be expected to come down with the amounts raised becoming more.

(b) Investor

- **Assured Interest:** Investor gets assured interest during gestation periods of the project, and starts receiving dividends once the project is functional and they choose to convert their debentures. thereby, it brings down the effective gestation period at the investor's end to zero.
- **Secured Investment:** The investment is secured against the assets of the company, as against company deposits which are unsecured.
- **Capital Gains:** There is a possibility of capital gains associated with conversion, which compensates for the lower interest rate on debentures.

(c) Government

- Debentures helped in mobilizing significant resources from the public and help in spreading the Equity investors, thereby reducing the pressure on financial institutions (which are managed by government) for their resources.

- By making suitable tax amendments, benefits are extended to promote these instruments, to :-
  (i) safeguard the funds of financial institutions,
  (ii) encouraging more equity participation, which will also require a higher compliance under corporate laws, whereby organisations can be monitored more effectively.

Disadvantages of OCD:

Issuer

(a) Ability to match the projected cash inflows and outflows by altering the terms and timing of conversion is diluted, and becomes a function of performance of the company and hence its market price.

(b) The company is not assured of hefty share premiums based on its past performance and an assured conversion of debentures.

(c) Planning of capital structure becomes difficult in view of the uncertainties associated with conversion.

Investor: There are many regulatory requirements to be complied with for conversion.

(iii) Deep Discount Bonds (DDBs)

Deep Discount Bond is a form of zero-interest bonds, which are sold at a discounted value (i.e. below par) and on maturity, the face value is paid to investors. A bond that sells at a significant discount from par value and has no coupon rate or lower coupon rate than the prevailing rates of fixed-income securities with a similar risk profile. They are designed to meet the long term funds requirements of the issuer and investors who are not looking for immediate return and can be sold with a long maturity of 25-30 years at a deep discount on the face value of debentures. **Example:** Bond of a face value of ₹ 1lakh may be issued for ₹ 5,000 for a maturity value of ₹ 1,00,000 after 20 Years.

Periodic Redemption: Issuing company may also give options for redemption at periodical intervals such as 5 Years or 10 Years etc.

No Interest: There is no interest payment during the lock-in / holding period.

Market Trade: These bonds can be traded in the market. Hence, the investor can also sell the bonds in stock market and realize the difference between initial investment and market price.

2.2.3 Euro Bond and Masala Bond

A **Eurobond** is a debt instrument that is denominated in a currency other than the home currency of the country or market in which it is issued. Eurobonds are frequently grouped together by the currency in which they are denominated, such as eurodollar or Euro-yen bonds.

Masala Bonds were introduced in India in 2014 by International Finance Corporation (IFC). The IFC issued the first masala bonds in India to fund infrastructure projects.

Masala Bonds are rupee-denominated bonds issued outside India by Indian entities. They are debt instruments which help to raise money in local currency from foreign investors. Both the government and private entities can issue these bonds. Investors outside India who would like to invest in assets in India can subscribe to these bonds. Any resident of that country can subscribe to these bonds which are members of the Financial Action Task Force. The investors who subscribe should be whose securities market regulator is a member of the International Organisation of Securities Commission. Multilateral and Regional Financial Institutions which India is a member country can also subscribe to these bonds.

2.2.4 Rolling Settlement, Clearing House Operations

Rolling Settlement

Settlement refers to the process in which traders who have made purchases make payments while those who have sold shares, deliver them. The exchange ensures that buyers receive their shares and the sellers receive payment for the same. The process of settlement is managed by stock exchanges through clearing Houses. SEBI introduced a new settlement cycle known as the 'rolling settlement cycle'.

A rolling settlement is the settlement cycle of the stock exchange, where all trades outstanding at the end of the day have to be settled, i.e., the buyer has to make payments for securities purchased and seller has to deliver the securities sold.

Example: In case of t + 1 settlement, transactions entered on a day should be settled within the next working day. in case of t + 2 settlement, settlement should be made within two working days from the date of transaction. In India the rolling settlement process was Trading Day (T) +5 but now it is T+3, made effective from April 2002 i.e all transactions to be settled within 3 working days.

Table 2.8: Process of Rolling Settlement

1.	Trading	Day of Trading	t
2.	Clearing	Confirmation of Custodial	t + 1
		Delivery Generation	t + 1
3.	Settlement	Securities & Funds Pay in	t + 2
		Securities & Funds Pay-out	t + 2

Benefits of Rolling Settlement:

- In rolling settlements, payments are quicker than in weekly settlements. Thus, investors benefit from increased liquidity,
- It keeps cash and forward markets separate,
- Rolling settlements provide for a higher degree of safety,
- From an investor's perspective, rolling settlement reduces delays. this also reduces the tendency for price trends to get exaggerated. Hence, investors not only get a better price but can also act at their leisure.

Clearing House Operations (CHO)

Clearing House is a body either owned by or independently associated with an exchange and charged with the function of ensuring the financial integrity of each trade. Orders entered into by members are cleared by means of the clearing house. Clearing Houses provide a range of services related to the guarantee of contracts, clearance and settlement of trades, and management of risk for their members and associated exchanges.

Role of Clearing House

(a) It ensures adherence to the system and procedures for smooth trading.

(b) It minimizes credit risks by being a counter party to all trades.

(c) It involves daily accounting of all gains or losses.

(d) It ensures delivery of payment for assets on the maturity dates for all outstanding contracts.

(e) it monitors the maintenance of speculation margins.

2.2.5 Dematerialization, Re-materialization and Depository System

Dematerialization

Dematerialization is the process of converting physical certificates to an equivalent number of securities in electronic form and credited into the investor's account with his / her Depository Participant. In simple terms, it refers to paperless trading.

Process of Dematerialization

In order to dematerialize physical securities, one has to fill in a DRF (Demat Request Form) which is available with the DP and submit the same along with physical certificates that are to be dematerialized. Separate DRF has to be filled for each ISIN.

Scheme

(a) The shareholder does not have a certificate to claim ownership of shares in a company. His interest is reflected by way of entries in the books of depository (an intermediary agent who maintains the share accounts of the shareholders).

(b) This is similar to bank account, where the account holder, and not the banker, is the true owner of the money value of sum indicated against his name in the bank's books.

Depository and Depository Participant

(a) A Depository is an organisation, which holds securities of investors in electronic form at the request of the investor through a registered Depository Participant. Example: National Depository Securities Limited (NSDL), Central Depository Securities Limited (CSDL).

(b) It also provides services related to transactions in securities.

(c) A Depository Participant (DP) is an agent of the depository registered with SEBI through which it interfaces with the investor.

Advantages: The advantages of holding securities in demat form are —

Table 2.9: Advantages

Investor's view Point	Issuer-Company's view Point
(a) It is speedier and avoids delay in transfers.	(a) Savings in printing certificates, postage expenses.
(b) Avoids lot of paper work.	(b) Stamp duty waiver.
(c) Saves on stamp duty.	(c) Easy monitoring of buying/selling patterns in securities, increasing ability to spot takeover attempts and attempts at price rigging.

Rematerialisation

Rematerialiation is the process by which a client/ shareholder can get his electronic holdings converted into physical certificates.

Features of Rematerialisation

(a) A client can rematerialise his dematerialised holdings at any point of time.

(b) The rematerialisation process is completed within 30 days.

(c) The securities sent for rematerialisation cannot be traded.

Process of Rematerialisation

The process is called rematerialisation. If one wishes to get back his securities in the physical form he has to fill in the RRF (Remat Request Form) and request his DP for rematerialisation of the balances in his securities account.

The process of rematerialisation is outlined below:

(a) Make a request for rematerialisation.

(b) Depository participant intimates depository regarding the request through the system.

(c) Depository confirms rematerialisation request to the registrar.

(d) Registrar updates accounts and prints certificates.

(e) Depository updates accounts and downloads details to depository participant.

(f) Registrar dispatches certificates to investor.

Depository System

A depository is an organisation which holds securities (like shares, debentures, bonds, government securities, mutual fund units etc.) of investors in electronic form at the request of the investors through a registered Depository Participant. It also provides services related to transactions in securities. At present two Depositories viz. National Securities Depository Limited (NSDL) and Central Depository Services (India) Limited (CDSL) are registered with SEBI.

The increase in the volume of activity on stock exchanges with the advent of on-screen trading coupled with operational inefficiencies of the former settlement and clearing system led to the emergence of a new system called the depository system. The SEBI mandated compulsory trading and settlement of select securities in dematerialized form.

Need for Setting-up a Depository in India

The need was realized in the 1990s due to various reasons as under:

- A lot of time was consumed in the process of allotment and transfer of shares.
- Increase in volume of transactions.
- Large scale irregularities in the securities scam of 1992 exposed the limitations of the prevailing settlement system.
- Problems associated with dealing in physical shares, such as
  - Problems of theft, fake and/or forged transfers,
  - Share transfer delays particularly due to signature mismatches; and
  - Paper work involved in buying, selling, and transfer leading to costs of handling, storage, transportation, and other back-office costs.

To overcome these problems, the Government of India, in 1996, enacted the Depositories Act, 1996 to start depository services in India.

Depository Process

There are four parties in a demat transaction: the customer, the depository participant (DP), the depository, and the share registrar and transfer agent (R&T). A Depository Participant (DP) is an agent of the depository through which it interfaces with the investor and provides depository services. Public financial institutions, scheduled commercial banks, foreign banks operating in India with the approval of the Reserve Bank of India, state financial corporations, custodians, stock-brokers, clearing corporations /clearing houses, NBFCs and registrar to an issue or Share Transfer Agent complying with the requirements prescribed by SEBI can be registered as DP. Banking services can be availed through a branch whereas depository services can be availed through a DP. The investor has to enter into an agreement with the DP after which he is issued a client account number or client ID number. PAN Card is now mandatory to operate a demat account.

2.2.6 Initial Public Offering (IPO), Follow on Public Offer (FPO), Book Building, Green shoe Option

Initial Public Offering (IPO)

An initial public offering (IPO) or stock market launch is a type of public offering where shares of stock in a company are sold to the general public, on a securities exchange, for the first time. Through this process, a private company transforms into a public company. It is an offering of either a fresh issue of securities or an offer for sale of existing securities, or both by an unlisted company for the first time to the public. Initial public offerings are used by companies to raise expansion capital, to possibly monetize the investments of early private investors, and to become publicly traded enterprises. a company selling shares is never required to repay the capital to its public investors.

The IPO process in India consists of the following steps:

- Appointment of merchant banker and other intermediaries
- Registration of offer document
- Marketing of the issue
- Post-issue activities

Follow on Public Offer (FPO)

A follow-on offering (often but incorrectly called secondary offering) is an offer of sale of securities by a listed company. A follow-on offering can be either of two types (or a mixture of both): dilutive and non-dilutive. A secondary offering is an offering of securities by a shareholder of the company (as opposed to the company itself, which is a primary offering). A follow on offering is preceded by release of prospectus similar to IPO: a Follow-on Public Offer (FPO).

As with an IPO, the investment banks who are serving as underwriters of the follow-on offering will often be offered the use of a green shoe or over-allotment option by the selling company.

A non-dilutive offering is also called a secondary market offering. Follow on Public offering is different from initial public offering.

- IPO is made when company seeks to raise capital via public investment while FPO is subsequent public contribution.

- First issue of shares by the company is made through IPO when company first becoming a publicly traded company on a national exchange while Follow on Public Offering is the public issue of shares for an already listed company.

Book Building

Book building means a process by which a demand for the securities proposed to be issued by a body corporate is elicited and built up and the price for such securities is assessed for the determination of the quantum of such securities to be issued by means of notice/ circular / advertisement/ document or information memoranda or offer document. It is a mechanism where, during the period for which the book for the offer is open, the bids are collected from investors at various prices, which are within the price band specified by the issuer. The process is directed towards both the institutional as well as the retail investors. The issue price is determined after the bid closure based on the demand generated in the process.

The book-building system is part of Initial Public Offer (IPO) of Indian Capital Market. It was introduced by SEBI on recommendations of Mr. Y.H. Malegam in October 1995. It is most practical, fast and efficient management of mega issues. Book building involves sale of securities to the public and the institutional bidders on the basis of predetermined price range.

- Book building is a price discovery mechanism and is becoming increasingly popular as a method of issuing capital. The idea behind this process is to find a better price for the issue.
- The issue price is not determined in advance. Book Building is a process wherein the issue price of a security is determined by the demand and supply forces in the capital market.
- Book building is a process used for marketing a public offer of equity shares of a company and is a common practice in most developed countries.
- Book building refers to the collection of bids from investors, which is based on an indicative price range.
- The issue price is fixed after the bid closing date. The various bids received from the investors are recorded in a book that is why the process is called Book Building.
- Unlike international markets, India has a large number of retail investors who actively participate in initial Public Offer (IPOs) by companies. Internationally, the most active investors are the mutual funds and other institutional investors, hence the entire issue is book built. But in India, 25 per cent of the issue has to be offered to the general public. Here there are two options with the company.
- An issuer company may make an issue of securities to the public through a prospectus in the following manner:
  - 100% of the net offer to the public through the book building process, or
  - 75% of the net offer to the public through the book building process and 25% at the price determined through the book building. The fixed portion is conducted like a normal public issue after the book built which the issue is determined.

Advantages of Book Building

1. The book building process helps in discovery of price and demand.
2. The costs of the public issue are much reduced.
3. The time taken for the completion of the entire process is much less than that in the normal public issue.
4. In book building, the demand for the share is known before the issue closes. Infact, if there is not much demand, the issue may be deferred.

5. It inspires investors' confidence leading to a large investor universe.
6. Issuers can choose investors by quality.
7. The issue price is market determined.

Disadvantages of Book Building

1. There is a possibility of price rigging on listing as promoters may try to bail out syndicate members.
2. The book building system works very efficiently in matured market conditions. But, such conditions are not commonly found in practice.
3. It is appropriate for the mega issues only.
4. The company should be fundamentally strong and well known to the investors without it book building process will be unsuccessful.

Green-shoe Option

Green shoe option is the option for stabilisation of the post-listing price of securities in a public issue by allotting excess shares. An issuer may provide green shoe option for stabilisation of the post-listing price of its securities by allotting excess shares. Up to 15 per cent of the issue size may be borrowed by the stabilising agent from the promoters/pre-issue shareholders holding more than 5 per cent of the securities.

2.2.7 Offer for Sale, Private Placement and Preferential Allotment

Offer for Sale

Offer for sale (OFS), introduced by SEBI, in February 2012, helps promoters of listed companies to dilute their stake through an exchange platform. The promoters are the sellers. The bidders may include market participant such as individuals, companies, qualified institutional buyers (QIBs) and foreign institutional investors (FII). The facility is available on the BSE Limited (BSE) and National Stock Exchange of India Limited (NSE).

Size of the offer for Sale of Shares

1. The size of the offer shall be a minimum of ₹ 25 crores. However, size of offer can be less than ₹ 25 crores so as to achieve minimum public shareholding in a single tranche.
2. Minimum 10% of the offer size shall be reserved for retail investors. For this purpose, retail investor shall mean an individual investor who places bids for shares of total value of not more than ₹ 2 lakhs aggregated across the exchanges.

Eligible Buyer(s)

1. All investors registered with trading member of the exchanges other than the promoter(s)/ promoter group entities.
2. In case a non-promoter shareholder offers shares through the OFS mechanism, promoters/ promoter group entities of such companies may participate in the OFS to purchase shares subject to compliance with applicable provisions of SEBI (Issue of Capital and Disclosure Requirements) Regulations, 2009 and SEBI (Substantial Acquisition of Shares and Takeovers) Regulations, 2011.

Private Placement and Preferential Allotment

When an issuer makes an issue of shares or convertible securities to a select group of persons not exceeding 49 persons, and which is neither a rights issue nor a public issue, it is called a private placement. Private placement of

shares or convertible securities by listed issuer can be of three types:

(i) **Preferential Allotment**: When a listed issuer issues shares or convertible securities, to a select group of persons in terms of provisions of Chapter VII of SEBI (ICDR) Regulations, 2009, it is called a preferential allotment. The issuer is required to comply with various provisions which inter–alia include pricing, disclosures in the notice, lock–in etc, in addition to the requirements specified in the Companies Act.

(ii) **Qualified institutions Placement (QIP):** When a listed issuer issues equity shares or non-convertible debt instruments along with warrants and convertible securities other than warrants to Qualified Institutions Buyers only, in terms of provisions of Chapter VIII of SEBI (ICDR) Regulations, 2009, it is called a QIP.

(iii) **Institutional Placement Programme (IPP):** When a listed issuer makes a further public offer of equity shares, or offer for sale of shares by promoter/promoter group of listed issuer in which the offer, allocation and allotment of such shares is made only to qualified institutional buyers in terms Chapter VIII A of SEBI (ICDR) Regulations, 2009 for the purpose of achieving minimum public shareholding, it is called an IPP.

2.2.8 Insider Trading

It is buying or selling or dealing in securities of a listed company by director, member of management, an employee or any other person such as internal or statutory auditor, agent, advisor, analyst consultant etc. who have knowledge of material, 'inside' information not available to general public.

Illegal: Dealing in securities by an insider is illegal when it is predicated upon utilization of inside information to profit at the expense of other investors who do not have access to such investment information. It is prohibited and is considered as an offence as per SEBI (Insider Trading) regulations,1992.

Punishable: Insider trading is an unethical practice resorted by those in power, causing huge losses to common investors thus driving them away from capital market, and hence punishable.

Three decades have passed since the SEBI (Prohibition of Insider Trading) Regulations, 1992 were notified which was framed to deter the practice of insider trading in the securities of listed companies. Since then there have been several amendments to the regulations and judicial paradigm through case laws have also evolved in India. In fact, world over, the regulatory focus is shifting towards containing the rising menace of insider trading effectively. To ensure that the regulatory framework dealing with insider trading in India is further strengthened, SEBI seeks review of the extant insider trading regulatory regime in India.

The Securities and Exchange Board of India (Prohibition of Insider Trading) Regulations 1992 requires that a person who is connected with a listed company and is in possession of any unpublished price sensitive information likely to materially affect the price of securities of company, shall not:

(i) On his behalf or on behalf of any other person deal in securities or

(ii) Communicate such information to any other person, who while in possession of such information shall not deal in securities.

Accordingly, SEBI has constituted a High-Level Committee under the Chairmanship of Hon'ble Justice Mr. N. K. Sodhi, retired Chief Justice of Karnataka High Court and Former Presiding officer of the Securities Appellate Tribunal, for reviewing the SEBI (Prohibition of Insider Trading) Regulations, 1992.

2.2.9 Credit Rating - Credit Rating Methods and Rating Agencies in India

Credit rating is the assessment of a borrower's credit quality. it is the assessment carried out from the viewpoint of credit-risk evaluation on a specific date, on the quality of a-

- Specific debt-security issued, or
- Obligation undertaken by an enterprise (Term Loans, etc.)

Areas of Assessment: Assessment is done on the: -

- **Ability:** Financial strength
- **Willingness:** Integrity and attitude, of the obligant to meet principal and interest payments on the rated debt instrument in a timely manner.

Need for Credit Rating:

A firm has to ascertain the credit rating of prospective customers, to ascertain how much and how long can credit be extended. credit can be granted only to a customer who is reliably sound. this decision would involve analysis of the financial status of the party, his reputation and previous record of meeting commitments.

Features:

Ratings are expressed in alphabetical or alphanumeric symbols, enabling the investor to differentiate between debt instruments based on their underlying credit quality.

Credit Rating do not measure the following:

(i) **Investment Recommendation:** Credit rating does not make any recommendation on whether to invest or not.

(ii) **Investment Decision:** They do not take into account the aspects that influence an investment decision.

(iii) **Issue Price:** Credit rating does not evaluate the reasonableness of the issue price, possibilities for capital gains or liquidity in the secondary market.

(iv) **Risk of Prepayment:** Ratings do not take into account the risk of prepayment by issuer, or interest or exchange risks.

(v) **Statutory Compliance:** Credit rating does not imply that there is absolute compliance of statutory requirements in relation to audit, taxation, etc. by-the issuing company.

Objectives:

(i) To maintain investors' confidence.

(ii) To protect the interest of investors.

(iii) To provide low cost and reliable information to the investors in debt securities.

(iv) To act as a tool for marketing of debt securities.

(v) To improve a healthy discipline on borrowers.

(vi) To help merchant bankers, financial intermediaries and regulatory authorities in discharging their functions related to the issue of debt securities.

(vii) To provide greater financial and accounting information of the issuers of securities to the investors.

(viii) To facilitate and formulate public guidelines on institutional investment.

(ix) To reduce interest costs for highly rated companies.

(x) To motivate savers to invest in debt securities for the development of trade and industry.

Limitations:

(i) **Rating Changes:** Rating given to instruments can change over a period of time. they have to be kept under rating watch. Downgrading of an instrument may not be timely enough to help investors.

(ii) **Industry Specific rather than Company Specific:** Downgrades are linked to industry rather than company performance. Agencies give importance to macro aspects and not to micro-ones; over react to existing conditions which come from optimistic / pessimistic views arising out of up / down turns.

(iii) **Cost -Benefit of Rating:** Ratings being mandatory, it becomes a must for entities rather than carrying out cost Benefit Analysis of obtaining such, ratings. Rating should be optional and the entity should be free to decide on the issue of obtaining a credit rating.

(iv) **Conflict of Interest:** The rating agency collects fees from the entity it rates leading to a conflict of interest. Rating market being competitive there is a possibility of such conflict entering into the rating system especially in a case where the rating agencies get their revenues from a single service or group.

(v) **Transparency:** Greater transparency in the rating process should exist an example being the disclosure of assumptions leading to a specific public rating.

Methods /Process of Credit Rating:

The steps involved in the Credit Rating are:

(1) Rating Request: The Customer (Prospective issuer of Debt Instrument) makes a formal request to the Rating Agency. The request spells out the terms of the rating assignment and contains analysis of the issues viz. historical performance, competitive position, business risk profile, business strategies, financial policies and evaluation of outlook for performance. information requirements are met through various sources like references, reviews, experience, etc.

(2) Formation of Rating Team: The rating process is initiated once a rating agreement is signed between Rating Agency and the client/ on receipt of a formal request (or mandate) from the client. Then the credit rating agency forms a team, whose composition is based on the expertise and skills required for evaluating the business of the issuer. The client is then provided with a list of information required and the broad framework for discussions.

(3) Initial Analysis: On the basis of the information gathered, the analysts submit the report to the Rating team. The authenticity and validity of the information submitted influences the credit rating activity.

(4) Evaluation by Rating Committee: Rating Committee is the final authority for assigning ratings. The rating team makes a brief presentation about the issuers' business and the management. All the issues identified during discussions stage are analysed.

(5) Actual Rating: Rating is assigned and all the issues, which influence the rating, are clearly spelt out.

(6) Communication to Issuer: Assigned rating together with the key issues is communicated to the issuer's top management for acceptance. the ratings, which are not accepted, are either rejected or reviewed. The rejected ratings are not disclosed and complete confidentiality is maintained.

(7) Review of Rating: If the rating is not acceptable to the issuer, he has a right to appeal for a review of the rating. These reviews are usually taken up, only if the issuer provides fresh inputs on the issues that were considered for assigning the rating. issuer's response is presented to the rating committee. If the inputs are convincing, the committee can revise the initial rating decision.

(8) Surveillance / Monitoring: credit rating agency monitors the accepted ratings over the tenure of the rated instrument. Ratings are reviewed every year, unless warranted earlier. During this course, the initial rating could be retained, upgraded or downgraded.

Various Credit Rating Agencies in India

There are seven credit rating agencies registered with the SEBI at present. They are outlined as follows:

1. **CRISIL Ratings Limited (Formerly the Credit Rating Information Services of India Limited):**
   - **(a) CRISIL** is the oldest rating agency originally promoted by ICICI.
   - **(b) Services Offered: CRISIL** offers a comprehensive range of integrated product and service offerings - real time news, analyzed data, opinion and expert advice - to enable investors, issuers, policy makers de-risk their business and financial decision making, take informed investment decisions and develop workable solutions.
   - **(c) Risk Standardisation: CRISIL** helps to understand, measure and standardise risks - financial and credit risks, price and market risks, exchange and liquidity risks, operational, strategic and regulatory risks.
2. **ICRA limited (Formerly Investment Information and Credit Rating Agency of India):**
   - **(a) ICRA** is an independent and professional company, providing investment information and credit rating services.
   - **(b) Activities: ICRA** executes assignments in credit ratings, equity grading, and mandated studies spanning diverse, industrial sectors. ICRA has broad based its services to the corporate and financial sectors, both in India and overseas and offers its services under three banners namely- rating services, information services, advisory services.
3. **Care Ratings Limited (Credit Analysis and Research Limited)**
   - **(a) CARE** is equipped to rate all types of debt instruments like Commercial Paper, Fixed Deposit, Bonds, Debentures and Structured Obligations.
   - **(b) Services: CARE's** information and advisory services group prepares credit reports on specific requests from banks or business partners, conducts sector studies and provides advisory services in the areas of financial restructuring, valuation and credit appraisal systems.
4. **India Ratings and Research Pvt. Ltd. (Formerly Fitch Ratings India Pvt. Ltd.):**

   Fitch Rating India was formerly known as DCR India- Duff and Phelps Credit Rating Co. Fitch Ratings, USA and DCR India merged to form a new entity called Fitch India. Fitch India is a 100% subsidiary of fitch ratings, USA and is the wholly owned foreign operator in India. fitch is the only international rating agency with a presence on the ground in India. fitch rating India rates corporates, banks, financial institutions, structured deals, securitized paper, global infrastructure and project finance, public finance, SMEs, asset management companies, and insurance companies.
5. **Brickwork Ratings India Private Limited**

   It is the fifth agency in the ratings business which commenced its activities from September 24, 2008. It rates IPOs, perpetual bonds of banks, non-convertible debenture issues, and certificate of deposits.
6. **Acuite Ratings & Research Limited (Formerly SMERA):**

   Acuite Ratings & Research Limited (www.acuite.in) is a full-service credit rating agency accredited by Reserve Bank of India (RBI) as an External Credit Assessment Institution (ECAI) and registered with the Securities and Exchange Board of India (SEBI). This CRA started its first bond rating in 2012 and has a track record of over 5 years in rating the entire range of debt instruments including NCDs, Commercial Paper and Bank Loan Ratings (BLR).
7. **Infomerics Valuation and Rating Pvt. Ltd.**

   Infomerics Valuation and Rating Private Limited is a SEBI registered and RBI accredited Credit Rating Agency in the year 2015.

Money Market

2.3

Money market is the market for dealing in monetary assets of short-term in nature. Short-term funds up to one year and for financial assets that are close substitutes for money are dealt in the money market. It is not a physical location (like the stock market), but an activity that is conducted over the telephone. Money market instruments have the characteristics of liquidity (quick conversion into money), minimum transaction cost and no loss in value. Excess funds are deployed in the money market, which in turn is availed to meet temporary shortages of cash and other obligations.

Features of Money Market:

(a) **Instruments Traded:** Money market is a collection of instruments like Call Money, Notice Money, Repos, Term Money, Treasury Bills, Commercial Bills, Certificate of Deposits, Commercial Papers, Inter-Bank Participation Certificates, Inter Corporate Deposits, Swaps, etc.

(b) **Large Participants :** The participants of money market are — (i) lenders, (ii) mutual funds, (iii) financial institutions including the RBI, Scheduled Commercial Banks, Discount and Finance House of India and (iv) borrowers. Network of a large number of Participants exists which add greater depth to the market. This network can be broadly classified as follows:

Organized Sector

(i) Commercial and Other Banks

(ii) Non-Banking Financial Companies

(iii) Co–operative Banks

Unorganised Sector

(i) Indigenous Bankers

(ii) Nidhis and Chit Funds

(iii) Unorganized Money Lenders

(c) **Zone Centric Activities:** Activities in the money market tend to concentrate in some centre, which serves a region or an area. The width of such area may vary depending upon the size and needs of the market itself.

(d) **Pure Competition:** Relationship between participants in a money market is impersonal in character, and the competition is relatively pure.

(e) **Lower Price Differentials:** Price differentials for assets of similar type tend to be eliminated by the interplay of demand and supply.

(f) **Flexible Regulations:** Certain degree of flexibility in the regulatory framework exists and there are constant endeavours for introducing a new instruments / innovative dealing technique.

(g) **Market Size:** It is a wholesale market and the volume of funds or financial assets traded are very large, i.e., in crores of rupees.

Major characteristics of money market instruments are:

- Short-term nature;
- Low risk;
- High liquidity (in general);
- Close to money.

2.3.1 Call Money

Call/Notice money is an amount borrowed or lent on demand for a very short period. If the period is more than one day and upto 14 days, it is called notice money and if the period is more than 14 days, it is called call money**.**

Exclusions: Intervening holidays and / or Sundays are excluded for this purpose. No collateral security is required to cover these transactions**.**

Table 2.18: Participants of Call Money

Nature of Persons	Persons
Borrow and Lend	Reserve Bank of India (RBI) through lAFS, Banks, Primary Dealers (PD)
Lenders	Financial Institutions such as: -
	(a) Life insurance corporation of India (LIC)
	(b) Unit Trust of India (UTI) and other mutual funds
	(c) General Insurance Corporation (GIC)
	(d) Industrial Development Bank of India (IDBI)
	(e) National Bank for Agricultural and Rural Development (NABARD)
	(f) Industrial Credit Investment Corporation of India (ICICI)

Benefits:

(a) **Banks and Institutions:** Call market enables banks and financial institutions to even out their day- to-day deficits and surpluses of money.

(b) **Cash Reserve Requirements:** Commercial Banks, Co-operative Banks and Primary Dealers are allowed to borrow and lend in this market for adjusting their cash reserve requirements.

(c) **Outlet for Deploying Funds:** It serves as an outlet for deploying funds on short-term basis to the lenders having steady inflow of funds.

Nature of Call Money Market

Call money represents the amount borrowed by the commercial banks from each other to meet their temporary funds requirements. The market for such extremely short period loans is referred to as the “call money market”.

Call loans in India are given:

(i) to the bill market,

(ii) to dealers in stock exchange for the purpose of dealings in stock exchange,

(iii) between banks, and

(iv) to individuals of high financial status in Mumbai for ordinary trade purpose in order to save interest on cash credit and overdrafts.

Among these uses, inter-bank use has been the most significant. These loans are given for a very short duration, between 1 day to 15 days. There are no collateral securities demanded against these loans i.e., unsecured. The borrower has to repay the loans immediately they are called for i.e., highly liquid. As such, these loans are described as "call loans" or "call money".

2.3.2 Treasury Bills

Treasury bills are short-term instruments issued by the Reserve Bank on behalf of the government to tide over short-term liquidity shortfalls. This instrument is used by the government to raise short-term funds to bridge seasonal or temporary gaps between its receipts (revenue and capital) and expenditure. They form the most important segment of the money market not only in India but all over the world as well.

T-bills are repaid at par on maturity. The difference between the amount paid by the tenderer at the time of purchase (which is less than the face value) and the amount received on maturity represents the interest amount on T-bills and is known as the discount. Tax deducted at source (TDS) is not applicable on T-bills.

Features of T-bills

- They are negotiable securities.
- They are highly liquid as they are of shorter tenure and there is a possibility of inter-bank repos in them.
- There is an absence of default risk.
- They have an assured yield, low transaction cost, and are eligible for inclusion in the securities for SLR purposes.
- They are not issued in scrip form. the purchases and sales are effected through the subsidiary general ledger (sgl) account.
- At present, there are 91-day, 182-day, and 364-day T-bills in vogue. The 91-day T-bills are auctioned by the RBI every Friday and the 364-day T-bills every alternate Wednesday, i.e., the Wednesday preceding the reporting friday.
- Treasury bills are available for a minimum amount of ₹ 25,000 and in multiples thereof.

Issue Price: Treasury Bills are issued at a discount and redeemed at face value.

Investors: Banks, Primary Dealers, State governments, Provident funds, financial institutions, Insurance companies, NBFCs, FIIs (as per prescribed norms), NRIs can invest in T-Bills.

Participants in the T-Bills Market: The Reserve Bank of India, commercial banks, mutual funds, financial institutions, primary dealers, provident funds, corporates, foreign banks, and foreign institutional investors are all participants in the T-bills market. The state governments can invest their surplus funds as non-competitive bidders in T-bills of all maturities.

Yield in Treasury Bills: It is calculated as per the following formula:

$$\text{Yield} = \frac{100 - P}{P} \times \frac{365}{D} \times 100$$

Where,

P = Purchase price

D = Days to maturity

Day Count for Treasury Bill: Actual number of days to maturity/ 365

Types of Treasury Bills

At present, the Reserve Bank issues T-bills of three maturities: 91-day, 182-day, and 364-day.

(1) 91 Day T-Bills

These are again two types- ordinary and ad-hoc. Ordinary treasury bills are issued to public and RBI for enabling central government to meet temporary requirements of funds. Treasury bills were used to be sold to public at a fixed rate throughout the week to commercial banks and the public. They are repaid at par on maturity. The difference between the amount paid by the tenderer at the time of purchase and the amount received on maturity represents the interest earned and also known by discount.

(2) 182 Day T-Bills These bills were reintroduced in 1999 to enable the development a market for government securities. The Reserve Bank of India introduced 182 days Treasury Bills, as an active money market instrument with flexible interest rates. Features of these T-Bills are:

(a) These Treasury Bills are issued following the procedure of auction.

(b) 182 Days treasury Bills are issued in minimum denomination of ₹ 1 lakh and in multiples thereof. However, in the secondary market, the deals are presently transacted for a minimum amount of ₹ 25 lakhs and thereafter in multiples of ₹ 10 lakhs.

(c) RBI does not purchase 182 Days Treasury bills before maturity but the investors (holders of these treasury Bills) can sell them in the secondary market.

(d) These bills are also eligible for repo transactions.

(3) 364 Day T-Bills

In April 1992, the 364-day T-bills were introduced to replace the 182-day T-bills. These T-bills are issued to generate market loans. The auction of these bills is done fortnightly, as their issue has become a regular activity by the Central Government. These bills offer short-term investment offer for investors and created good response. RBI offers these bills periodically and auctions by giving an opportunity to banks and other financial institutions. The Government of India has now floated Treasury bills of varying maturities upto 364 days on an auction basis which are identical to that for the 182 days treasury bills. They contain varying period of maturities help the short-term investors to decide on the period of investment of their funds.

2.3.3 Commercial Bills

The working capital requirement of business firms is provided by banks through cash-credits / overdraft and purchase/discounting of commercial bills.

Commercial bill is a short term, negotiable, and self-liquidating instrument with low risk. It enhances the liability to make payment in a fixed date when goods are bought on credit. The bill of exchange is a written unconditional order signed by the drawer requiring the party to whom it is addressed to pay on demand or at a future time, a definite sum of money to the payee. It is negotiable and self-liquidating money market instrument which evidences the liquidity to make a payment on a fixed date when goods are bought on credit.

Types of Commercial Bills

Commercial bills can be inland bills or foreign bills.

Inland bills must:

(1) be drawn or made in India and must be payable in India: or

(2) drawn upon any person resident in India.

Foreign bills, on the other hand, are:

(1) drawn outside India and may be payable and by a party outside India, or may be payable in India or drawn on a party in India or

(2) it may be drawn in India and made payable outside India A related classification of bills is export bills and import bills. While export bills are drawn by exporters in any country outside India, import bills are drawn on importers in India by exporters abroad.

Purpose:

Commercial Bills may be used for financing the movement and storage of goods between countries, before export

(pre-export credit), and also within the country. In India, the use of bill of exchange appears to be in vogue for financing agricultural operations, cottage and small-scale industries, and other commercial and trade transactions.

2.3.4 Commercial Paper

Commercial paper (CP) is an unsecured short-term promissory note, negotiable and transferable by endorsement and delivery with a fixed maturity period. It is issued only by large, well known, creditworthy companies and is typically unsecured, issued at a discount on face value, and redeemable at its face value. the aim of its issuance is to provide liquidity or finance company's investments, e.g., in inventory and accounts receivable.

The major issuers of commercial papers are financial institutions, such as finance companies, bank holding companies, insurance companies. Financial companies tend to use CPs as a regular source of finance. Non-financial companies tend to issue CPs on an irregular basis to meet special financing needs.

Advantages

(1) **Simplicity:** Documentation involved in issue of Commercial Paper is simple and minimum.

(2) **Cash Flow Management:** The issuer company can issue Commercial Paper with suitable maturity periods (not exceeding one year), tailored to match the cash flows of the Company.

(3) **Alternative for Bank Finance:** A well-rated company can diversify its sources of finance from Banks, to short-term money markets, at relatively cheaper cost.

(4) **Returns to Investors:** CP's provide investors with higher returns than the banking system.

(5) **Incentive for Financial Strength:** Companies which raise funds through CP become well-known in the financial world for their strengths. They are placed in a more favourable position for raising long-term capital also. So, there is an inbuilt incentive for Companies to remain financially strong.

RBI Guidelines in respect of issue of Commercial Paper

(1) Eligible issuers of CP: (a) Corporates, (b) Primary Dealers (PDs), and (c) All-India Financial Institutions (FIs) that have been permitted to raise short-term resources under the umbrella limit fixed by RBI are eligible to issue CP.

- **All-India Financial Institutions** (FIs) mean those financial institutions which have been permitted specifically by the RBI to raise resources by way of Term Money, Term Deposits, Certificates of Deposit, Commercial Paper and Inter-Corporate Deposits, where applicable, within umbrella limit.
- **Primary Dealer** means a non-banking financial company which holds a valid letter of authorization as a Primary Dealer issued by the RBI.

(2) Investors for CP: CP may be issued to and held by —

(a) Individuals
(b) Banking companies
(c) Other corporate Bodies registered/ incorporated in India
(d) Unincorporated Bodies
(e) Non-Resident Indians (NRIs) and
(f) Foreign Institutional Investors (FIIs)

(3) Maturity: CP can be issued for maturities between a minimum of 7 days and a maximum up to one year from the date of issue. Maturity date of CP should not go beyond the date up to which the credit rating of the issuer is valid.

(4) Denominations: CP can be issued in denominations of ₹ 5 lakh or multiples thereof. Amount invested by a single investor should not be less than ₹ 5 lakh (face value).

(5) Basic issue conditions for a corporate: A Corporate would be eligible to issue CP provided –

(a) Its tangible net worth, as per the latest audited balance sheet, is not less than ₹ 4 Crores.

(b) It has been sanctioned working capital limit by bank/s or all-India financial institution/s.

(c) Its borrowal account is classified as a standard asset by the financing bank(s)/ institution(s).

(6) Credit Rating: All eligible participants shall obtain the credit rating for issuance of CP from –

(a) Credit Rating Information Services of India Ltd. (CRISIL) or

(b) Investment Information and Credit Rating Agency Of India Ltd. (ICRA) or

(c) Credit Analysis and Research Ltd. (CARE) or

(d) Fitch Ratings India Pvt. Ltd. or

(e) Such other credit rating agencies as may be specified by the RBI.

Minimum credit rating shall be P-2 of CRISIL or such equivalent rating by other agencies. At the time of issuance of CP, the rating so obtained should be current and not fallen due for review.

(7) Amount of CP:

(a) The aggregate amount of CP from an issuer shall be the least of—

- limit as approved by its Board of Directors, or
- quantum indicated by the Credit Rating Agency for the specified rating.

(b) An FI can issue CP within the overall umbrella limit fixed by the RBI, i.e. issue of CP together with Term Money Borrowings (TMB), Term Deposits (TD), Certificates of Deposit (CD) and Inter-Corporate Deposits (ICD) should not exceed 100% of its Net Owned Funds, as per the latest audited Balance sheet.

(8) Time Period: The total amount of CP proposed to be issued should be raised within two weeks from the date on which the issue is open for subscription. Every CP issue shall be reported to the RBI, through the Issuing and Paying Agent (IPA) within three days from the date of completion of the issue.

(9) Mode of Issuance: The following points are relevant –

(a) CP can be issued either in the form of a promissory note (physical form) or in a dematerialized form (Demat form) through any of the depositories approved by and registered with SEBI.

(b) CP will be issued at a discount to face value as may be determined by the issuer.

(c) No issuer shall have the issue of CP underwritten or co-accepted.

(10) Issuing and Paying Agent (IPA): Only a scheduled bank can act as an IPA for issuance of CP. Every issuer must appoint an IPA for issuance of CP.

(11) Procedure for Issuance: Issuer should disclose its financial position to the potential investors. After the exchange of deal confirmation, issuing Company shall issue physical certificates to the investor or arrange for crediting the CP to the investor's account with a depository. Investors shall be given a copy of IPA certificate to the effect that the issuer has a valid agreement with the IPA and documents are in order.

(12) Mode of Investment in CP: The investor in CP shall pay the discounted value (issue price) of the CP by means of a crossed account payee cheque to the account of the issuer through IPA.

(13) Repayment of CP on Maturity: On maturity of CP, when the CP is held in physical form, the holder of the CP shall present the instrument for payment to the issuer through the IPA. When the CP is held in demat form, the holder of the CP will get it redeemed through the depository and receive payment from the IPA.

(14) Defaults in CP Market: In order to monitor defaults in redemption of CP, Scheduled Banks which act as IPAs, shall immediately report, on occurrence, full particulars of defaults in repayment of CPs to the RBI.

(15) Stand-by Facility: Non-bank entities including corporates may provide unconditional and irrevocable guarantee for credit enhancement for CP issue provided –

(a) the issuer fulfils the eligibility criteria prescribed for issuance of CP,

(b) the guarantor has a credit rating at least one notch higher than the issuer given by an approved credit rating agency, and

(c) the offer document for CP properly discloses the net worth of the guarantor company, the names of the Companies to which the guarantor has issued similar guarantees, the extent of the guarantees offered by the guarantor Company, and the conditions under which the guarantee will be invoked.

2.3.5 Certificate of Deposits (CD)

CD is a negotiable money market instrument and issued in dematerialized form or as a usance promissory note, for funds deposited at a Bank or other eligible Financial Institution for a specified time period.

Salient Features:

- CDs can be issued to individuals, corporations, companies, trusts, funds, associates, etc.
- NRIs can subscribe to CDs on non-repatriable basis.
- CDs attract stamp duty as applicable to negotiable instruments.
- Banks have to maintain SLR and CRR on the issue price of CDs. no ceiling on the amount to be issued.
- The minimum issue size of CDs is rs1 lakh and in multiples thereof.
- CDs are transferable by endorsement and delivery.
- The minimum lock-in-period for CDs is 15 days.
- CDs are issued by Banks, when the deposit growth is sluggish and credit demand is high and a tightening trend in call rate is evident. CDs are generally considered high-cost liabilities and banks have recourse to them only under tight liquidity conditions.

2.3.6 Repo, Reverse Repo

Repo or ready forward contact is an instrument for borrowing funds by selling securities with an agreement to repurchase the said securities on a mutually agreed future date at an agreed price which includes interest for the funds borrowed. Repo rate is the return earned on a repo transaction expressed as an annual interest rate.

The Reverse of the repo transaction is called '**reverse repo**' which is lending of funds against buying of securities with an agreement to resell the said securities on a mutually agreed future date at an agreed price which includes interest for the funds lent.

It can be seen from the definition above that there are two legs to the same transaction in a repo/ reverse repo.

The duration between the two legs is called the 'repo period'. Predominantly, repos are undertaken on overnight basis, i.e., for one day period. Settlement of repo transactions happens along with the outright trades in government securities.

The consideration amount in the first leg of the repo transactions is the amount borrowed by the seller of the security. On this, interest at the agreed 'repo rate' is calculated and paid along with the consideration amount of the second leg of the transaction when the borrower buys back the security. The overall effect of the repo transaction would be borrowing of funds backed by the collateral of Government securities.

Features of Repo:

(1) Banks and primary dealers are allowed to undertake both repo and reverse repo transactions.

(2) It is a collateralized short-term lending and borrowing agreement.

(3) It serves as an outlet for deploying funds on short-term basis.

(4) The interest rates depend on the demand and supply of the short-term surplus/deficit amongst the interbank players.

(5) In addition to T-Bills all Central and State Government securities are eligible for repo.

(6) No sale of securities should be affected unless the securities are actually held by the seller in his own investment portfolio.

(7) Immediately on sale, the corresponding amount should be reduced from the investment account of the seller.

(8) The securities under repo should be marked to market on the balance sheet.

Participants: Buyer in a Repo is usually a Bank which requires approved securities in its investment portfolio to meet the statutory liquidity ratio (SLR).

Types of Repos:

- **Overnight Repo:** When the term of the loan is for one day, it is known as an overnight repo. Most repos are overnight transactions, with the purchase and sale taking place one day and being reversed the next day.
- **Term Repo:** When the term of the loan is for more than one day it is called a term repo. Long-term repos which are as such can be extended for a month or more.
- **Open Repo:** Open repo simply has no end date. Usually, repos are for a fixed period of time, but openended deals are also possible.

Interest:

(a) **Computation:** Interest for the period of Repo is the difference between Sale Price and Purchase Price.

(b) **Recognition:** Interest should be recognized on a time-proportion basis, both in the books of the buyer and seller.

2.3.7 Promissory Notes and Government Securities

Promissory Notes

A written, dated and signed two-party instrument containing an unconditional promise by the maker to pay a definite sum of money to a payee on demand or at a specified future date.

Essentials of a Promissory Note:

- It must be in writing.
- It must not be a bank note or a currency note.
- It must contain unconditional undertaking.
- It must be signed by the maker.
- The undertaking must be to pay on demand or at a fixed or determinable future time.
- The undertaking must be to pay a certain sum of money.
- The money must be payable to a certain person or to his order, or to the bearer of the instrument.

Government Securities

A government security is a tradable instrument issued by the central government or the state governments. It acknowledges the Government's debt obligation. Such securities are short-term (usually called treasury bills, with original maturities of less than one year) or long-term (usually called Government bonds or dated securities with original maturity of one year or more). In India, the Central Government issues both, treasury bills and bonds or dated securities while the State Governments issue only bonds or dated securities, which are called the State Development Loans (SDLs). Government securities carry practically no risk of default and, hence, are called riskfree gilt-edged instruments. Government of India also issues savings instruments (Savings Bonds, National Saving Certificates (NSCs), etc.) or special securities (oil bonds, Food Corporation of India bonds, fertilizer bonds, power bonds, etc.). They are, usually not fully tradable and are, therefore, not eligible to be SLR securities.

Government securities are mostly interest bearing dated securities issued by RBI on behalf of the government of India GOI uses these funds to meet its expenditure commitments. These securities are generally fixed maturity and fixed coupon securities carrying semi-annual coupon. Since the date of maturity is specified in the securities, these are known as dated Government Securities.

Features of Government Securities

1. Issued at face value.
2. No default risk as the securities carry sovereign guarantee.
3. Ample liquidity as the investor can sell the security in the secondary market.
4. Interest payment on a half yearly basis on face value.
5. No tax deducted at source.
6. Can be held in demat form.
7. Rate of interest and tenor of the security is fixed at the time of issuance and is not subject to change (unless intrinsic to the security like FRBs - Floating Rate Bonds).
8. Redeemed at face value on maturity.
9. Maturity ranges from 91 days-30 years.
10. Government securities qualify as SLR (Statutory Liquidity Ratio) investments, unless otherwise stated.

Government Securities- Types

1. Treasury Bills
2. Government Bonds or Dated Securities
3. State Development Loans
4. Any other security created and issued by the Government in such form and for such of the purposes of the act as may be prescribed

Government Securities- Issuers

Government securities are issued by the following agencies:

1. Central Government

2. State Government

3. Semi-government authorities

4. Public sector undertakings

Solved Case 1

Delhi Manufacturers intend to raise ₹ 40,00,000 of equity capital through a rights offering. It currently has 10,00,000 shares outstanding which have been most recently selling / trading for ₹ 50 and ₹ 56 per share. In consultation with the SEBI Caps, the company has set the subscription price for the rights at ₹ 50 per share.

You are required to:

(a) Determine the number of new shares of the company should sell to raise the desired amount of capital.

(b) Ascertain the number of shares each right would entitle a holder of one share to purchase. How many additional shares can an investor who holds 10,000 shares of the company purchase?

Solution:

(a) Number of new shares $= \frac{₹\ 40,00,000 \text{ (to be raised)}}{₹\ 50 \text{ (Subcription price)}} = 80,000$ Shares

(b) Number of shares per right $= \frac{80,000 \text{ (new shares)}}{10,00,000 \text{ (Shares outstanding)}} = 0.08$ Shares

Solved Case 2

The RBI offers 91-Days Treasury Bills to raise ₹ 1,500 crore. The following bids have been received.

Bidder	Bid Rate (₹)	Amount (₹ in crore)
X	98.95	1,800
Y	98.93	700
Z	98.92	1,000

What is the yield for each of the price at which the bid has been made?

Who are the winning bidders if it was a yield-based auction and how much of the security will be allocated to each winning bidder?

Solution:

(a) Yield = Y = $\left(\frac{F-P}{9}\right) \times \frac{365}{M} \times 100$

Where, M = 91 Days for all. F = Face Value = ₹100

By using the above formula, yields are calculated as below:

X = 4.26% (P = Price = ₹ 98.95)

Y = 4.34% (P = Price = ₹ 98.93)

Z = 4.38% (P = Price = ₹ 98.92)

(b) As this is the yield-based auction, so lowest yield rate will be allotted first and so on. Bidder X will be allotted the entire amount of ₹ 1,500 crore at the lowest yield and X's would be accepted.

X = 4.26% (P = Price = ₹ 98.95)

Exercise

A. Theoretical Questions:

⊙ Multiple Choice Questions

1. Assets Management company is formed
   (a) To manage bank's assets
   (b) To manage mutual funds investments
   (c) To construct infrastructure projects
   (d) To run a stock exchange
2. Prime duty of a merchant banker is -
   (a) Maintaining records of clients
   (b) Giving loans to clients
   (c) Working as a Capital Market Intermediary
   (d) None of the above
3. Basic objective of a money market mutual fund is
   (a) Guaranteed rate of return
   (b) Investment in short-term securities
   (c) Both (a) & (b)
   (d) Neither (a) & (b)
4. Short selling refers to
   (a) Buying shares and then selling them on the same day
   (b) Selling shares without owning them
   (c) Selling some shares out of a large holding
   (d) Continuously selling shares in lots.
5. Which of the following is not regulated by SEBI?
   (a) Foreign Institutional Investors
   (b) Foreign Direct Investment
   (c) Mutual Funds
   (d) Depositories
6. Which of the following is true for mutual funds in India?
   (a) Exit load is not allowed
   (b) Entry load is allowed
   (c) Entry load is not allowed
   (d) Exit load allowed is some cases

7. Which of the following is not available in India?
   (a) Index Options
   (b) Index Futures,
   (c) Commodity Options
   (d) Commodity Futures
8. Which of the following is the benefit of Depositories?
   (a) Reduction in the share transfer time to the buyer
   (b) Reduced Risk of stolen, fake, forged shares
   (c) No Stamp duty on transfer of shares in dematerialized form\
   (d) All of the above
9. Credit Rating of a debt security is
   (a) Guarantee of Repayment
   (b) Merely opinion
   (c) Positive suggestion
   (d) Negative suggestion
10. The first computerised online stock exchange in India was
   (a) NSE
   (b) OTCEI
   (c) BSE
   (d) MCX
11. Which of the following derivative is not traded on Indian Stock Market?
   (a) Index Options
   (b) Stock Futures
   (c) Index Futures
   (d) Forward Rate Agreements
12. How many depositories are there in India?
   (a) 2
   (b) 3
   (c) 0
   (d) 1
13. Secondary Market in India is regulated by
   (a) Reserve Bank of India
   (b) Securities and Exchange Board of India

(c) Ministry of Finance

(d) Forward Market Commission

14. _____ funds do not have a fixed date of redemption.

(a) Open ended funds

(b) Close ended funds

(c) Diversified funds

(d) Both A and B.

15. In India, NIFTY and SENSEX are calculated on the basis of

(a) Market Capitalization

(b) Paid up Capital

(c) Free-float Capitalization

(d) Authorized Share Capital

16. The type of collateral (security) used for short-term loan is

(a) Real estate

(b) Plant & Machinery

(c) Stock of good

(d) Equity share capital

17. Which of the following is a liability of a bank?

(a) Treasury Bills

(b) Commercial papers

(c) Certificate of Deposits

(d) Junk Bonds.

18. Commercial paper is a type of

(a) Fixed coupon Bond

(b) Unsecured short-term debt

(c) Equity share capital

(d) Government Bond

19. Which of the following is not a spontaneous source of short-term funds?

(a) Trade credit

(b) Accrued expenses

(c) Provision for dividend

(d) All of the above.

20. In India, Commercial Papers are issued as per the lines issued by -
    (a) Securities and Exchange Board of India
    (b) Reserve Bank of India
    (c) Forward Market Commission
    (d) RBI
21. Commercial paper are generally issued at a pries
    (a) Equal to face value
    (b) More than face value
    (c) Less than face value
    (d) Equal to redemption value
22. Which of the following is not applicable to commercial paper?
    (a) Face Value
    (b) Issue Price
    (c) Coupon Rate
    (d) None of the above.
23. Which of the following forms of equity financing is especially designed for funding High Risk & High Reward projects?
    (a) ADR
    (b) GDR
    (c) FCCB
    (d) Venture Capital
24. β (Beta) of a security measures its
    (a) Divisible Risk
    (b) Financial Risk
    (c) Market Risk
    (d) None of the above
25. Corporate financing instruments which have an unlimited life, voting right and right to receive dividends are known as
    (a) Non-Redeemable Preference Shares
    (b) Redeemable Preference Shares
    (b) Equity Shares
    (d) Debentures

26. Which of the following securities is not a part of money market?

    (a) Commercial Paper

    (b) Call money

    (c) 91 day Treasury bill

    (d) 5 year Public Deposit

27. The aim of foreign exchange risk management is :

    (a) To maximize profits.

    (b) To know with certainty the quantum of future cash flows.

    (c) To minimize losses.

    (d) To earn a minimum level of profit.

28. A company is planning to issue a discount bond with a par value of ₹ 1,000, implicit interest rate of 11.5% and a redemption period of 5 years. The company also intends to offer an early bird incentive of 1.5%. The issue price (rounded up to nearest rupee) will be [Given : PVIF (11.5%, 5 years) = 0.5803]

    (a) ₹ 580

    (b) ₹ 572

    (c) ₹ 543

    (d) ₹ 490

29. Exchange rate system where the central bank intervenes to smoothen out exchange rate fluctuations is known as :

    (a) Free float

    (b) Managed float

    (c) Fixed rate system

    (d) Floating rate system

30. Money market hedge involves

    (a) Borrowing in foreign currency in case of exports;

    (b) Investing in foreign currency in case of imports;

    (c) Both A and B.

    (d) None of the above

31. Eurodollar deposit means :

    (a) Dollar deposit outside USA

    (b) Dollar deposit beyond the control of monetary authority

    (c) Dollar deposit in the US and outside US

    (d) None of the above.

32. A company issue commercial paper for ₹3 crores with a maturity period of 90 days. The interest rate is 11% p.a. The net amount received by the company will be :

    (a) ₹ 2.94 crores

    (b) ₹ 2.92 crores

    (c) ₹ 2.85 crores

    (d) ₹ 3.08 crores

33. Global Depository Receipts (GDR) are issued to :

    (a) Investors of India who want to subscribe to shares of foreign companies

    (b) Only to persons of Indian origin residing in a foreign country

    (c) Non resident investors against publicly traded shares of the issuing companies and denominated in US dollars.

    (d) Foreign banks as security to raise foreign currency loans.

34. RBI sold a 91 days T-Bill of face value of ₹100 at an yield of 7%. What was the issue price?

    (a) ₹ 98.00

    (b) ₹ 98.08

    (c) ₹ 98.18

    (d) ₹ 98.28

35. The face value of a 364-day T-bill is ₹100. If the purchase price is ₹86 then the yield on such a bill is

    (a) 12.45%

    (b) 13.36%

    (c) 16.32%

    (d) 16.56%

36. Preference shares must be redeemed within a period of _____ from the date of issue.

    (a) 10 yrs

    (b) 20 yrs

    (c) 30 yrs

    (d) 50 yrs

37. From the enumerated list please select instrument which is not dealt in capital market.

    (a) Commercial Paper

    (b) Debenture

    (c) Sweat Equity

    (d) None of the above

38. From the enumerated list please select instrument which is not dealt in money market.
    (a) Equity shares
    (b) Treasury Bill
    (c) Certificate of Deposit
    (d) None of the above
39. If the RBI intends to reduce the supply of money as part of an anti-inflation policy, it might
    (a) Lower Bank rate
    (b) Increase Cash Reserve Ratio
    (c) Buy Govt. securities in open market
    (d) Decrease Statutory Liquidy Ratio
40. The maturity period of commercial paper usually ranges from :
    (a) 90 days to 360 days
    (b) 6 months
    (c) 91 days to 360 days
    (d) 90 days
41. Which of the following is not a characteristics of GDR :
    (a) Freely traded in the international market
    (b) Investors earn fixed income by way of dividend
    (c) Shares underlying the GDR carry voting rights.
    (d) GDR is a negotiable instrument.
42. SPO refers to _____, the second and subsequent time a company raises money from the public directly.
    (a) Second Public Offering
    (b) Subsequent Public Offering
    (c) Subsequent Public Offer
    (d) Seasonal Public Offering

Answer:

1	2	3	4	5	6	7	8	9	10	11	12
b	c	b	b	b	d	c	d	b	b	d	a
13	14	15	16	17	18	19	20	21	22	23	24
b	a	c	c	c	b	c	b	c	d	d	c
25	26	27	28	29	30	31	32	33	34	35	36
c	d	b	b	b	c	b	b	c	d	c	b
37	38	39	40	41	42						
a	a	b	a	c	d						

State True or False

1. Financial services refer to facilities relating to capital market.
2. Non-banking finance companies are engaged in financial services.
3. NBFCs provide financial services to corporate sector only.
4. All NBFCs operating in India must be registered with SEBI.
5. Regulatory framework for NBFCs is provided by RBI.
6. Any NBFC can borrow funds on mutually agreed terms.
7. Prudential norms for Assets and Investments by NBFCs were framed on the recommendations of Narasimhan Committee.
8. Assets of NBFCs are also classified as Standard, Non-Standard, Doubtful and Lost.
9. NBFCs are not allowed to operate in Insurance sector.
10. A merchant banker helps in procuring overdraft from a commercial bank.
11. All merchant bankers have to be registered with RBI.
12. A lead manager has post-issue responsibilities also.
13. Merchant bankers should follow the prescribed code or conduct.
14. Share capital issued by a company for the first time is known as venture capital.
15. A mutual fund can operate as a venture capital fund.
16. A venture capital firm deals with a new, risky and untested product.
17. All venture capital funds in India have been promoted by Government.
18. Portfolio managers are not required to be registered.
19. A portfolio manager has to operate as per the code of conduct prescribed by SEBI.
20. Credit rating is an authoritative guarantee regarding; the credit position of a person.
21. RBI has prescribed guidelines for the operations of credit rating agencies in India.
22. Securitisation and Factoring are two sides of the same coin.
23. Securitization in India is regulated by RBI.
24. Capital market includes money market and foreign exchange market.
25. Stock exchanges are a part of primary market segment.
26. Securities are issued in the secondary market segment.
27. SEBI is an association of stock exchanges in India.
28. Primary objectives of SEBI include Investors' Protection and Regulation of capital market in India.
29. Badla system is prevailing in India.
30. Book-building system cannot be used for issue of shares.
31. Operations of stock exchanges are directly controlled by Government.

32. National Stock Exchange has been established by SEBI.
33. OTCEI is a subsidiary of National Stock Exchange.
34. At the Stock Exchange, Mumbai (BSE Ltd.. the trading in shares is made through out-cry system).
35. The term 'bought out' deal is related to OTCEI.
36. The efficiency with which the information is reflected in the market prices of securities, is denoted as the strength of the market.
37. SEBI regulates the operations in both the primary and the secondary market.
38. New Issue Market is an element of primary market.
39. Individual investors can deal with only in secondary market.
40. National Stock Exchange of India is a Public Sector Organisation.
41. In the on-line trading system at the National Stock Exchange, the badla system has been formalised.

Answers:

1	**F**
4	**F**
7	**T**
10	**F**
13	**T**
16	**T**
19	**T**
22	**F**
25	**F**
28	**T**
31	**F**
34	**F**
37	**T**
40	**F**

2	**T**
5	**T**
8	**T**
11	**F**
14	**F**
17	**F**
20	**F**
23	**T**
26	**F**
29	**F**
32	**F**
35	**T**
38	**T**
41	**F**

3	**F**
6	**F**
9	**F**
12	**T**
15	**T**
18	**F**
21	**F**
24	**F**
27	**F**
30	**F**
33	**F**
36	**F**
39	**F**

⊙ Fill in the Blanks

1. Capital markets are a sub-part of the _____ system.
2. _____ intermediaries act as a link between savers and investors.
3. The primary function of financial intermediaries is to convert _____ securities into _____ securities.
4. The two key financial markets are _____.
5. Money market is a market for _____ funds having maturity of _____.
6. The capital market consists of _____ and the stock exchanges.
7. While the primary market deals in _____ securities, the stock market is a market for _____ securities.

8. The prices of new issues are influenced, to a marked extent, by the price movements in the _____ market.
9. Origination, underwriting and _____ are three services provided by the new issue market.
10. _____ is a method to sell securities to the existing shareholders of a company.
11. Pricing of issues is left to the investors in _____.

Answers:

1	**Financial**	**2**	**Financial**	**3**	**Direct, Indirect**
4	**Money Market and Capital Market**	**5**	**Short-Term One Year or Less**	**6**	**New Issue Markets**
7	**New, Old**	**8**	**Stock**	**9**	**Distribution**
10	**Right Issue**	**11**	**Book Building Method**		

⊙ Short Essay Type Questions

1. What do you mean by Monetary Policy?
2. What is Cash Reserve Ratio (CRR)?
3. What do you mean by Statutory Liquidity Ratio (SLR)?
4. What do you mean by Liquidity Adjustment Facility (LAF)?
5. Write short notes on Repo Rate and Reverse Repo Rate.
6. Discuss the role of RBI as the Governments' Debt Manager
7. Narrate down the regulatory objectives of NBFCs.
8. Discuss on 'Registration requirement of NBFCs'.
9. State various prudential regulations applicable to NBFCs.
10. Discuss on 'residuary Non-Banking Company (RNBC').
11. State the general nature of Insurance Companies.
12. Write short notes on:
    (a) Defined Benefits Pension Plan (DBPP),
    (b) Defined Contribution Pension Plan (DCPP) or Money Purchase Pension Plan (MPPP),
    (c) Pay-as-you-go Pension Plan (PAYGPP)
13. Explain 'Bank Employees Pension Scheme (BEPS)'
14. Discuss the hedging strategies adopted in case of Hedge Funds.
15. What is hedge fund? Mention the benefits of Hedge Funds.
16. What are the functions of the Secondary Market?
17. Make differences between Primary and Secondary Market.

18. Write down the similarities between Primary and Secondary Market.
19. Write short notes on (a) American Depository Receipts (ADRs) (b) Global Depository Receipts (GDRs)
20. What is compulsory convertible debenture (CCD)? Discuss its advantages and disadvantages.
21. What are Euro and Masala Bonds?
22. What is Rolling Settlement? State its benefits.
23. Discuss the Clearing House Operations (CHO)
24. State the merits and demerits of Depository system of recording shares and trading in shares and securities.
25. What is Follow on Public Offer (FPO)?
26. What is Reverse Book Building? Discuss the process for Reverse Book Building.
27. Explain briefly the concept of Green-shoe Option.
28. Discuss the Private Placement issue mechanism.
29. What do you mean by Insider Trading?
30. Discuss on Credit Rating Symbols in India.
31. What is Money Market? Discuss the features of Money Market.
32. Mention the features of Treasury Bills.
33. Discuss different types of Commercial Bills.
34. What is Commercial Paper? Discuss its salient features and advantages.
35. Discuss on RBI Guidelines in respect of issue of commercial Paper.
36. What is Certificate of Deposits? State its features.
37. What is Promissory Note? Discuss the essentials of a Promissory Note.
38. What is Government Securities? Discuss the features of Government Securities.

⊙ Essay Type Questions

1. Discuss the structure, organisation and governance of RBI.
2. Explain the regulatory role of RBI.
3. Discuss the functions of Commercial Banks.
4. State the objectives and functions of State Cooperative Banks.
5. Mention different types/categories of NBFCs registered with RBI.
6. Discuss the statutory functions of IRDA.
7. What is Pension Fund? Classify different Pension Plans.
8. Discuss different types of Alternative Investment Funds (AIF).
9. State different styles of Hedge Funds.
10. Compare Hedge Funds and Mutual Funds.

11. Discuss important Securities and Exchange Board of India (SEBI) Regulations.
12. Highlight the functions of a capital market.
13. Write short notes on: Initial Public Offering (IPO), Follow on Public Offer (FPO), Book Building, Green-shoe Option Initial Public Offering (IPO).
14. What is Book Building Process? Discuss advantages and disadvantages of Book Building.
15. What is Credit Rating? Discuss on Credit Rating Methods and Rating Agencies in India.
16. Discuss different types of Money Market Instruments.
17. Discuss different types of Government Securities.
18. What are the risks involved in holding Government securities?
19. What is preference share? What are the key merits and demerits of preference shares as a source of longterm finance?
20. Write short notes on: straight bond value, conversion value, market value and market premium.
21. Discuss the method for valuation of compulsorily convertible debentures into shares.
22. How is the value of an optionally convertible debenture affected by the straight debenture value, conversion value and option value?
23. What is a warrant? How does it differ from convertible securities?

B. Numerical Questions:

⊙ Comprehensive Numerical Problems

1. The RBI offers 91-Days Treasury Bills to raise ₹ 5,000 crore. The following have been received.

Bidder	Bid Rate (₹)	Amount (₹ in crore)
AB Ltd.	98.95	1,800
BC Ltd.	98.93	700
CD Ltd.	98.92	1,000
DE Ltd.	98.90	1,200
EF Ltd.	98.90	600
FG Ltd.	98.87	200
GH Ltd.	98.85	350
HI Ltd.	98.85	150

You are required to find out:

Who are the winning bidders if it was a yield-based auction, and how much of the amount of security will be allocated to each winning bidder?

Answer:

Fully accepted bidders: AB Ltd., BC Ltd., CD Ltd.

Proportionately allotted bidders: DE Ltd. and EF Ltd.

2. PQR Ltd. issued Commercial Paper and the details are given below:

Date of Issue	:	17th January 2023
Date of Maturity	:	17th April 2024
No. of Days	:	90 Days
Interest Rate	:	11.25%
Face Value	:	₹ 100
Issue Size	:	₹ 1,000 crore

Calculate the net amount received by the company on issue of commercial paper.

Answer: ₹ 973 crore

Unsolved Case(s)

1. Gupta Dairy Ltd. is one of the leading manufacturers and marketers of dairy-based branded foods in Hyderabad. In the initial years, its operation was restricted only to collection and distribution of milk. But, over the years it has achieved a reasonable market share by offering a diverse range of dairy-based products including fresh milk, flavoured yogurt, ice creams, butter milk, cheese, ghee etc. In order to raise the capital finance its expansion plans, Gupta Dairy Ltd. has decided to approach capital market through a mix of offer for sale of 4 crore shares and a public issue of 2 crores shares.

   In context of the above case:

   (a) Name and explain the segment of capital being approached by Gupta Dairy Ltd. and

   (b) Identify the methods of floatation used by Gupta Dairy Ltd. to raise the required capital.

2. The SEBI has imposed a penalty of ₹ 6200 crore on Asianol Corporation Limited (ACL) and its four directors, namely Mr. T. Ghosh, Mr. S. Singh, Mr. Tanay Bose, and Mr. K. Bhattacharyya who had mobilized funds from the general public through illegal collective investments schemes in the name of purchase and development of agriculture land.

   While imposing the penalty, the biggest in its history, SEBI said ACL that to deserve the maximum penalty for duping the common man. Its prevention of Fraudulent and Unfair Trade Practices Regulations provides for severe-to-severe penalties for dealing with such violation. As per SEBI norms, it can impose penalty of ₹ 25 crore or three times of the profit made by indulging in Fraudulent and Unfair Trade Practices of the illicit gains.

   In the context of the above case:

   (a) State the objectives of setting up SEBI

   (b) Identify the type of function performed by SEBI.

3. S. Ltd. is a large creditworthy company operating in Eastern India. It is an export-oriented unit, dealing in high quality Basmati Rice. The floods in the region have created many problems for S. Ltd. Packaged rice has been destroyed due to this. The S. Ltd. is therefore, unable to get an uninterrupted supply of rice from the wholesale

suppliers. To add to the problems of the organisation, the wholesale suppliers of rice who were earlier selling on credit are asking the S. Ltd. for advance payment or cash payment on delivery. The company (S. Ltd.) is facing a liquidity crisis.

The CEO of the S. Ltd. feels that taking a bank loan is the only option with the company to meet its short-term shortage of cash.

As a finance manager of the S. Ltd., name and explain the alternative to bank borrowings that the company (S. Ltd) can use to resolve the crisis.

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Tools for Financial Analyses 3

This Module Includes

3.1 Comparative, Common-Size Financial Statements and Trend Analysis

3.2 Financial Ratio Analysis

3.3 Fund Flow Statement – Preparation and Analysis

3.4 Cash Flow Statement – Preparation and Analysis

Tools for Financial Analyses

SLOB Mapped against the Module:

To acquire application-oriented knowledge of various tools for financial analysis in order to assist the management in planning and decision making.

Module Learning Objectives:

After studying this module, the students will be able to –

- Understand the basic concept of comparative, common-size financial statements and trend analysis;
- Compute, interpret and analyse the comparative, common-size financial statements and trend analysis;
- Discuss the basic concept, types, advantages and disadvantages of financial ratio analysis;
- Compute, interpret and analyse different financial ratio analysis;
- Equip themselves with detail understanding of the different models to predict financial distress like Altman's Z Score, Beneish M Score, Piotroski F Score;
- Compute, interpret and analyse the Financial Scores based on Altman's Z Score, Beneish M Score, Piotroski F Score;
- Discuss the conceptual framework including definition, significance and limitations of fund flow statement;
- Prepare and analyse different problems on fund flow statement;
- Know the conceptual framework of cash flow statement;
- Prepare and analyse different problems on cash flow statement;
- Discuss the differences between fund flow statement and cash flow statement.

Introduction

3

A financial statement is a numerical report covering financial information to express the financial results and financial condition of the concern. According to AICPA (American Institute of Certified Public Accountants), financial statements reflect a combination of recorded facts, accounting principles and personal judgements.

Financial statements are prepared for presenting a periodical review or report on the progress by the management and deal with

(i) the status of investments in the business and

(ii) the results achieved during the period under review.

The financial analysis of an enterprise is usually undertaken so that investors, creditors, and other stakeholders can make decisions about those companies. It may be used internally to evaluate issues like employee performance, operating efficiency, credit policies and exterrnally important to evaluate potential investments and credit-worthiness of borrowers, among other things.

An analyst draws the financial data needed in financial analysis from many sources. The primary source is the data provided by the company itself in its annual report and required disclosures. The annual report comprises of balance sheet, income statement, the statement of cash flows as well as footnotes to these statements, chairman's speech, the director's report, the auditor's report and accounting policy changes. Schedules, supplementary statements, explanatory notes, footnotes etc. supports these statements.

A. Financial Analysis – Meaning and Concept

Financial analysis means proper arrangement of the financial data and methodical classification of the data given in the financial statement and regrouped into their distinct and different components parts. It involves the division of facts based on some definite plans, classifying them into classes based on certain condition and presenting them in most convenient simple and understandable form. It is really an art, it involves many processes; like arrangement, analysis, establishing relations between available facts and drawing conclusion on that basis.

The figures given in the financial statement will not help unless they are put in a simplified form. Interpretation means explaining the meaning and significance of the data so simplified. It is comparison and examination of components for making conclusion about the profitability, efficiency and liquidity position of the business.

B. Objectives of Financial Analysis

The basic objectives of financial analysis are as follows:

i. To examine the financial health of a firm;

ii. To evaluate the profitability of the enterprise;

iii. To understand the long-term and short-term solvency position of the firm;

iv. To study the debt servicing capacity of the firm;

C. Importance and Benefits of Financial Analysis and Interpretation

The significance of financial statements lies not in their preparation but in their analysis and interpretation. The analysis and interpretation of financial statement is the comprehensive and intelligent presentation of information that helps the interested parties for judgement and decision-making. Robert H. Wessal defined analysis and interpretation of financial statement as a technique of X-Raying the financial position as well as the progress of a company.

Various parties like management, shareholders, creditors, investors, and government etc. are interested in financial statement analysis.

The importance and benefits of financial analysis from the viewpoint of various internal and external stakeholders are mentioned below:

i. **Management:** According to Robert. H. Wessel, through the financial statement analysis the management can measure the effectiveness of its own policies; can determine the ability of adopting new policies and procedures and can measure the result of their managerial efforts. They can also study the relative efficiency and weakness of different departments and can find the ways to overcome the deficiencies.

ii. **Investors:** From this analysis, the investor will be able to know the earning capacity, soundness of dividend policies, and degree of financial growth. By analysing the financial statement, the prospective investor can take investment decision.

iii. **Creditors:** From this analysis, creditors will be able to know the credit worthiness, capacity to pay the outsiders obligation of the firm.

iv. **Financial Analysts and Research Scholars:** Financial analysts and scholars can look through the financial policies persuade by the management and offered constructing suggestion to overcome the financial problems.

v. **Analysts:** An analyst can study the extent of concentration of economic power, can analyse the financial policies, and can make an option about the pattern of investment.

vi. **Labour Union**: The labour union can understand the income and expenditure of the firm. Accordingly bargain the fair wages and, other benefits.

vii. **Legislation:** Legislation can get the information about licensing, price fixing and other regulations.

D. Limitations of Financial Analysis and Interpretation

Financial statement is prepared with the object of presenting a periodical report on the progress by management and deals with the status and result of the business. But these objectives are not fulfilled due to following limitations:

i. It is difficult to decide on the proper basis of comparison.

ii. The comparison is difficult because of difference in situation of two companies or of one company over years.

iii. It is invalid if the price level changes.

iv. Historical financial statements are not the indicators of future.

E. Types of Financial Analysis

Different types of financial analysis are summarized below:

1. **According to Users' Perspective :** Financial analysis is of two types – external analysis and internal analysis.

   (a) **External Analysis:** If analysis of financial statement is made by external persons who are not directly related to the accounting records of the concern and have to depend on published financial statement is called external analysis. Outsiders use only the figures of financial statement and other supplementary of the annual reports to get an idea and to take appropriate decision. As it is used by the external people so it is called external analysis. Generally, it is made by bank, money lenders, creditors, govt. agencies, prospective investors etc.

   (b) **Internal Analysis:** If the analysis of financial statement is made by internal persons who are related to the accounting records of the concerns from internal records and books is known as internal analysis. It is made by members of the concern such as, staff of finance and accounting department, executives etc. to help the management in assessing the profitability, solvency, liquidity etc. and to indicate the reasons of weakness of the firm. This is conducted by the people inside the firm and for the benefits of the organisation so it called internal analysis.

2. **According to Modus Operandi of Analysis (or Method of Operation) :** Financial analysis may be of two types: - Horizontal and vertical:

   (a) **Horizontal Analysis:** When financial statement of one year of a particular organisation are analysed and interpreted with comparing another year or years, it is called horizontal analysis.

   (b) **Vertical Analysis:** When financial statement of an organisation for one period is analyzed then it is called vertical analysis. This analysis is useful in inter-firm comparison.

3. **According to Objectives:** Financial statement analysis may be long-term and short-term analysis.

   (a) **Long-Term Analysis:** Long-term analysis is made to study long-term financial stability, solvency, and profitability of a concern. This analysis helps to know whether the firm will survive in long run and helps in long-term financial planning.

   (b) **Short-Term Analysis:** Short-term analysis is made to study current financial stability, solvency, and profitability of a concern. This analysis helps to know whether the firm will have sufficient fund to t meet its short-term requirement that helps in working capital analysis.

F. Financial Analysis - Traditional Approach vs. Modern Approach

Financial Analysis is a process of evaluating the relationship between component parts of financial statement to obtain a better understanding of the firm's position and performance. This analysis is made based on two approaches – Traditional approach and Modern approach.

(i) **Traditional Approach**: Traditional approach refers to subject matter of financial statement analysis as a separate branch of study. It is based on basic conceptual and analytical framework. It is not applicable in internal decision making.

(ii) **Modern Approach**: Modern approach of financial analysis is broad approach that provides a conceptual and analytical framework for financial decision making. It is an integral part of overall management.

So, there are certain differences between traditional approach and modern approach are mentioned below:

Table 3.1: Differences between Tradeitional and Modern Approach

Traditional Approach	Modern Approach
(i) In traditional approach, financial statement analysis is not an integral part of the various disciplines concerned with decision making. Economists and finance experts do not rely on the information reported in the financial statements and they ignore financial statement analysis	(i) In modern approach, financial statement processing system as an information processing system designed to generate relevant information as input to the application of various decision making models, e.g., the portfolio selection model, bank lending decision models etc.
(ii) Here the frameworks (within which analytical methods and techniques are developed) are not defined appropriately, resulting in the lack of direction and progress.	(ii) Here tools and techniques are developed and tested within the well-defined framework of decision theory.
(iii) Here financial statement analysis is completely detached from economic theories and models	(iii) Here financial statement analysis is closely connected with economic and finance models.
(iv) Here no statistical tools or techniques are used, but simple mathematical tools like ratio, percentage, average etc. are applied.	(iv) Here various statistical tools and techniques as well as complicated mathematical models are used.
(v) Here accounting data are conventionally reported in financial statements.	(v) Here reported accounting data, unreported accounting data (such as, market value of assets) and non-accounting data (e.g., share prices) are taken into consideration.

G. Tools of Financial Analysis

The important methods or tools used in financial statements are shown below:

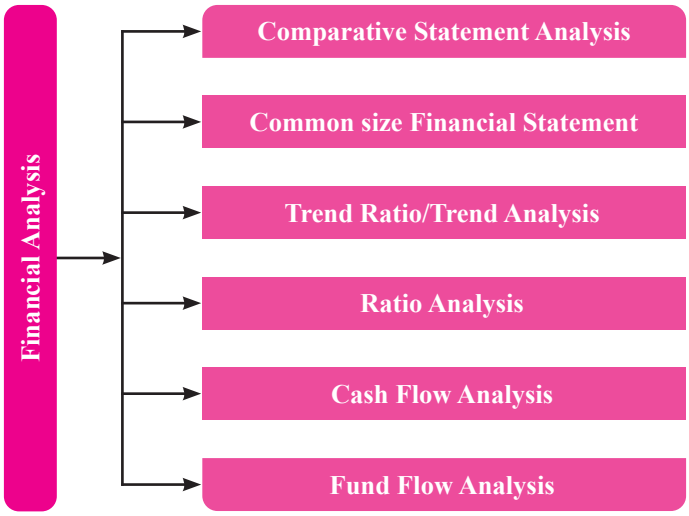

Figure 3.1: Important methods or tools used in Financial Statements

Comparative, Common-Size Financial Statements and Trend Analysis

3.1

The analysis which is based on single year's statement, will not be very much useful. For this purpose, comparative analysis, common size analysis, trend analysis are necessary. In this section, comparative, common-size financial statements and trend analysis are discussed.

3.1.1 Comparative Financial Analysis

If the financial statement is re-casted for comparing all the elements of financial conditions from year to year in absolute term as well as in percentage then the re-casted statement is called comparative financial statement.

This statement is designed to provide time view of various elements of financial statement. This statement is made by: -

(i) Showing absolute money values of each element of Income Statement and Balance Sheet of different periods.

(ii) Showing increase / decrease in absolute money value of each element by deducting elements of current period from past period.

(iii) Showing increase / decreasing value in terms of percentage

$$\text{i.e., } \frac{\text{Increasing/Decreasing amount}}{\text{Amount in the past period}} \times 100$$

(iv) Keeping in mind that the principles and procedures followed in the collection, and presentation of data should not materially differ over the periods.

Advantages

The advantages of Comparative Financial Analysis are as follows

(i) Figures for two or more periods are placed side by side to facilitate inter-firm comparison and in horizontal analysis.

(ii) It brings out more clearly the nature and trend of current changes that affect the enterprise.

(iii) It helps in estimating weakness in the operating cycle, financial health and future position of the business.

Disadvantages

(i) Comparative Financial Analysis may be misleading, if frequent changes have been allowed in principles and procedures over the periods.

(ii) Without the knowledge of internal analysis, it may be extremely misleading.

(iii) It does not show the relation of any items to total assets or to total liabilities or to total net sales in a year.

(iv) Proper comparison between two or more firms cannot be possible by this statement because there is no common base of comparison.

3.1.2 Common Size Statement Analysis

Common size financial statement is re-stated financial statement showing percentage of total items with common base for comparison.

This statement is made in the following procedure: -

(i) Assets side is classified in fixed assets, investments, current assets (CA), fictitious assets showing individually and in total. Then total assets (TA) are taken as common base 100.

$$\text{Then, } \frac{\text{Investment}}{\text{Total Assets}} \times 100; \quad \frac{\text{Current Assets}}{\text{Total Assets}} \times 100; \quad \frac{\text{Fictitious Assets}}{\text{Total Assets}} \times 100 \text{ etc. are calculated}$$

(ii) Liabilities side is classified in proprietor's fund, long-term loan, and current liabilities showing individually and in total. Then percentage of each liability to total liability is calculated accordingly like assets side.

(iii) Income statement is classified in sales, cost of goods sold, operating expenses, net profit, interest, tax, EAT (earning after tax) etc. Then percentage of each element to sales is calculated.

Advantages

(i) Common size statement shows the changes over the years in relation to total assets, total liabilities, sales.

(ii) It helps in inter-firm comparison with common base.

(iii) It helps in vertical analysis of figures.

(iv) It helps in understanding financial strategy of the firms in comparison.

(v) It shows the relative efficiency of each cost items of two firms.

Disadvantages

(i) It shows the percentage of each item to the total in each period but not changes of each items from period to period.

(ii) Its observations are not very useful because there are more definite norms for the proportion of each item to total.

(iii) If there is no uniform costing system, no same accounting practice among the all firms of an industry, then it is meaningless for studying the comparative financial position of two firms.

3.1.3 Trend Analysis / Trend Ratio Analysis

Trend analysis or trend ratio is an index number of each financial item in the financial statement of different periods. The method of calculating trend percentages involves the calculation of percentage relation of necessary items with the same items of base year. i.e., trend percentages are not calculated for all items of financial statements.

They are calculated only for major items since the purpose is to highlight important changes. On the other hand, any year may be taken as base year – generally the earliest year is taken as base. Any intervening year may also be taken as the base year.

$$\text{Thus, Trend Percentage or Trend Ratio} = \frac{\text{Value of each item is financial statement of any period}}{\text{Value of same item is financial statement of base period}} \times 100$$

While calculating trend percentages care should be taken regarding the following matters: -

(i) The uniform accounting system should be followed from year to year for horizontal analysis.

(ii) The accounting principles and practices should follow consistency convention throughout the period of analysis. Without such consistency, the comparison will be adversely affected.

(iii) The base year should be that normal year which is monitored and representative of the items shown in the statement.

(iv) Trend percentages should be calculated only for items having logical relationship with one another.

(v) Trend percentages should be studied after considering the absolute figures on which they are based, otherwise, they may give misleading results. For example, one expense may increase from ₹ 100 to ₹ 200 while other expenses may increase from ₹ 10,000 to ₹ 15,000. In the first case, trend percentage will show 100% increase while in second case it will show 50% increase. This is misleading because in the first case, the change though 100% is not at all significant in Absolute/Monetary real terms as compared to second case.

(vi) The figures for the current year should also be adjusted in the light of price level changes as compared to the base year before calculating the trend percentage, otherwise comparison will be meaningless.

Advatages

(i) It shows the trend of items with passage of time.

(ii) It shows the nature and rate of movement of various financial factors.

(iii) It shows horizontal and vertical analysis to reflect the behaviour of various financial items with passage of time.

(iv) It helps in estimating the financial factor in future.

Disadvatages

If there is no uniform accounting system year after year, then trend ratios give misleading result.

(i) It does not take into consideration the inflation accounting system. So, figures of base period are incomparable with the figures of current period in case of inflation.

(ii) Trend ratios must be always read with absolute data on which they are based, otherwise the conclusion drawn may be misleading. It may be said that a 10% change in trend ratio may represent an absolute change of ₹1000 only in one item, while a 10% change in another item may represent an absolute change of ₹ 10,000.

Illustration 1

From the following income statement, prepare a common size statement and also interpret the results.

Income Statement for the year ended 31st March

Particulars	2023 (₹)	2024 (₹)
Net Sales	10,50,000	13,50,000
Less: Cost of Goods Sold	5,70,000	6,45,000
Gross Profit	4,80,000	7,05,000
Less: Other Operating Expenses	1,50,000	2,16,000
Operating Profit	3,30,000	4,89,000
Less: Interest on Long-term Debt	60,000	51,000
Profit Before Tax (PBT)	2,70,000	4,38,000

Solution :

Common Size Statement for the year ended 31st March, 2023 and 2024

Particulars	2023	2024
Net Sales	100%	100%
Less: Cost of Goods Sold $\left(\frac{\text{Cost of Goods Sold}}{\text{Net Sales}} \times 100\right)$	54.3%	47.8%
Gross Profit $\left(\frac{\text{Gross Profit}}{\text{Net Sales}} \times 100\right)$	45.7%	52.2%
Less: Other operating expenses $\left(\frac{\text{Other Operating Expenses}}{\text{Net Sales}} \times 100\right)$	14.3%	16%
Operating Profit $\left(\frac{\text{Operating Profit}}{\text{Net Sales}} \times 100\right)$	31.4%	36.2%
Less: Interest on Long-term Debt $\left(\frac{\text{Interest}}{\text{Net Sales}} \times 100\right)$	5.7%	3.8%
Profit Before Tax (PBT) $\left(\frac{\text{PBT}}{\text{Net Sales}} \times 100\right)$	25.7%	32.4%

Comments:

(i) The PBT to net sales has increased from 25.7% in the year 2022-23 to 32.4% in the year 2023-24. It indicates that the profit earning capacity of the company has improved during the study period. This improvement in the profitability of the company has been mainly due to significant reduction in the cost of goods sold of the company. It may occur due to fall down of input market or may occur due to improvement in the efficiency of the company. As other operating expenses are higher in 2023-24 so, it is clear that company has been operated with tight supervision, tight inventory control for reduction of Cost of Goods Sold.

(ii) The interest on long-term debt to net sales has declined from 5.7% in the 2022-23 to 3.8% in 2023-24. It implies that the financial burden of the company has reduced significantly during the study period. Higher operating profit or fund from operation has been utilised for repayment of long-term debt, so that the financial risk associated with the company has declined significantly during the study period.

Illustration 2

From the following figures prepare a common size comparative statement and comment on the results.

Particulars	2019-20	2020-21	2021-22	2022-23	2023-24
	₹ (in lakh)	₹ (in lakh)	₹ (in lakh)	₹ (in lakh)	₹ (in lakh)
Cost of Materials	150	220	250	200	200
Labour Cost	200	140	150	150	175
Conversion Cost	150	150	140	200	175
Total Manufacturing cost	500	510	540	550	550
Sales Revenue	1,200	1,100	1,000	1,000	950
Gross Profit	700	590	460	450	400
Less: Other Operating Expenses	300	220	200	200	180
Operating Profit	400	370	260	250	220

Solution:

Common Size Comparative Income Statement

Particulars	2019-20	2020-21	2021-22	2022-23	2023-24
Cost of Materials $\frac{\text{Cost of Materials}}{\text{Sales}} \times 100$	12.5%	20%	25%	20%	21.05%
Labour Cost $\frac{\text{Labour Cost}}{\text{Sales}} \times 100$	16.67%	12.73%	15%	15%	18.42%
Conversion Cost $\frac{\text{Conversion Cost}}{\text{Sales}} \times 100$	12.50%	13.64%	14%	20%	18.42%
Total Manufacturing Cost $\frac{\text{Total Manufacturing Cost}}{\text{Sales}} \times 100$	41.67%	46.36%	54%	55%	57.89%
Sales Revenue	100%	100%	100%	100%	100%
Gross Profit $\frac{\text{Gross Profit}}{\text{Net Sales}} \times 100$	58.33%	53.64%	46%	45%	42.11%

Particulars	2019-20	2020-21	2021-22	2022-23	2023-24
Other Operating Expenses $\frac{\text{Other Operating Expense}}{\text{Net Sales}} \times 100$	25%	20%	20%	20%	18.95%
Operating Profit $\frac{\text{Operating Profit}}{\text{Sales}} \times 100$	33.33%	33.64%	26%	25%	23.16%

Comments:

From the above analysis, it can be concluded that there was a clear upward rising trend in the manufacturing cost of goods sold during the study period. As a result, gross profit to sales has been decreased very significantly during the same period. It was 58.33% in the year 2019-20 which ultimately reduced to 42.11% in the ultimate year of the study period i.e., 2023-24. It implies that operational efficiency of the company has been reduced very significantly during the period.

Illustration 3

From the following balance sheet prepare a common size statement and comment.

Particulars	Amount (₹) 31.03.2023	Amount (₹) 31.03.2024
Shareholders' Fund		
Equity Share Capital (₹10 each)	7,20,000	7,20,000
Reserve & Surplus	2,88,000	5,46,000
Non-current Liabilities		
Long-term debt	5,46,000	5,08,000
Current Liabilities		
Current Liabilities & Provisions	2,40,000	1,75,500
Total	**18,00,000**	**19,50,000**
Non-current Assets		
Fixed Assets	12,06,000	11,70,000
Current Assets		
Inventory	2,52,000	3,51,000
Debtors	1,80,000	1,95,000
Bank	1,62,000	2,34,000
Total	**18,00,000**	**19,50,000**

Solution:

Common Size Balance Sheet as on 31.03.2023 & 31.03.2024

Particulars	On 31.03.2023 % of total	On 31.03.2024 % of total
Shareholders' Fund		
Equity Share Capital $\left(\frac{\text{Share Capital}}{\text{Total Liabilities}} \times 100\right)$	40%	36.92%
Reserve & Surplus $\left(\frac{\text{Reserve \& Surplus}}{\text{Total Liabilities}} \times 100\right)$	16%	28%
Total Shareholders Fund/Owners' Equity	56%	64.22%
Non-current Liabilities		
Long-Term Debt $\left(\frac{\text{Long-Term Debt}}{\text{Total Liabilities}} \times 100\right)$	30.33%	26.05%
Current Liabilities		
Current Liabilities & Provision $\left(\frac{\text{Current Liabilities}}{\text{Total Liabilities}} \times 100\right)$	13.33%	9%
	100%	100%
Non-current Assets		
Fixed Assets $\left(\frac{\text{Fixed Assets}}{\text{Total Assets}} \times 100\right)$	67%	60%
Current Assets		
Inventory $\left(\frac{\text{Inventory}}{\text{Total Assets}} \times 100\right)$	14%	18%
Debtors $\left(\frac{\text{Debtors}}{\text{Total Assets}} \times 100\right)$	10%	10%

Particulars	On 31.03.2023 % of total	On 31.03.2024 % of total
Bank $\left(\frac{\text{Bank}}{\text{Total Assets}} \times 100\right)$	9%	12%
Total Current Assets	33%	40%
Total Assets	100%	100%

Comments:

(i) The proportion of owner's equity to total liabilities of the company has been increased from 56% to 64.92% whereas the proportion of long-term debt to total liabilities has been decreased from 30.33% to 26.05% in the year 2023-24. So, we can conclude that the dependency on outsiders has been decreased and degree of financial risk associated with the company has been reduced during the study period.

(ii) The percentage of current assets to total assets has been increased from 33% to 40% whereas the percentage of current liabilities to total liabilities decreased from 13.33% to 9% in the year 2023-24. Therefore, it indicates that the liquidity position of the company has been significantly improved during the period under study.

But reduction of fixed assets may hamper the long-term stability and operating efficiency of the company.

Illustration 4

The following are the income statements of A Limited for the years ended 31.03.2023 and 31.03.2024

	31.03.23 (₹)	31.03.24 (₹)
Net Sales	1,70,000	1,90,400
Less: Cost of goods sold	1,05,000	1,20,000
Gross Profit (P)	65,000	70,400
Administrative expenses (A)	13,200	14,960
Selling expenses:		
Advertisement expenses	3,000	4,000
Other selling expenses	40,800	41,800
Total selling expenses (B)	43,800	45,800
Operating expenses (A + B)	57,000	60,760
Operating Profit (D) [D = P – (A + B)]	8,000	9,640
Other Incomes (E)	6,400	9,200
Other expenses (F)	6,800	4,800
Profit before tax (PBT) [PBT = D + E – F]	7,600	14,040
Income tax (T)	3,800	6,200
Profit after tax (PAT) [PAT = PBT – T]	3,800	7,840

Prepare a comparative income statement and comment on the performance of A Limited.

Solution:

Comparative Income Statement of A Ltd. for the years ended 31st March, 2023 and 2024

Particulars	31.03.23 (₹)	31.03.24 (₹)	Amount of increase (+) or decrease (-) (₹)	Percentage increase (+) or decrease (-) (₹)
Net Sales	1,70,000	1,90,400	(+) 20,400	Note (i) (+) 12.0
Less: Cost of goods sold	1,05,000	1,20,000	(+) 15,000	Note (ii) (+) 14.3
Gross Profit (P)	65,000	70,400	(+) 5,400	(+) 8.3
Administrative expenses (A)	13,200	14,960	(+) 1,760	(+) 13.3
Selling expenses:				
Advertisement expenses	3,000	4,000	(+) 1,000	(+) 33.3
Other selling expenses	40,800	41,800	(+) 1,000	(+) 2.5
Total selling expenses (B)	43,800	45,800	(+) 2,000	(+) 4.6
Operating expenses (A + B)	57,000	60,760	(+) 3,760	(+) 6.6
Operating Profit (D) [D = P – (A + B)]	8,000	9,640	(+) 1,640	(+) 20.5
Other Incomes (E)	6,400	9,200	(+) 2,800	(+) 43.8
Other expenses (F)	6,800	4,800	(–) 2,000	(–) 29.4
Profit before tax (PBT) [PBT = D + E – F]	7,600	14,040	(+) 6,440	84.7
Income tax (T)	3,800	6,200	(+) 2,400	(+) 63.2
Profit after tax (PAT) [PAT = PBT – T]	3,800	7,840	(+) 4,040	(+) 106.3

Notes: Calculation for percentage increase (+) or decrease (–):

(i) $\left(\frac{₹\,20,400}{₹\,1,70,000}\times 100\right)$ = 12%

(ii) $\left(\frac{₹\,15,000}{₹\,1,05,000}\times 100\right)$ = 14.3%; and so on.

Comments:

Comparative income statement shows the income and expenses of two periods of same company, absolute changes of each item for the year ended 31.03.2024 over 31.03.2023 and also shows percentage change.

The following comments can be made on the performance of A Ltd.:

(i) Sales of A Ltd. has been increased by ₹ 20,400 during the year 2023-24 over 2022-23. But, the cost of goods sold has also increased by ₹ 15,000 in the same period. i.e., sales have improved by 12% and cost of goods sold has increased by 14.3%. So, Gross Profit has not improved markedly. Cost of goods sold may increase due to higher quantity of sales or due to higher input cost. As sale value has increased so it is clear cost of goods sold has increased due to higher quantity of sales. If such quantity has been sold at previous price, then sales value has been increased with higher amount. But here sales value has not increased significantly. It indicates that the addition in sales has been due to lowering of sale price. It is also clear from advertisement expenses. The increase in advertisement expenses (33.3%) has been much higher than the percentage increase reduction of sale price was necessary in order to higher quantity of sales. Such situation may also arise due to new product launching where huge advertisement is necessary and reduction of sale price is necessary.

(ii) There has been a substantial improvement in other incomes, both in relative term (43.8%) and in absolute term (₹ 2,800). Similarly, there has been a considerable reduction in other expenses in relative term (29.4%) as well as in absolute term (₹ 2,000). These items have been responsible for the increase in profit before tax (PBT) for the period under study by 84.7%. It implies that more emphasis has been given by the management of the company on earning non-operating profits as compared to the operating profits.

Illustration 5

Compute the Trend Ratios from the following data and comment.

Particulars	Balances as on 31st March			
	2021 (₹)	2022 (₹)	2023 (₹)	2024 (₹)
Cost of materials consumed	2,00,000	2,50,000	2,00,000	1,80,000
Labour cost	1,50,000	1,50,000	2,00,000	1,25,000
Other expenses	1,50,000	2,00,000	1,00,000	1,50,000
Cost of sales	5,00,000	6,00,000	5,00,000	4,55,000
Profit	3,00,000	3,00,000	2,50,000	3,45,000
Sales	8,00,000	9,00,000	7,50,000	8,00,000

Solution:

Computation of Trend Ratio (%)

	2020-2021	2021-2022 $\frac{2021-22}{2020-21} \times 100$	2022-2023 $\frac{2022-23}{2020-21} \times 100$	2023-2024 $\frac{2023-24}{2020-21} \times 100$
Cost of materials consumed	100	125	100	90
Labour cost	100	100	133.3	83.3
Other expenses	100	133.3	66.7	100
Cost of sales	100	120	100	91
Profit	100	100	83.3	115
Sales	100	112.5	93.8	100

Comment: The reduction in cost of sales in the year 2022-23 and 2023-24 is mainly due to reduction in cost of material consumed. Except that there is fluctuating trend in all the items disclosed in the financial statement during the period under study. So, no definite conclusion can be drawn from the above analysis.

Note:

Calculation of Trend Ratio:

$$\frac{\text{Current year's cost of material Consumed}}{\text{Base year's cost of material consumed}} \times 100$$

$$= \frac{₹\ 2,50,000}{₹\ 2,00,000} \times 100$$

= 125% and so on.

Financial Ratio Analysis

3.2

3.2.1 Financial Ratio Analysis

Ratio analysis is the process of determining and interpreting numerical relationships based on financial statements. A ratio is a statistical yard stick that provides a measure of the relationship between variables figures. This relationship can be expressed as percent (i.e., cost of goods sold as a percent of sales) or as a quotient (i.e., current assets as a certain number of times the current liabilities).

As ratios are simple to calculate and easy to understand there is a tendency to employ them profusely. While such statistical calculations stimulate thinking and develop understanding there is a danger of accumulation of a mass of data that obscures rather than clarifies relationships. The financial analyst has to steer a careful course. His experience and objective of analysis help him in determining which of the ratios are more meaningful in a given situation.

Ratios are used by the (i) Owners or investors; (ii) Creditors; and (iii) Financial executives. Although all these three groups are interested in the financial conditions and operating results of an enterprise the primary information that each seeks to obtain from these statements is to serve. Investors desire a primary basis for estimating earning capacity. Creditors (trade and financial) are concerned primarily with liquidity and ability to pay interest and redeem loan within a specific period. Management is interested in evolving analytical tools that will measure costs, efficiency, liquidity and profitability with a view to making intelligent decisions.

Objectives of Financial Ratio Analysis

The importance of financial ratio analysis lies in the fact that it presents data on a comparative basis and enables the drawing of inferences regarding the performance of the firm. Ratio analysis helps in concluding the following aspects:

(i) **Liquidity Position:** Ratio analysis helps in determining the liquidity position of the firm. A firm can be said to have the ability to meet its current obligations when they become due. It is measured with the help of liquidity ratios.

(ii) **Long-term Solvency:** Ratio analysis helps in assessing the long-term financial viability of a firm. Longterm solvency measured by leverage/capital structure and profitability ratios.

(iii) **Operating Efficiency:** Ratio analysis determines the degree of efficiency of management and utilization of assets. It is measured by the activity ratios.

(iv) **Overall Profitability:** The management of the firm is concerned about the overall profitability of the firm which ensures a reasonable return to its owners and optimum utilization of its assets. This is possible if an integrated view is taken and all the ratios are considered together.

(v) **Inter-firm Comparison:** Ratio analysis helps in comparing the various aspects of one firm with the other.

Significance of Ratio Analysis

(i) Commercial bankers and trade creditors and the institutional lenders are mostly concerned with the ability of a borrowing enterprise to meet its financial obligations timely. As a result, they are most interested in ratios like the current ratio, acid test ratio, turnover of receivables, inventory turnover, coverage of interest by level of earnings, etc.

(ii) Long-term creditors would be interested in the working capital position of the borrower as an indication of ability to pay interest and principal in case earnings decline. So, they are interested in the ratios of total debt to equity, net worth to total assets, long-term debt to equity, long-term debt to net working capital, fixed assets to net worth, fixed assets to long-term debt, fixed debt to capitalization etc. The number of times fixed charges are covered by earnings before interested and taxes will be of particular interest for such long-term creditors.

(iii) Investors in shares are primarily interested in per share ratio like earnings per share, book value per share, market price per share, dividends per share, etc. They would also be interested in knowing the capitalization rate (EPS Ratio = Earnings per share/ Price per share) which is the reciprocal of P/E Ratio (Price/ Earnings ratio) and also the dividend yield, i.e.; D/P Ratio.

Advantages of Ratio Analysis

Ratio analysis is useful in assessing the performance of a firm in respect of the following purposes:

(i) **To measure the liquidity position:** The purpose of ratio analysis to measure the liquidity position of a firm. Whether the firm is able to meet its current obligations when they become due or not? A firm can be said to be liquid, if it has sufficient liquid funds to pay the interest charges on shortterm debt within a year. The liquidity ratios are useful in credit analysis by banks and other financial institutions.

(ii) **To know the solvency position:** Ratio analysis is helpful for assessing the long-term financial liability of the firm. The long-term solvency is measured through the leverage, and profitability ratios. These ratios reveal the strengths and weaknesses of a firm in respect of the solvency position. The leverage ratios indicate the proportion of various sources of finance in the firm's capital structure, particularly the ratio of debt and equity share capital.

(iii) **Operating efficiency or turnover of the firm:** The ratios are helpful in measuring the operating efficiency or the turnover of the firm. These ratios indicate the efficiency in utilizing the assets of the firm such as fixed assets turnover ratio, total resources turnover ratio etc.

(iv) **To assess the profitability position of the firm:** The ratios are useful to assess and measure the profitability of the firm in respect of sales and the investments. These ratios are concerned about the over –all profitability of the firm.

(v) **Inter - firm and intra – firm comparison:** Ratios are not only reflecting the financial position of a firm, but also serves as a tool for remedial actions. This is made possible only due to inter-firm comparison. This would demonstrate the relative position of the firm vis-à-vis its competition. If there is any variance in the ratios either with the industry average or with, those of competitors, the firm has to identify the reasons and would take remedial measures.

(vi) **Trend analysis:** The trend analysis of ratios indicates whether the financial position of a firm is improving or deteriorating over the year. The significance of a trend analysis of ratio lies in the fact that the analysis can know the direction of movement whether the movement is favourable or unfavourable. Thus, ratio analysis is considered better than a mere comparison of figures in carrying out an over – all appraisal of a company's business.

Standards for Comparison

For making a proper use of ratios, it is essential to have fixed standards for comparison. A ratio by itself has very little meaning unless it is compared to some appropriate standard. Selection of proper standards of comparison is most important element in ratio analysis. The four most common standards used in ratio analysis in Financial Management are: absolute, historical, horizontal and budgeted.

(i) **Absolute:** Absolute standards are those which become generally recognized as being desirable regardless of the type of company, the time, stage of business cycle and the objectives of the analyst.

(ii) **Historical:** Historical (also known as internal) standards involves comparing a company's own past performance as a standard for the present or future. But this standard may not provide a sound basis for judgment as the historical figure may not have represented an acceptable standard. It is also called as intrafirm comparison.

(iii) **Horizontal:** In case of horizontal (external) standards, one company is compared with another or with the average of other companies of the same nature. It is also called as inter-firm comparison.

(iv) **Budgeted:** The budgeted standard is arrived at after preparing the budget for a period. Ratio developed from actual performance are compared to the planned ratios in the budget in order to examine the degree of accomplishment of the anticipated targets of the firm.

Limitations of Ratio Analysis

(i) It is always a challenging job to find an adequate standard. The conclusions drawn from the ratios can be no better than the standards against which they are compared.

(ii) It is difficult to evaluate the differences in the factors that affect the company's performance in a particular year as compared with that of another year and that of another company. The task becomes more difficult when comparison is made of one company with another when they are of substantially different size, age and diversified products.

(iii) While making comparisons of ratios, due allowance should be made for changes in price level. A change in price level can seriously affect the validity of comparisons of ratios computed for different time periods and particularly in case of ratios whose numerator and denominator are expressed in different units of currency.

(iv) Comparisons are also become difficult due to differences in definition. The terms like gross profit, operating profit, net profit etc. have not got precise definitions and there is considerable diversity in practice as to how they should be measured.

(v) A balance sheet may fail to reflect the average or typical situation, as it is prepared as of one moment of time. It ignores short-term fluctuations in assets and equities that may occur within the period covered by the two Balance Sheet dates.

(vi) Various differences are found among the accounting methods used by different companies which variously affect the comparability of financial statements. Methods of recording and valuing assets, write-offs, costs, expenses etc. differ from company to company.

(vii) As ratios are simple to calculate and easy to understand, there is a tendency to over-employ them. While such statistical approach stimulates thinking, it is also likely to lead to the accumulation of a mass of data; if due care is not taken, that might obscure rather than clarify relationships.

Classification of Ratios

In view of the requirements of the various users of ratios, we may classify them into the following important categories:

A. Profitability Ratios

B. Activity Ratios

C. Solvency Ratios

D. Valuation and Payout Ratios

These are discussed below:

A. Profitability Ratios

These ratios give an indication of the efficiency with which the operations of business are carried on. The following are the important profitability ratios:

(i) Gross Profit Ratio (GPR):

This ratio expresses the relationship between Gross Profit and Net Sales. It can be computed as follows:

$$\text{GPR} = \frac{\text{Gross Profit}}{\text{Net Sales (i.e., Less sales returns)}} \times 100$$

Significance: The ratio indicates the overall limit within which a business must manage its operating expenses. It also helps in ascertaining whether the average percentage of mark-up on the goods is maintained. A high gross profit margin ratio is a sign of good management. A low gross profit margin may reflect higher cost of goods sold due to the firm's inability to purchase raw materials at favourable terms, inefficient utilization of plant and machinery, or over-investment in plant and machinery, resulting in higher cost of production.

(ii) Net Profit Ratio (NPR):

The ratio indicates net margin earned on a sale of ₹ 100.

It is calculated as follows:

$$\text{NPR} = \frac{\text{Net Profit}}{\text{Net Sales}} \times 100$$

Significance: The ratio helps in determining the efficiency with which the affairs of a business are being managed. Constant increase in the above ratio year after year is a definite indication of improving conditions of the business.

(iii) Operating Profit Ratio:

The net profit margin is indicative of management's ability to operate the business with sufficient success not only to recover from revenues of the period, the cost of merchandise or services, the expenses of operating the business (including depreciation) and the cost of the borrowed funds, but also to leave a margin of reasonable compensation to the owners for providing their capital at risk.

$$\text{Operating Profit Ratio} = \frac{\text{Earnings before Interest and Taxes (EBIT)}}{\text{Net Sales}} \times 100$$

(iv) Expenses Ratio:

Another profitability ratio related to sales is the expenses ratio. It is computed by dividing expenses by sales. The term 'expenses' includes (i) cost of goods sold, (ii) administrative expenses, (iii) selling and distribution

expenses, (iv) financial expenses but excludes taxes, dividends and extraordinary losses due to theft of goods, good destroyed by fire and so on. There are different variants of expenses ratios. That is,

(a) $$\text{Cost of Goods Sold Ratio} = \frac{\text{Cost of Goods Sold}}{\text{Net Sales}} \times 100$$

(b) $$\text{Operating Expenses Ratio} = \frac{\text{Operating Expenses}}{\text{Net Sales}} \times 100$$

(v) Return on Investment:

An investor or shareholder or other interested parties want to know how much return they will get from their investment. From the firm's perspective investment may refer to total assets or net assets. Net assets are total assets minus current liabilities. Shareholders' investment is reflected by total equity (net worth). Investments made by shareholders and debtholders is known as capital employed or invested capital. Invested capital is capital employed minus cash, cash equivalents and goodwill. Based on the different aspects, we can calculate the following Return on Investment (ROI) ratios:

(a) Return on Assets (ROA): This ratio measures the operating efficiency of a firm's assets in generating profit without effect of methods of financing. It can be calculated as follows:

$$\text{Post-tax Return on Net Assets (RONA)} = \frac{\text{Earnings before Interest and Taxes (1-Tax)}}{\text{Total Assets}}$$

$$\text{Pre-tax Return on Net Assets (RONA)} = \frac{\text{Earnings before Interest and Tax}}{\text{Total Assets}}$$

Earnings before Interest and Tax (EBIT) is the operating income of a firm and excludes the effect of debt. Total Assets is sum of non-current and current assets.

(b) Return on Capital Employed (ROCE): This ratio is useful to measure the return on investors' capital employed by the firm. Capital employed is the sum of debt (long-term and short-term debt) and equity which is related to the operating income of the firm. RONA can be calculated as follows:

$$\text{Post-tax Return on Capital Employed (ROCE)} = \frac{\text{Earnings before Interest and Taxes (1-Tax)}}{\text{Debt + Equity}}$$

$$\text{Pre-tax Return on Capital Employed (ROCE)} = \frac{\text{Earnings before Interest and Tax}}{\text{Debt + Equity}}$$

(c) Return on Equity (ROE): This ratio is calculated to see the profitability of owners' investment. The shareholders' equity or net worth will include paid up share capital, share premium and reserves and surplus less accumulated loss. ROE can be calculated as under:

$$\text{Return on Equity (ROE)} = \frac{\text{Profit after Tax}}{\text{Equity}}$$

ROE indicates how well the firm has used the resources of owners. In fact, this ratio is one of the most important relationships in financial analysis. The earning of a satisfactory return is the most desirable objective of a business.

B. Turnover Ratios / Activity Ratios

These ratios indicate the efficiency with which capital employed is rotated in the business. The various turnover ratios are as follows:

(i) Inventory Turnover Ratio:

Inventory turnover shows the efficiency of the firm in producing and selling its product. It is calculated as follows:

$$\text{Inventory Turnover Ratio} = \frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$$

The average inventory is the average of opening and closing balances of inventory. In a manufacturing company inventory of finished goods is used to calculate inventory turnover.

In a manufacturing firm, inventory consists of two more components: (a) raw materials and (b) work-inprocess. An analyst may also be interested in examining the efficiency with which the firm converts raw materials into work-in-process and work-in-process into finished goods.

(a) $$\text{Raw Material Inventory Turnover Ratio} = \frac{\text{Raw Materials Consumed}}{\text{Average Raw Material Inventory}}$$

(b) $$\text{Work-in-Progress Inventory Turnover Ratio} = \frac{\text{Cost of Production}}{\text{Average Work-in-Progress Inventory}}$$

The inventory turnover shows how rapidly the inventory is turning into receivable through sales. Generally, a high inventory turnover is indicative of good inventory management. A low inventory turnover implies excessive inventory levels than warranted by production and sales activities, or a slow-moving or obsolete inventory.

(ii) Debtors (Accounts Receivable) Turnover Ratio:

The ratio indicates the speed with which money is collected from the debtor. It is computed as follows:

$$\text{Debtors Turnover Ratio} = \frac{\text{Net Credit Sales}}{\text{Average Accounts Receivable}}$$

Or

$$\text{Debtors Turnover Ratio} = \frac{\text{Net Credit Sales}}{\text{Average Accounts Receivable}}$$

The term average account receivable includes trade debtors and bills receivable. Average accounts receivables are computed by taking the average receivables in the beginning and at the end of the accounting year.

Debtors' turnover ratio is used to measure how rapidly receivables are collected. The higher the ratio, better it is. A high ratio indicates that debts are collected rapidly. The formula for computation of debtors collection period is as follows:

$$\text{Debtors Collection Period (in month)} = \frac{\text{12 Months}}{\text{Debtors Turnover Ratio}}$$

For example, if the credit sales are ₹ 80,000, average accounts receivable ₹ 20,000, the debtors' turnover ratio and debt collection period will be computed as follows:

$$\text{Debtors Turnover Ratio} = \frac{\text{Net Credit Sales}}{\text{Average Accounts Receivable}}$$

$$= \frac{80,000}{20,000}$$

= 4 (times per year)

= 3 months

$$\text{Debtors Collection Period} = \frac{12 \text{ Months}}{\text{Debtors Turnover Ratio}}$$

$$= \frac{12 \text{ months}}{4 \text{ months}}$$

= 3 months

This means on an average three months credit is allowed to the debtor. An increase in the credit period would result in unnecessary blockage of funds and with increased possibility of losing money due to debts becoming bad.

Significance: Debtors turnover ratio or debt collection period ratio measures the quality of debtors since it indicates the speed with which money is collected from the debtor. A shorter collection period implies prompt payment by debtor. A longer collection period implies too liberal and inefficient credit collection performance. The credit policy should neither be too liberal nor too restrictive. The former will result in more blockage of funds and bad debts while the latter will cause lower sales which will reduce profits.

For example, the credit sales of a firm in a year amount to ₹ 12,00,000. The outstanding amount of debtors at the beginning and end of the year were ₹ 1,40,000 and ₹ 1,60,000 respectively.

$$\text{Debtors turnover ratio} = \frac{₹\ 12,00,000}{(₹\ 1,40,000 + 1,60,000)/2} = 8 \text{ (times per year)}$$

$$\text{The average collection period} = \frac{12 \text{ months}}{8} = 1.5 \text{ months}$$

(iii) Creditors (Accounts Payable) Turnover Ratio:

This is similar to Debtors Turnover Ratio. It indicates the speed with which payments for credit purchases are made to creditors. It can be computed as follows:

$$\text{Creditors Turnover Period} = \frac{\text{Net Credit Purchases}}{\text{Average Accounts Payable}}$$

The term 'accounts payable' include trade creditors and bills payable.

With the help of the creditors' turnover ratio, creditors payment period can be computed as follows:

$$\text{Creditors Payment Period (in month)} = \frac{12 \text{ Months}}{\text{Creditors Turnover Ratio}}$$

For example, if the credit purchases during a year are ₹ 1,00,000, Average accounts payable ₹ 25,000, the creditors' turnover ratio and Creditor's collection period will be computed as follows:

$$\text{Creditors Turnover Period} = \frac{\text{Net Credit Purchases}}{\text{Average Accounts Receivable}}$$

$$= \frac{₹\ 1,00,000}{₹\ 25,000}$$

= 4 (times per year)

$$\text{Creditors Payment Period} = \frac{12 \text{ Months}}{\text{Creditors Turnover Ratio}}$$

$$= \frac{12 \text{ months}}{4}$$

$$= 3 \text{ months}$$

Significance: The creditors turnover ratio and the creditors payment period indicate about the promptness or otherwise in making payment for credit purchases. A higher creditors turnover ratio or a lower creditors payment period signifies that the creditors are being paid promptly thus enhancing the credit-worthiness of the company. However, a very favourable ratio to this effect also shows that the business is not taking full advantage of credit facilities which can be allowed by the creditors.

(iv) Fixed Assets Turnover Ratio:

The ratio indicates the extent to which the investment in fixed assets has contributed towards sales. The ratio can be calculated as follows:

$$\text{Fixed Assets Turnover Ratio} = \frac{\text{Net Sales}}{\text{Net Fixed Assets}}$$

Significance: The comparison of fixed assets turnover ratio over a period of time indicates whether the investment in fixed assets has been judicious or not. Of course, investment in fixed assets does not pushup sales immediately but the trend of increasing sales should be visible. If such trend is not visible or increase in sales has not been achieved after the expiry of a reasonable time it can be very well said that increased investments in fixed assets has not been judicious.

(v) Total Assets Turnover Ratio:

Some analysts prefer to calculate total assets turnover ratio.

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

(vi) Working Capital Turnover Ratio:

Working capital turnover ratio is a formula that calculates how efficiently a company uses working capital to generate sales. In this formula, working capital refers to the operating capital that a company uses in day-to-day operations. This ratio demonstrates a company's ability to use its working capital to generate income.

This formula may also be referred to as net sales to working capital.

$$\text{Working Capital Turnover Ratio} = \frac{\text{Net Annual Sales}}{\text{Working Capital}}$$

For example, if a company's sales is ₹ 10,00,000 in sales for a calendar year and ₹ 2,00,000 is working capital, then its working capital turnover ratio would be ₹ 5. This means that every rupee of working capital produces ₹ 5 in revenue.

C. Solvency Ratios

Solvency Ratios indicate about the financial position of the company. A company is considered to be financially sound if it is in a position to carry on its business smoothly and meet all its obligations both short-term and longterm without strain. The Financial or Solvency Ratios can therefore be classified into following categories:

(i) Long-term Solvency Ratios, which include fixed assets ratio, debt equity ratio and proprietary ratio;

(ii) Short-term Solvency Ratios, which include current ratio, liquidity ratio, super-quick ratio and defensive interval ratio & debt service coverage ratio.

Each of these ratios are now being discussed in detail-

(1) Long-term Solvency Ratios

(i) Debt-Equity Ratio:

The ratio is determined to ascertain the proportion between the 'outsiders' 'funds and share-holders funds' in the capital structure of an enterprise. The term outsiders' funds are generally used to represent total longterm debt. The ratio can be computed as follows:

$$\text{Debt} - \text{Equity Ratio} = \frac{\text{Total Long-term Debt}}{\text{Shareholders' Funds}}$$

Another approach to the calculation of the debt-equity ratio is to relate the total debt (not merely long-term debt) to the shareholders' equity. That is,

In such a case the ratio will be computed as follows:

$$= \frac{\text{Total Debt}}{\text{Shareholders' Funds}}$$

The ratio is considered to be ideal if the shareholders' funds are equal to total long-term debt. However, these days the ratio is also acceptable if the total long-term debt does not exceed twice of shareholders' funds.

Significance: The ratio is an indication of the soundness of the long-term financial policies pursued by the business enterprise. The excessive dependence on outsiders' funds may cause insolvency of the business. The ratio provides the margin of safety to the creditor. It tells the owners the extent to which they can gain by maintaining control with a limited investment.

(ii) Proprietary Ratio:

It is a variant of Debt-Equity Ratio. It establishes relationship between the proprietors' or shareholders' funds and the total tangible assets. It may be expressed as follows:

$$\text{Properietary Ratio} = \frac{\text{Shareholders' Funds}}{\text{Total Tangible Assets}}$$

Significance: The ratio focuses attention on the general financial strength of the business enterprise. The ratio is of particular importance to the creditors who can find out the proportion of shareholders' funds in the total assets employed in the business. A high proprietary ratio will indicate a relatively little danger to the creditors or vise-versa in the event of forced reorganization or winding up of the company.

(iii) Capital Gearing Ratio:

This ratio is a useful tool to analyze the capital structure of a company and is computed by dividing the common stockholders' equity by fixed interest or dividend bearing funds. Analyzing capital structure means measuring the relationship between the funds provided by common stockholders and the funds provided by those who receive a periodic interest or dividend at a fixed rate. A company is said to be low geared if the larger portion of the capital is composed of common stockholders' equity. On the other hand, the company is said to be highly geared if the larger portion of the capital is composed of fixed interest/dividend bearing funds.

Capital gearing refers to a company's relative leverage, i.e., its debt versus its equity value.

To calculate the capital gearing ratio, use the following formula:

$$\text{Capital Gearing Ratio} = \frac{\text{Common Stockholders' Equity}}{\text{Fixed Cost bearing Funds}}$$

For example, the following information has been taken from the Balance Sheet of L&T Limited.

8% bonds payable: ₹ 8,00,000

12% preferred stock: ₹ 7,00,000

Common stockholders' equity: ₹ 2,000,000

Required: Calculate the company's capital gearing ratio.

Solution:

$$\text{Capital Gearing Ratio} = \frac{\text{Common Stockholders' Equity}}{\text{Fixed Cost bearing Funds}}$$

$$= \frac{₹\ 20,00,000}{(₹\ 8,00,000 + ₹\ 7,00,000}$$

$$= \frac{₹\ 20,00,000}{(₹\ 15,00,000}$$

= 4 : 3 (low-geared)

(2) Short-term Solvency Ratios

(i) Current Ratio

The ratio is an indicator of the firm's commitment to meet its short-term liabilities. It is expressed as follows:

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

An ideal current ratio is 2:1. However, a ratio of 1.5:1 is also acceptable if the firm has adequate arrangements with its bankers to meet its short-term requirements of funds.

Significance: The ratio is an index of the concern's financial stability, since, it shows the extent to which the current assets exceed its current liabilities. A higher current ratio would indicate inadequate employment of funds, while a poor current ratio is a danger signal to the management.

(ii) Liquidity/Quick Ratio:

The ratio is also termed as Acid Test Ratio or Quick Ratio. The ratio is ascertained by comparing the liquid assets i.e., current assets (excluding stock and prepaid expenses) to current liabilities.

Some accountants prefer the term liquid liabilities for current liabilities. The term 'liquid liabilities' means liabilities payable within a short period. Bank overdraft and cash credit facilities (if they become permanent modes of financing) are excluded from current liabilities for this purpose. The ratio may be expressed as follows:

$$\text{Current Ratio} = \frac{\text{Liquid Assets}}{\text{Current Liabilities}}$$

An ideal liquidity ratio is '1:1'.

Significance: The ratio is an indicator of short-term solvency of the company. A comparison of the current ratio to quick ratio should also indicate the inventory hold-ups. For instance, if two units have the same current ratio but different liquidity ratios, it indicates over-stocking by the concern having low liquidity ratio as compared to the firm which has a higher liquidity ratio.

(iii) Fixed Charges Cover Ratio (FCCR):

The ratio indicates the number of times the fixed financial charges are covered by income before interest and tax. This ratio is calculated as follows:

$$\text{FCCR} = \frac{\text{Income before Interest and Tax}}{\text{Interest}}$$

Significance: The ratio is significant from the lender's point of view. It indicates whether the business would earn sufficient profits to pay periodically the interest charges. Higher the ratio, better it is.

(iv) Defensive-Interval Ratio (DIR)

This ratio denotes the liquidity of a firm in relation to its ability to meet projected daily expenditure from operations. It can be expressed as follows:

$$\text{Defensive Interval Ratio} = \frac{\text{Liquid Assets (Quick Assets)}}{\text{Daily Cash Requirements (Projected)}}$$

$$\text{Daily Cash Requirements (projected)} = \frac{\text{Projected Cash Operating Expenditure}}{\text{Number of Days in a Year}}$$

Significance: The DIR is thought by many people to be a better liquidity measure than the quick and current ratios. Because these ratios compare assets to liabilities rather than comparing assets to expenses, the DIR and current/quick ratios would give quite different results if the company had a lot of expenses, but no debt.

(v) Debt Service Coverage Ratio (DSCR)

This ratio indicates whether the business is earning sufficient profits to pay not only the interest charged, but also whether due of the principal amount. The ratio is calculated as follows:

$$\text{Debt Service Coverage Ratio} = \frac{\text{Profit after Taxes + Depreciation + Interest on Loan}}{\text{Interest on Loan + Loan Repayment in a Year}}$$

To service the loan in regard to timely payment of interest and repayment of loan installment. 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.

D. Valuation and Payout Ratios

Valuation ratios focus on the value of shareholders' investment in a company on the value of the firm. The value of shareholders' investment is reflected in the market capitalization which is equal to the market price per share multiplied by number of outstanding shares. The valuation ratios are as under:

(i) Price Earnings Ratio (P/E Ratio):

This ratio indicates the number of times the earning per share is covered by its market price. It is calculated as follows:

$$\text{P/E Ratio} = \frac{\text{Market Price Per Equity Share}}{\text{Earnings Per Share}}$$

For example, if the market price of an equity share is ₹ 20 and earnings per share is ₹ 5, the price earnings ratio will be 4 (i.e., 20 ÷ 5). This means for every one rupee of earning people are prepared to pay ₹4. In other words, the rate of return expected by the investors is 25% Significance. P/E Ratio helps the investors in deciding whether to buy or not to buy the shares of a company at a particular price. For Instance, in the example given, if the EPS falls to ₹ 3, the market price of the share should be ₹ 12 (i.e., 3 × 4). In case the market price of the share is ₹ 15, it will not be advisable to purchase the company's shares at that price.

(ii) Market Value to Book Value Share (MV/BV):

This ratio indicates the share price to book value per share.

$$\text{Market Value to Book Value Share Ratio} = \frac{\text{Market Value Per Share}}{\text{Book Value Per Share}}$$

(iii) Tobin's q:

Tobin's q is the ratio of the market value of a firm's assets (or equity and debt) to its assets' replacement costs.

$$\text{Tobin's q} = \frac{\text{Market Value of Assets}}{\text{Replacement Costs of Assets}}$$

(iv) Dividend Pay-Out Ratio:

The ratio indicates what proportion of earning per share has been used for paying dividend. It can be calculated as follows:

$$\text{Pay-Out Ratio} = \frac{\text{Dividend per Equity Share}}{\text{Earnings per Equity Share}}$$

The lower the pay-out ratio, the higher will be the amount of earnings ploughed back in the business. A lower pay-out ratio means a stronger financial position of the company.

(v) Dividend Yield Ratio (DYR):

The ratio is calculated by comparing the rate of dividend per share with its market value. It is calculated as follows:

$$\text{DYR} = \frac{\text{Dividend per Share}}{\text{Market Price per Share}} \times 100$$

Significance: The ratio helps an intending investor in knowing the effective return he is going to get on his investment.

For example, if the market price of a share is ₹ 25, paid-up value is ₹ 10 and dividend rate is 20%. The dividend yield ratio is 8% (i.e., 100 × 2/25). The intending investor can now decide whether it will be advisable for him to go for purchasing the shares of the company or not at the price prevailing in the market.

Ratios in Different Industries:

1. **Ratios used in Hotel Industry:** The variety of ratios used by hotel industry which are:
   (i) Room Occupancy Ratio
   (ii) Bed Occupancy Ratio
   (iii) Double Occupancy Ratio
   (iv) Seat Occupancy Ratios etc.

2. **Ratios used in Transport Industry:** The following important ratios are used in transport industry:
   (i) Passenger Kilometers
   (ii) Seat occupancy Ratios
   (iii) Operating cost per kilometer
3. **Bank Industry:** The following important ratios are used in Bank Industry:
   (i) Operating expenses ratios for various periods
   (ii) Loans to deposits ratios
   (iii) Operating income ratios for various periods
4. **Telecom Industry:** The following important ratios are used in telecom Industry.
   (i) Average duration of the outgoing call
   (ii) Number of outgoing calls per connection
   (iii) Revenue per customer

Illustration 7

Following is the Profit and Loss Account and Balance Sheet of Jai Hind Ltd. Redraft them for the purpose of analysis and calculate the following ratios: (1) Gross Profit Ratio (2) Overall Profitability Ratio (3) Current Ratio (4) Debt-Equity Ratio (5) Stock-Turnover Ratio (6) Finished Goods Turnover Ratio (7) Liquidity Ratio.

Dr. **Profit and Loss A/C for the year ended 31st March, 2024** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
Opening stock of finished goods	1,00,000	Sales	10,00,000
Opening stock of raw material	50,000	Closing stock of raw material	1,50,000
Purchase of raw material	3,00,000	Closing stock of finished goods	1,00,000
Direct wages	2,00,000	Profit on sale of shares	50,000
Manufacturing expenses	1,00,000		
Administration expenses	50,000		
Selling & distribution expenses	50,000		
Loss on sale of plant	55,000		
Interest on debentures	10,000		
Net Profit	3,85,000		
Total	**13,00,000**	**Total**	**13,00,000**

Balance Sheet as on 31.3.2024

Liabilities	Amount (₹)	Assets	Amount (₹.)
Equity share capital	1,00,000	Fixed assets	2,50,000
Preference share capital	1,00,000	Stock of raw material	1,50,000
Reserves	1,00,000	Stock of finished goods	1,00,000

Debentures	2,00,000	Bank balance	50,000
Sundry creditors	1,00,000	Debtors	1,00,000
Bills payable	50,000		
Total	**6,50,000**	**Total**	**6,50,000**

Jai Hind Ltd.

Income Statement for the year ended 31st March, 2024

Particulars	Amount (₹)	Amount (₹)
Sales		1,000,000
(-) Cost of goods sold:		
Raw material consumed	2,00,000	
Wages	2,00,000	
Manufacturing expenses	1,00,000	
Cost of production	5,00,000	
(+) Opening stock of finished goods	1,00,000	
(-) Closing stock of finished goods	(1,00,000)	(5,00,000)
Gross profit		5,00,000
(-) Operating expenses:		
Administrative expenses	50,000	
Selling and distribution	50,000	(1,00,000)
Operating profit		4,00,000
(+) Non operating income (profit on sale of shares)		50,000
(-) Loss on sale of plant		(55,000)
EBIT		3,95,000
(-) Interest		(10,000)
EBT / Net Profit		3,85,000

Statement of Financial Position

Particulars	(₹)
Bank	50,000
Debtors	1,00,000
Liquid assets	1,50,000
(+) Stock (Raw Materials and Furnished Goods)	2,50,000
Current assets	4,00,000
(–) Current liabilities (Sundry Creditors and Bills Payable)	(1,50,000)
Working capital	2,50,000
(+) Fixed assets	2,50,000

Capital employed in business	5,00,000
(–) External liabilities	(2,00,000)
Shareholders' funds	3,00,000
(–) Preference share capital	(1,00,000)
Equity share capital	**2,00,000**
Represented by	
Equity share capital	1,00,000
(+) Reserves	1,00,000
	2,00,000

(1) Gross Profit Ratio $= \frac{\text{Gross Profit}}{\text{Sales}} \times 100$ $\frac{₹5,00,000}{₹10,00,000} \times 100 = 50\%$

(2) Overall Profitability Ratio $= \frac{\text{Operating Profit}}{\text{Capital Employed}} \times 100$ $\frac{₹4,00,000}{₹5,00,000} \times 100 = 80\%$

(3) Current Ratio $= \frac{\text{Current Assets}}{\text{Current Liabilities}} = \frac{₹4,00,000}{₹1,50,000} = 2.67$ times

(4) Debt Equity Ratio $= \frac{\text{Long-term Debt}}{\text{Long-term Fund}} = \frac{₹2,00,000}{₹5,00,000} = 0.4$ times

(5) Stock Turnover Ratio $= \frac{\text{Raw Materials Consumed}}{\text{Average Stock of Raw Material}} = \frac{₹2,00,000}{₹1,00,000} = 2$ times

[Average Stock of Raw Materials $= \frac{₹50,000 + ₹1,50,000}{2} = ₹1,00,000$]

(6) Finished Goods Turnover Ratio $= \frac{\text{Cost of goods sold}}{\text{Average stock of Raw Material}} = \frac{₹5,00,000}{₹1,00,000} = 5$ times

[Average Stock of Raw Materials $= \frac{₹1,00,000 + ₹1,00,000}{2} = ₹1,00,000$]

(7) Liquid Ratio $= \frac{\text{Liquid Assets}}{\text{Current Liabilities}} = \frac{₹1,50,000}{₹1,50,000} = 1$

[Liquid Asset: Bank Balance + Debtors = ₹ 50,000 + ₹ 1,00,000 = ₹ 1,50,000]

Illustration 8

The capital of A Ltd. is as follows:

10% Preference shares, ₹ 10 each	₹ 3,00,000
Equity shares of ₹ 10 each	₹ 8,00,000
Total	**₹ 11,00,000**

Additional information: Profit (after tax at 35%), ₹ 2,70,000; Depreciation, ₹ 60,000; Equity dividend paid 20%; Market price of equity shares, ₹ 50.

You are required to compute the following, showing the necessary workings: (a) Dividend yield on the equity shares (b) Cover for the preference and equity dividends (c) Earnings per shares and (d) Price-earnings ratio.

Solution:

(a) Dividend yield on the equity shares $= \frac{\text{Dividend per share}}{\text{Market price per share}} \times 100$

$= \frac{₹2\ (0.20 \times ₹10)}{\text{Market price per share}} \times 100$

$= 4\%$

(b) Dividend Coverage Ratio :

(i) Preference $= \frac{\text{Profit after taxes}}{\text{Dividend payable to preference Shareholders}} \times 100$

$= \frac{₹2,70,000}{₹30,000\ (0.10 \text{ of } ₹3,00,000)} = 9 \text{ times}$

(ii) Equity $= \frac{\text{Profit after taxes - Preference shares dividend}}{\text{Dividend payable to equity shareholders at current rate of ₹ 2 per share}}$

$= \frac{₹2,70,000 - ₹30,000}{₹1,60,000\ (80,000 \text{ shares } ₹2)} = 152 \text{ times}$

(c) Earnings per Equity Share $= \frac{\text{Earning available to equity shareholders}}{\text{Number of equity shares outstanding}} = \frac{₹2,40,000}{80,000} = ₹3 \text{ per share}$

(d) Price-earnings (P/E) Ratio $= \frac{\text{Market price per share}}{\text{Earnings per share}} = \frac{₹50}{₹3} = 16.67 \text{ times}$

Illustration 9

The following are the ratios relating to the activities of X Ltd.

Debtors' velocity (months)	3
Stock velocity (months)	8
Creditors' velocity (months)	2
Gross profit ratio (%)	25

Gross profit for the current year ended December, 31st, 2024 amounts to ₹ 4,00,000. Closing stock of the year is ₹ 10,000 above the opening stock. Bills receivables amount to ₹ 25,000 and bills payable to ₹ 10,000. Find out (a) Sales, (b) Closing Stock, and (c) Sundry Creditors.

Solution:

(a) Determination of sales:

$$\text{Sales} = \frac{₹4,00,000}{25} \times 100 = ₹\ 16,00,000$$

(b) Determination of sundry debtors:

Debtors' velocity is 3 months. In other words, debtors collection period is 3 months, or debtors' turnover ratio is 4. Assuming all sales to be credit sales and debtors' turnover ratio being calculated on the basis of year-end figures.

$$\text{Debtors' turnover ratio} = \frac{\text{Credit Sales}}{\text{Closing Debtors' + Bills Receivables}}$$

$$\text{Closing debtors' + Bills Receivables} = \frac{\text{Credit Sales}}{\text{Debtors' Turnover ratio}} = \frac{₹\ 16,00,000}{4} = ₹\ 4,00,000$$

Closing Debtors = ₹ 4,00,000 – ₹ 25,000 = ₹ 3,75,000

(c) Determination of Closing Stock:

Stock velocity of 8 months signifies that the inventory holding period is 8 months, stock turnover ratio is 1.5 i.e., (12 months / 8).

$$\text{Stock Turnover} = \frac{\text{Cost of Goods Sold (Sales – Gross Profit)}}{\text{Average Stock}} = \frac{₹\ 12,00,000}{\text{Average Stock}} = 1.5$$

$$\text{Average Stock} = \frac{₹\ 12,00,000}{1.5} = ₹\ 8,00,000$$

Closing Stock – Opening Stock = ₹ 10,000 ..... (i)

$$\frac{\text{Closing Stock + Opening Stock}}{2} = ₹8,00,000 \text{ ..... (ii)}$$

Closing Stock + Opening Stock = ₹ 16,00,000 ..... (iii)

Subtracting (i) from (iii) we have,

2 Opening Stock = ₹15,90,000

Opening Stock = ₹7,95,000

Therefore, Closing Stock = ₹8,05,000

(d) Determination of Sundry Creditors':

Creditors' velocity of 2 months signifies that the credit payment period is 2 months. In other words, creditors' turnover ratio is 6 (i.e., 12 months/2). Assuming all purchases to be credit purchases and creditors turnover is based on year- end figures.

$$\text{Creditors Turnover Ratio} = \frac{\text{Credit purchase}}{\text{Creditors + Bills payable}}$$

$$6 = \frac{₹\ 12,00,000}{\text{Creditors} + ₹\ 10,000}$$

$$\text{or, Creditors} + ₹\ 10,000 = \frac{₹\ 12,00,000}{6}$$

or, Creditors = ₹ 2,01,667 – ₹ 10,000

Therefore, Creditors = ₹1,91,667

Credit purchases are calculated as follows:

Cost of Goods Sold = Opening Stock + Purchases + Closing Stock

or, ₹ 12,00,000 = ₹ 7,95, 000 + Purchases – ₹ 8,05,000

or, ₹ 12,00,000 + ₹ 10,000 = Purchases

or, ₹ 12,10,000 = Purchases (credit)

3.2.2 Financial Scores

1. Altman's Z Score

In 1968, Edward I. Altman developed a Multivariate Model of Corporate Distress Prediction on the basis of Multiple Discriminant Analysis (MDA). He selected 33 failed and 33 non-failed firms, of which 22 Accounting and Non-accounting Ratios, which had been deemed to be the predictors of Corporate Distress, were taken into consideration. Of the 22 Accounting Ratios, he selected 5 ratios which had been deemed as the best predictors of Corporate Distress Prediction.

The purposes of these five selected ratios are as follows:

- To measure liquidity position of the firms.
- To measure reinvestment of earnings of the firms.
- To measure profitability of the firms.
- To measure financial leverage condition of the firms.
- To measure sales-generating ability of firm's Assets.

Hence, the Model is:

$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5$

Where,

Z = Overall Index of Multiple Index Function

X_1 = Working Capital / Total Assets. It measures liquid assets in relation to the size of the company.

X_2 = Retained Earnings / Total Assets. It measures profitability that reflects the company's age and earning power.

X_3 = Earnings before Interest and Taxes / Total Assets. It measures operating efficiency apart from tax and leveraging factors. It recognizes operating earnings as being important to long-term viability.

X_4 = Market Value of Equity / Book Value of Total Liabilities. It adds market dimension that can show up security price fluctuation as a possible red flag.

X_5 = Sales / Total Assets. Standard measure for total asset turnover (varies greatly from industry to industry).

Analysis of Value of Z-score

(i) If the calculated value of Z-score is greater than 2.99, it is predicted that the firm belongs to non-bankrupt class (i.e., non-failed firm).

(ii) If the calculated value of Z-score is smaller than 1.81, it is predicted that the firm belongs to bankrupt class (i.e., failed firm).

(iii) If the calculated value of Z-score of a firm falls between 1.81 and 2.99 (referred to as Grey Area), it is predicted that the firm consists of both bankrupt and non-bankrupt class (i.e., mixture of failed and nonfailed elements) and, therefore, requires further investigation to determine its solvency status.

As per Altman's Multivariate Model of Distress Prediction

(a) If $Z > 2.99$: Non-failed or non-distressed firm

(b) If $Z < 1.81$: Failed or distressed firm

(c) If $Z \geq 1.81$ but ≤ 2.99 : Mixture of failed and non-failed elements which requires further investigation to determine its solvency status.

In 1983, Altman developed a revised Z-score model for privately held firms. "Credit analysis, private placement dealers, accounting auditors, and firms themselves are concerned that the original model is only applicable to publicly traded entities (since X requires stock price data)". The revised Z-scores substitute the book value of equity for the market value in X.

The new Z-score model ratios are listed below:

X_1 = Working Capital / Total Assets

X_2 = Retained Earnings / Total Assets

X_3 = Earnings before Interest and Taxes / Total Assets

X_4 = Market Value of Equity / Total Liabilities

X_5 = Sales / Total Assets

A change in the weight factor is also calculated. The revised Z-Score formula follows:

$Z = 0.717(X_1) + 0.847(X_2) + 3.107(X_3) + 0.420(X_4) + 0.998(X_5)$

Zones of Discrimination:

$Z > 2.9$	"Safe" Zone
$1.23 < Z < 2.9$	"Grey" Zone
$Z < 1.23$	"Distress" Zone

Z-score estimated for manufacturers, industrials, non-manufacturers & emerging markets:

X_1 = (Current Assets – Current Liabilities) / Total Assets

X_2 = Retained Earnings / Total Assets

X_3 = Earnings before Interest and Taxes / Total Assets

X_4 = Book Value of Equity / Total Liabilities

Z-Score bankruptcy model:

$Z = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$

Zones of discriminations:

$Z > 2.60$	"Safe" Zone
$1.1 < Z < 2.60$	"Grey" Zone
$Z < 1.1$	"Distress" Zone

Illustration: 10

From the information given below relating to Bad Past Ltd., calculate Altman's Z-score and comment:

(i)	Working Capital to Total Assets	= 25%
(ii)	Retained Earnings to Total Assets	= 30%
(iii)	EBIT to Total Assets	= 15%
(iv)	Market Value of Equity Shares to Book Value of Total Debt	= 150%
(v)	Sales to Total Assets	= 2 times

Solution:

As per Altman's Model (1968) of Corporate Distress Prediction:

$Z = 1.2\ X_1 + 1.4\ X_2 + 3.3\ X_3 + 0.6\ X_4 + 1.0\ X_5$

Here, the five variables are as follows:

X_1 = Working Capital to Total Assets = 25%

X_2 = Retained Earnings to Total Assets = 30%

X_3 = EBIT to Total Assets = 15%

X_4 = Market Value of Equity Shares to Book Value of Total Debt =150%

X_5 = Sales to Total Assets = 2 times

Hence, Z-score $= (1.2 \times 25\%) + (1.4 \times 30\%) + (3.3 \times 15\%) + (0.6 \times 150\%) + (1 \times 2.00)$

$= 0.30 + 0.42 + 0.495 + 0.90 + 2.00$

$= 4.115$

Comment: As the calculated value of Z-score is much higher than 2.99, it can be strongly predicted that the company is a non-bankrupt company.

2. Beneish M Score

In 1999, Messod D. Beneish developed a mathematical model that uses financial ratios and eight variables to identify whether a company has manipulated its earnings[1]. Beneish M Score helps to uncover companies who are likely to be manipulating their reported earnings. Companies with a higher score are more likely to be manipulators.

He also found that companies are incentivised to manipulate profits if they have high sales growth, deteriorating gross margins, rising operating expenses and rising leverage. They are likely to manipulate profits by accelerating sales recognition, increasing cost deferrals, raising accruals and reducing depreciation.

1 Beneish Messod D. (1999), The Detection of Earnings Manipulation, Financial Analysts Journal, Vol. 55, No. 5 (Sep. - Oct., 1999), pp. 24-36.

These eight ratios or variables are discussed below:

1. **Days' Sales in Receivables Index (DSRI):** A large increase in receivable days might suggest accelerated revenue recognition to inflate profits.

   DSRI = (Net Receivables$_t$ / Sales$_t$) / Net Receivables$_{t-1}$ / Sales$_{t-1}$)

2 **Gross Margin Index (GMI):** A deteriorating gross margin sends a negative signal about a firm's prospects and creates an incentive to inflate profits.

   GMI = [(Salest-1 - COGSt-1) / Salest-1] / [(Salest - COGSt) / Salest]

3. **Asset Quality Index (AQI):** An increase in long-term assets (for example, the capitalisation of costs), other than property plant and equipment, relative to total assets indicates that a firm has potentially increased its involvement in cost deferral to inflate profits.

   AQI = [1 - (Current Assetst + PP&Et + Securitiest) ÷ Total Assetst] / [1 - {(Current Assetst-1 + PP&Et-1 + $\frac{t}{t-1}$ × Securitiest-1) ÷ Total Assetst-1}]

4. **Sales Growth Index (SGI):** High sales growth does not imply manipulation but high growth companies are more likely to commit financial fraud because their financial position and capital needs put pressure on managers to achieve earnings targets. If growth firms face large stock prices losses at the first indication of a slowdown, they may have greater incentives to manipulate earnings.

   SGI = Salest / Salest-1

5. **Depreciation Index (DEPI):** A falling level of depreciation relative to net fixed assets raises the possibility that a firm has revised upwards the estimated useful life of assets, or adopted a new method that is income increasing.

   DEPI = (Depreciation$_{t-1}$/ (PP&E$_{t-1}$ + Depreciation$_{t-1}$)) / (Depreciation$_t$ / (PP&E$_t$ + Depreciation$_t$))

6. **Sales, General and Administrative Expenses (SGAI):** Analysts might interpret a disproportionate increase in SG&A relative to sales as a negative signal about a firm's future prospects, thereby creating an inventive to inflate profits.

   SGAI = (SG&A Expense$_t$ / Sales$_t$) / (SG&A Expense$_{t-1}$ / Sales$_{t-1}$)

7. **Leverage Index (LVGI):** Leverage is measured as total debt relative to total assets. An increase in leverage creates an incentive to manipulate profits in order to meet debt covenants.

   LVGI = [(Curren$_t$ Liabilities$_t$ + Total Long-term Debt$_t$) / Total Assets$_t$] / [(Curren$_t$ Liabilities$_{t-1}$ + Total Long-term Debt$_{t-1}$) / Total Assets$_{t-1}$]

8. **Total Accruals to Total Assets (TATA):** Total accruals are calculated as the change in working capital (other than cash) less depreciation relative to total assets. Accruals, or a portion thereof, reflect the extent to which managers make discretionary accounting choices to alter earnings. A higher level of accruals is, therefore, associated with a higher likelihood of profit manipulation.

   TATA = (Income from Continuing Operations$_t$ - Cash Flows from Operations$_t$) / Total Assets$_t$

Beneish M Score

Beneish M Score = −4.84 + 0.92 × DSRI + 0.528 × GMI + 0.404 × AQI + 0.892 × SGI + 0.115 × DEPI −0.172 × SGAI + 4.679 × TATA − 0.327 × LVGI

Interpretation:

(a) The threshold value is -1.78 for the model.

(b) If M-score is less than -1.78, the company is unlikely to be a manipulator. For example, an M-score value of -2.50 suggests a low likelihood of manipulation.

(c) If M-score is greater than −1.78, the company is likely to be a manipulator. For example, an M-score value of -1.50 suggests a high likelihood of manipulation.

Here are optimal cut-offs according to Beneish, presented as the score followed by the cost of Type I error relative to cost of Type II error):

M Score Table

Score	Relative Error Costs (Type I: Type II)
M Score > -1.49	(10:1)
M Score > -1.78	(20:1)
M Score > -1.89	(40+:1)

The best cut-off point depends on the costs mistakenly classifying in one of two ways:

(i) Classifying firm that is manipulating earnings as a non-manipulator (Type I error), and

(ii) Classifying a firm as a manipulator when it actually was not manipulating (Type II Error).

This model is used by students from Cornell University and detect Enron Corporation was correctly identified 1998 as an earnings manipulator using M-score.

Limitations of the Model

This is a probabilistic model, so it will not detect manipulators with 100% accuracy.

(i) Financial institutions were excluded from the sample in Beneish Model when calculating M-score. It means that the M-score for fraud detection cannot be applied among financial firms (banks, insurance).

(ii) Financial institutions were excluded from the sample in Beneish Model when calculating M-score. It means that the M-score for fraud detection cannot be applied among financial firms (banks, insurance).

3. Piotroski F Score

Joseph Piotroski, an accounting professor at the University of Chicago published a research paper on Value Investing: The Use of Historical Financial Statement Information to Separate Winners from Losers[2]. He examined whether a simple accounting-based fundamental analysis strategy, when applied to a broad portfolio of high bookto- market firms, can shift the distribution of returns earned by an investor. The strategy builds on investing in value stocks with strong financial performance. Piotroski (2000) documented for the US market between 1976 and 1996 that investors can increase the mean return with 7.5 % annually by investing in financially strong (high F-score) value stocks. Furthermore, he showed that an investment strategy that buys expected financially strong (high F-score) value stocks and short sell expected financially weak (low F-score) value stocks earn a return of 23 % annually.

The Piotroski F-score was first published in 2000. The F-score is a binary scoring system from 0 to 9 based on nine parameters/variables. The nine variables capture the factors profitability, leverage/liquidity and operating efficiency. Hence, a company can receive an F-score between 0 and 9 whereof 9 is the best score and is expected to have the strongest subsequent financial performance. For every criterion that are met, the company is given one

2 Piotroski Joseph D., (2000) Value Investing: The Use of Historical Financial Statement Information to Separate Winners from Losers, The University of Chicago Graduate School of Business

point, and if it is not met, then no points are awarded. The points are then added up to determine the best value stocks. Piotroski stated that the financial strength of a company could be determined using data solely from its financial statements. Moreover, a score of 0 is expected to have the weakest financial performance.

F -Score is based on nine signals which measure a stock's financial condition from three perspectives: profitability, financial leverage/liquidity and operating efficiency. A fundamental signal is classified as either good or bad whereof one is good and zero is bad.

A. Financial Performance Signals: Profitability

1. Return on Assets (ROA): (1 point if it is positive in the current year, 0 otherwise);
2. Operating Cash Flow (CFO) (1 point if it is positive in the current year, 0 otherwise);
3. Change in Return of Assets (ΔROA) (1 point if ROA is higher in the current year compared to the previous one, 0 otherwise);
4. Accruals (F_ ACCRUAL) (1 point if Operating Cash Flow/Total Assets is higher than ROA in the current year, 0 otherwise);

He defined ROA and CFO as net income before extraordinary items and cash flow from operations, respectively, scaled by beginning of the year total assets. If the firm's ROA (CFO) is positive, the indicator variable would be F_ROA (F_CFO) equal to one, zero otherwise. Further, ΔROA defined as the current year's ROA less the prior year's ROA. If ΔROA > 0, the indicator variable F_ ΔROA equals one, zero otherwise.

The variable ACCRUAL defined as current year's net income before extraordinary items less cash flow from operations, scaled by beginning of the year total assets. The indicator variable F_ ACCRUAL equals one if CFO > ROA, zero otherwise.

B. Financial Performance Signals: Leverage, Liquidity, and Source of Funds

1. Change in Leverage (ΔLEVER) (long-term) ratio (1 point if the ratio is lower this year compared to the previous one, 0 otherwise);
2. Change in Current ratio (ΔLIQUID) (1 point if it is higher in the current year compared to the previous one, 0 otherwise);
3. Change in the number of shares (EQ_OFFER) (1 point if no new shares were issued during the last year);

ΔLEVER defined as the historical change in the ratio of total long-term debt to average total assets, and view an increase (decrease) in financial leverage as a negative (positive) signal. The indicator variable defined F_ΔLEVER to equal one (zero) if the firm's leverage ratio fell (rose) in the year preceding portfolio formation.

The variable ΔLIQUID measures the historical change in the firm's current ratio between the current and prior year, an improvement in liquidity (i.e., ΔLIQUID > 0) is a good signal about the firm's ability to service current debt obligations. The indicator variable F_ΔLIQUID equals one if the firm's liquidity improved, zero otherwise.

The indicator variable defined EQ_OFFER to equal one if the firm did not issue common equity in the year preceding portfolio formation, zero otherwise.

C. Financial Performance Signals: Operating Efficiency

1. Change in Gross Margin (ΔMARGIN) (1 point if it is higher in the current year compared to the previous one, 0 otherwise);
2. Change in Asset Turnover ratio (ΔTURN) (1 point if it is higher in the current year compared to the previous one, 0 otherwise);

Financial Management and Business Data Analytics

ΔMARGIN defined as the firm's current gross margin ratio (gross margin scaled by total sales) less the prior year's gross margin ratio. An improvement in margins signifies a potential improvement in factor costs, a reduction in inventory costs, or a rise in the price of the firm's product. The indicator variable F_ΔMARGIN equals one if ΔMARGIN is positive, zero otherwise.

ΔTURN as the firm's current year asset turnover ratio (total sales scaled by beginning of the year total assets) less the prior year's asset turnover ratio.

Some adjustments that were done in calculation of the required financial ratios. The score is calculated based on the data from financial statement of a company. A company gets 1 point for each met criterion.

Summing up of all achieved points gives Piotroski F-score (number between 0 and 9).

Piotroski's Investment Strategy in Three Steps

Step 1: **Book-to-market** - Calculate book-to-market for all firms at fiscal year-end - Categorize values into quintiles.

Step 2: **F-score** - Calculate F-score for all firms in the highest quintile at fiscal year-end.

Step 3: **Investment** - Buy the firm 5 months after fiscal year-end. Sell 12 months after investment.

Interpretation

A company that has Piotroski F-score of 8–9 is considered to be strong. Alternatively, firms achieving the F-score of 0–2 are considered to be weak.

Average value of Piotroski F-score can be different in different branches of economy (e.g., manufacturing, finance, etc.). This should be taken into consideration when comparing companies with different specializations.

Fund Flow Statement - Preparation and Analysis

3.3

The Balance Sheet provides only a static view of the business. It is a statement of assets and liabilities on a particular date. It does not show the movement of funds. In business concerns, funds flow from different sources and similarly funds are invested in various sources of investment. It is a continuous process. The study and control of this funds flow process is one of the important objectives of Financial Management to assess the soundness and solvency of a business, financing and investing activities over the related period. Like the Balance Sheet, even the Profit and Loss Account does not depict the changes that have taken place in financial condition of a business concern between two dates. Hence, there is a need to prepare an additional statement to know the changes in assets, liabilities and owners' equity between dates of two Balance Sheets. Such a statement is called Funds Flow Statement or Statement of Sources and Uses of Funds or 'Where Got and Where Gone Statement'.

Definition of Fund Flow Statement

The Fund Flow Statement, which is also known as the Statement of Changes in financial position, is yet another tool of analysis of financial statements.

According to Foulke, "**A statement of sources and application of funds is a technical device designed to analyse the changes in the financial condition of a business enterprise between two dates**".

Anthony defines funds flow statement as "**Funds Flow Statement describes the sources from which additional funds were derived and the use to which these sources were put**".

So, Funds Flow Statement gives detailed analysis of changes in distribution of resources between two Balance Sheet dates. This statement is widely used by the financial analysts and credit granting institutions and Finance Managers in performing their jobs. Thus, Funds, Flow Statement, in general is able to present that information which either is not available or not readily apparent from an analysis of other financial statements.

Significance of Fund Flow Statement

It is very useful tool in the financial managers analytical kit. It provides a summary of management decisions on financing activities of the firm and investment policy. The following are the advantages of Fund Flow Statement.

(i) **Analysis of financial operations**: The fund flow statement reveals the net affect of various transactions on the operational and financial position of the business concern. It determines the financial consequences of business operations. This statement discloses the causes for changes in the assets and liabilities between two different points of time. It highlights the effect of these changes on the liquidity position of the company.

(ii) **Financial policies**: Fund flow Statement guides the management in formulating the financial policies such as dividend, reserve etc.

(iii) **Control device**: It serves as a measure of control to the management. If actual figures are compared with budgeted projected figures, management can take remedial action if there are my deviations.

(iv) **Evaluation of firm's financing:** Funds flow statement helps in evaluating the firm's financing. It shows how the funds were obtained from various sources and used in the past. Based on this, the financial manager can take corrective action.

(v) **Acts as a future guide:** Fund flow statement acts as a guide for future, to the management. It helps the management to know various problems it is going to face in near future for want of funds.

(vi) **Appraising the use of working capital**: Funds flow statement helps the management in knowing how effectively the working capital put into use.

(vii) **Reveals financial soundness**: Funds flow statement reveals the financial soundness of the business to the creditors, banks, financial institutions.

(viii) **Changes in working capital:** Funds flow statement highlights the changes in working capital. This helps the management in framing its investing policy.

(ix) **Assessing the degree of risk:** Funds flow statement helps the bankers, creditors, financial institutions in assessing the degree of risk involved in granting the credit to the business concern.

(x) **Net results:** This statement reveals the net results of operations during the year in terms of cash.

Limitations of Funds Flow Statement Analysis

It indicates only the past changes. It cannot reveal continuous changes.

(i) When both the aspects of the transaction are current, they are not considered.

(ii) When both the aspects of the transaction are non-current, even then they are not included in funds flow statement.

(iii) Some Management Accountants are of the opinion that this statement is not ideal tool for financial analysis.

(iv) Funds Flow Statement is historic in nature. Hence this projected fund flow statement cannot be prepared with much accuracy.

Preparation and Analysis of Fund Flow Statement

Two statements are involved in preparing and analysis of fund flow statement.

(I) Statement or Schedule of Changes in Working Capital

(II) Statement of Funds Flow

(I) Statement of Changes in Working Capital: This statement when prepared shows whether the working capital has increased or decreased during two balance sheet dates. But this does not give the reasons for increase or decrease in working capital. This statement is prepared by comparing the current assets and the current liabilities of two periods.

(II) Funds Flow Statement: Funds flow statement is also called as statement of changes in financial position or statement of sources and applications of funds or where got, where gone statement. The purpose of the funds flow statement is to provide information about the enterprise's investing and financing activities. The activities that the funds flow statement describes can be classified into two categories:

(i) Activities that generate funds, called Sources, and

(ii) Activities that involve spending of funds, called Uses or, Application

When the funds generated are more than funds used, we get an increase in working capital and when funds generated are lesser than the funds used, we get decrease in working capital. The increase or decrease in working capital disclosed by the schedule of changes in working capital should tally with the increase or decrease disclosed by the funds flow statement.

Sources and Uses or Application of Funds

In general, the assets of an enterprise represent the net uses of funds and its liabilities and net worth represent net sources of funds. The items of current assets and liabilities are not included in the sources and uses of funds. Sources and uses of funds are given below:

Sources of Funds

(i) Issue of share capital

(ii) Funds from business operations

(iii) Issue of debentures of long-term loans

(iv) Sale of fixed assets or long-term investments

(v) Non-trading income

(vi) Decrease in working capital

(vii) Any other increase in liability and decrease in asset

Application/Uses of Funds

(i) Redemption of preference share capital

(ii) Redemption of debentures

(iii) Repayment of long-term loans

(iv) Purchase of fixed assets or long-term investments

(v) Payment of dividends and tax

(vi) Any other non-trading payment

(vii) Funds lost through business operations

(viii) Increase in working capital

If the total of funds received exceeds that of the funds applied, the difference is excess funds, which will be represented by an increase in working capital. On the other hand, if the total of funds used exceeds the total of funds received, the difference is shortage in fund represented by decrease in working capital.

Illustration 11

From the Balance Sheet of X Ltd., prepare: (A) Statement of changes in the Working Capital and (B) Funds Flow Statement.

Balance Sheet

Liabilities	31st March		Assets	31st March	
	2023 (₹)	2024 (₹)		2023 (₹)	2024 (₹)
Equity Share Capital:	3,00,000	4,00,000	Goodwill	1,15,000	90,000
8% Preference share capital	1,50,000	1,00,000	Land & Buildings	2,00,000	1,70,000
P & L A/c	30,000	48,000	Plant	80,000	2,00,000

Liabilities	31st March		Assets	31st March	
	2023 (₹)	2024 (₹)		2023 (₹)	2024 (₹)
General Reserve	40,000	70,000	Debtors	1,60,000	2,00,000
Proposed Dividend	42,000	50,000	Stock	77,000	1,09,000
Creditors	55,000	83,000	Bills Receivable	20,000	30,000
Bills Payable	20,000	16,000	Cash in hand	15,000	10,000
Provision for Taxation	40,000	50,000	Cash at Bank	10,000	8,000
	6,77,000	**8,17,000**		**6,77,000**	**8,17,000**

Following is the additional information available.

(i) Depreciation of ₹ 10,000 and ₹ 20,000 have been charged on Plant and Land and Buildings respectively in 2024.

(ii) Interim dividend of ₹ 20,000 has been paid in 2024.

(iii) Income tax of ₹ 35,000 has been paid in 2024.

Solution:

A. Calculation of changes in Working Capital

Current Asset	2022 (₹)	2023 (₹)
Debtors	1,60,000	2,00,000
Stock	77,000	1,09,000
Bills Receivable	20,000	30,000
Cash in hand	15,000	10,000
Cash at Bank	10,000	8,000
A: Total Current Assets	**2,82,000**	**3,57,000**

Current Liabilities	2023	2024
Creditors	55,000	83,000
Bill Payable	20,000	16,000
B: Total Current Liabilities	75,000	99,000
Working capital (A-B)	2,07,000	2,58,000

Increase in working capital ₹ 2,58,000 – ₹ 2,07,000 = ₹ 51,000

Funds Flow Statement

Sources	Amount (₹)	Application	Amount (₹)
Funds from Operations	2,30,000	Purchases of Plant	1,30,000

Sources	Amount (₹)	Application	Amount (₹)
Sale proceeds of Land & Building	10,000	Increase in Working Capital	51,000
Issue of Equity Share Capital	1,00,000	Tax Paid	35,000
		Redemption of Preference Share Capital	50,000
		Proposed Dividend	42,000
		Interim Dividend paid	20,000
		Preference Dividend paid	12,000
	3,40,000		**3,40,000**

Working note:

Dr. **1. Land & Buildings A/c** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To, Balance b/d	2,00,000	By, Depreciation provided	20,000
		By, Bank – sale proceeds (b/f)	10,000
		By, Balance c/f	1,70,000
	2,00,000		**2,00,000**

Dr. **2. Plant A/c** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To, Balance b/d	80,000	By, Depreciation provided	10,000
To, Bank (b/f)	1,30,000	By, Balance c/f	2,00,000
	2,10,000		**2,10,000**

Dr. **3. Provision for Tax A/c** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To, Bank – paid	35,000	By, Balance b/d	40,000
To, Balance c/f	50,000	By, P & L A/c –provided	45,000
	85,000		**85,000**

Dr. **4. P/L Adjustment A/c** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To, Depreciation	30,000	By, Balance b/d	30,000
To, Preference Dividend (1,50,000 × 8%)	12,000		
To, Transfer to G/R	30,000		
To, Provision for Tax	45,000		
To, Proposed Dividend	50,000		

To, Goodwill written off	25,000		
To, Interim Dividend	20,000		
To, Balance C/f	48,000	By, Funds from Operation, (b/f)	2,30,000
	2,60,000		**2,60,000**

Illustration 12

The following is the Balance Sheet of Gama Limited for the year ending March 31, 2023 and March 31, 2024

Balance Sheet as on March, 31

Particulars	2023 (₹)	2024 (₹)
Capital and Liabilities		
Share Capital	6,75,000	7,87,500
General Reserves	2,25,000	2,81,250
Capital Reserve (Profit on Sale of Investment)	– 1,12,500	11,250
Profit & Loss Account	3,37,500	2,25,000
15% Debentures	11,250	2,25,000
Accrued Expenses	1,80,000	13,500
Creditors	33,750	2,81,250
Provision for Dividends	78,750	38,250
Provision for Taxation		85,500
Total	**16,53,750**	**19,48,500**

Assets		
Fixed Assets	11,25,000	13,50,000
Less: Accumulated depreciation	2,25,000	2,81,250
Net Fixed Assets	9,00,000	10,68,750
Long – Term Investments (at cost)	2,02,500	2,02,500
Stock (at cost)	2,25,000	3,03,750
Debtors (net of provision for doubtful debts of ₹ 45,000 and ₹ 56,250 respectively for 2023 and 2024 respectively)	2,53,125	2,75,625
Bills receivables	45,000	73,125
Prepaid Expenses	11,250	13,500
Miscellaneous Expenditure	16,875	11,250
Total	**16,53,750**	**19,48,500**

Additional Information:

(a) During the year 2023-24, fixed assets with a net book value of ₹ 11,250 (accumulated depreciation, ₹ 33,750) was sold for ₹ 9,000.

(b) During the year 2023-24, Investments costing ₹ 90,000 were sold, and also Investments costing ₹ 90,000 were purchased.

(c) Debentures were retired at a Premium of 10%.

(d) Tax of ₹ 61,875 was paid for 2022-23.

(e) During the year 2023-24, bad debts of ₹ 15,750 were written off against the provision for Doubtful Debt account.

(f) The proposed dividend for 2022-23 was paid in 2023-24.

Prepare a Funds Flow Statement (Statement of changes in Financial Position on working capital basis) for the year ended March 31, 2024.

Solution:

In the books of Gama Ltd.

Funds Flow Statement For the year ended March 31, 2024

Sources of Fund	Amount (₹)	Application of Funds	Amount (₹)
Increase in Share Capital	1,12,500	Debenture Redemption	1,12,500
Sale of Assets	9,000	Redemption Premium	11,250
Fund from Operations	3,84,750	Tax paid	61,875
Sale of Investment	1,01,250	Dividend paid	33,750
		Increase in Working Capital	28,125
		Purchase of Fixed Assets	2,70,000
		Purchase of Investment	90,000
	6,07,500		**6,07,500**

Working notes:

Statement showing Funds from Operations

Particulars	Amount (₹)	Amount (₹)
Net Profit [2,25,000 – 1,12,500]		1,12,500
Add: Transfer to General Reserve	56,250	
Loss on sale of fixed assets	2,250	
Premium on Redemption of Debentures	11,250	
Provision for Tax	68,625	
Provision for Dividend	38,250	
Depreciation	90,000	
Misc. Expenses. write off	5,625	2,72,250
Funds from Operations		**3,84,750**

Statement showing changes in Working Capital

Particulars	(₹)	
	2023	2024
Current Assets		
Stock	2,25,000	3,03,750
Debtors	2,53,125	2,75,625
Bills Receivables	45,000	73,125
Prepaid Expenses	11,250	13,500
Total Current Assets (A)	5,34,375	6,66,000
Current Liabilities		
Accrued Expenses	11,250	13,500
Creditors	1,80,000	2,81,250
Total Current Liabilities (B)	1,91,250	2,94,750
Working Capital (A) – (B)	3,43,125	3,71,250
Increase in Working Capital		28,125

Dr. **Provision for Doubtful Debt A/c** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Bad debts	15,750	By Balance b/d	45,000
To Balance c/d	56,250	By P & L A/c	27,000
	72,000		**72,000**

Dr. **Provision for Dividends** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Divend paid	33,750	By Balance b/d	33,750
To Balance c/d	38,250	By P & L A/c	38,250
	72,000		**72,000**

Dr. **Provision for Tax** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Tax paid	61,875	By Balance B/d	78,750
To Balance c/d	85,500	By P & L A/c	68,625
	1,47,375		**1,47,375**

Dr. **Accumulated Depreciation A/c** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Asset sold	33,750	By Balance b/d	2,25,000
To Balance c/d	2,81,250	By P & L A/c	90,000
	3,15,000		**3,15,000**

Dr. **Fixed Assets A/c** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance b/d	11,25,000	By Account depreciation	33,750
To Bank	2,70,000	By Bank	9,000
		By P & L	2,250
		By Balance c/d	13,50,000
	13,95,000		**13,95,000**

Cash Flow Statement - Preparation and Analysis

3.4

Cash Flow Statement reveals the causes of changes in cash position of business concern between two dates of Balance Sheets. According to Ind AS-7 an enterprise should prepare a Cash Flow Statement and should present it for each period with financial statements prepared. Ind AS-7 has also given the meaning of the words cash, cash equivalent and cash flows.

(i) **Cash:** This includes cash on hand and demand deposits with banks.

(ii) **Cash equivalents:** This includes purely short-term and highly liquid investments which are readily convertible into cash and which are subject to an insignificant risk of changes in value. Therefore an investment normally qualifies as a cash equivalent only when it has a short maturity, of say three months or less.

(iii) **Cash flows:** This includes inflows and outflows of cash and cash equivalents. If the effect of transaction results in the increase of cash and its equivalents, it is called an inflow (source) and if it results in the decrease of total cash, it is known as outflow (use of cash).

3.4.1 Classification of Cash Flows

According to Ind AS-7 cash flows are classified into three main categories:

A. Cash flows from Operating Activities

B. Cash flows from Investing Activities

C. Cash flows from Financing Activities

A. Cash flows from Operating Activities: Operating activities are the principal revenue-producing activities of the enterprise and other activities that are not investing or financing activities.

The amount of cash flows arising from operating activities is a key indicator of the extent to which the operations of the enterprise have generated sufficient cash flows to maintain the operating capability of the enterprise, pay dividends, repay loans, and make new investments without recourse to external sources of financing.

Cash flows from operating activities are primarily derived from the principal revenue-producing activities of the enterprise. The following are the important operating activities:-

(i) Cash receipts from the sale of goods and the rendering of services.

(ii) Cash receipts from royalties, fees, commissions and other revenue.

(iii) Cash payments to suppliers for goods and services.

(iv) Cash payments to and on behalf of employees.

(v) Cash receipts and cash payments of an insurance enterprise for premiums and claims, annuities and other policy benefits

(vi) Cash payments or refunds of income taxes unless they can be specifically identified with financing and investing activities

(vii) Cash receipts and payments relating in future contracts, forward contracts, option contracts and swap contracts when the contracts are held for dealing or trading purposes.

(viii) Some transactions such as the sale of an item of plant, may give rise to a gain or loss which is included in the determination of net profit or loss. However, the cash flows relating to such transactions are cash flows from investing activities.

An enterprise may hold securities and loans for dealing or trading purposes, in which case they are similar to inventory acquired specifically for sale. Therefore, cash flows arising from the purchase and sale of dealing or trading activities are classified as operating activities. Similarly cash advances and loans made by financial enterprises are usually classified as operating activities since they relate by the main revenue producing activity of that enterprise.

B. Cash flows from Investing Activities: Investing activities are the acquisition and disposal of long-term assets and other investments not included in cash equivalents. The separate disclosure of cash flows arising from investing activities is important because the cash flows represent the extent to which expenditures have been made for resources intended to generate future income and cash flows.

Examples of cash flows arising from Investing Activities are:

(i) Cash payments to acquire fixed assets (including intangibles). These payments include those relating to capitalised research & development costs and self constructed fixed assets.

(ii) Cash receipts from disposal of fixed assets (including intangibles).

(iii) Cash payments to acquire shares, warrants, or debt instruments of other enterprises and interests in joint ventures.

(iv) Cash receipts from disposal of shares, warrants, or debt instruments of other enterprises and interests in joint venture.

(v) Cash advances and loans made to third parties (other than advances and loans made by a financial enterprise).

(vi) Cash receipts from the repayment of advances and loans made to third parties (other than advances and loans of a financial enterprise).

(vii) Cash payments for future contracts, forward contracts, option contracts, and swap contracts except when the contracts are held for dealing or trading purposes or the payments are classified as financing activities and

(viii) Cash receipts from future contracts, forward contracts, option contracts and swap contracts except when the contracts are held for dealing or trading purpose, or the receipts are classified as financing activities.

When a contract is accounted for as a hedge of an identifiable position, the cash flows of the contract are classified in the same manner as the cash flows of the position being hedged.

C. Cash flows from Financing Activities: Financing activities are activities that result in changes in the size and composition of the owners capital (including Preference Share Capital in the case of a company) and borrowing of the enterprise.

The separate disclosure of cash flows arising from financing activities is important because it is useful in predicting claims on future cash flows by providers of funds (both capital and borrowing) to the enterprise.

Examples of cash flows arising from financing activities are:

(i) Cash proceeds from issuing shares or other similar instruments.

(ii) Cash proceeds from issuing debentures loans, notes, bonds and other short-or long-term borrowings and

(iii) Cash repayments of amounts borrowed such as redemption of debentures, bonds, preference shares.

Treatment of some Typical Items: Ind AS-7 has also provided for the treatment of cash flows from some peculiar items as discussed below :

(a) Extraordinary Items: The cash flows associated with extraordinary items should be classified as arising from operating, investing or financing activities as appropriate and separately disclosed in the Cash Flows Statement to enable users to understand their nature and effect on the present and future cash flows of the enterprise.

(b) Interest and Dividends: Cash flows from interest and dividends received and paid should be disclosed separately. Further, the total amount of interest paid during the period should be disclosed in the Cash Flow Statement whether it has been recognised as an expense in the statement of profit and loss or capitalised. The treatment of interest and dividends received and paid depends upon the nature of the enterprise. For this purpose, the enterprises are classified as (i) Financial enterprises, and (ii) Other enterprises.

(i) **Financial Enterprises:** In the case of financial enterprises, cash flows arising from interest paid and interest and dividend received should be classified as cash flows arising from operating activities.

(ii) **Other Enterprises:** In the case of other enterprises, cash flows arising from interest paid should be classified as cash flows from financing activities while interest and dividends received should be classified as cash flows from investing activities. Dividends paid should be classified as cash flows from financing activities.

(c) Taxes on Income: Cash flows arising from taxes on income should be separately disclosed and should be classified as cash flows from operating activities unless they can be specifically identified with financing and investing activities.

(d) Acquisitions and Disposals of Subsidiaries and other Business Units : The aggregate cash flows arising from acquisitions and from disposals of subsidiaries or other business units should be presented separately and classified as investing activities. An enterprise should disclose, in aggregate in respect of both acquisition and disposal of subsidiaries or other business units during the period each of the following:

(i) The total purchase or disposal consideration and

(ii) The portion of the purchase or disposal consideration discharged by means of cash and cash equivalents.

The separate presentation of the cash flow effects of acquisitions and disposals of subsidiaries and other business units as single line items helps to distinguish those cash flows from other cash flows. The cash flow effects of disposals are not deducted from those of acquisitions.

(e) Foreign Currency Cash Flows: Cash flows arising from transactions in a foreign currency should be recorded in an enterprise's reporting currency by applying to the foreign currency amount the exchange rate between the reporting currency and the foreign currency at the date of the cash flow. The effect of changes in exchange rates on cash and cash equivalents held in a foreign currency should be reported as a separate part of the reconciliation of the changes in cash and cash equivalents during the period.

Unrealised gains and losses arising from changes in foreign exchange rates are not cash flows. However, the effect of exchange rate changes on cash and cash equivalents held or due in a foreign currency is reported in the Cash Flow Statement in order to reconcile cash and cash equivalents at the beginning and

at the end of the period. This amount is presented separately from cash flows from operating investing and financing activities and includes the difference, if any had those cash flows been reported at the end of period exchange rates.

(f) Non-cash Transactions: Many investing and financing activities do not have a direct impact on current cash flows although they do affect the capital and asset structure of an enterprise. Examples of non-cash transactions are :

(i) The acquisition of assets by assuming directly related activities.

(ii) The acquisition of an enterprise by means of issue of shares; and

(iii) The conversion of debt to equity.

Investing and financing transactions that do not require the use of cash or cash equivalents should be excluded from a Cash Flow Statement. Such transactions should be disclosed elsewhere in the financial statements in a way that provides all the relevant information about these investing and financing activities.

3.4.2 Methods of Calculating Cash flows (Used in) from Operating Activities

There are two methods of reporting cash flows from operating activities namely (1) Direct Method and (2) Indirect Method.

1. **The Direct Method:** Under the direct method, cash receipts (inflows) from operating revenues and cash payments (outflows) for operating expenses are calculated to arrive at cash flows from operating activities.

   The difference between the cash receipts and cash payments is the net cash flow provided by (or used in) operating activities. The following are the examples of cash receipts and cash payments (called cash flows) resulting from operating activities :

   (a) Cash receipts from the sale of goods and the rendering of services.

   (b) Cash receipts from royalties, fees commissions and other revenues.

   (c) Cash payment to suppliers for goods and services.

   (d) Cash payment to and on behalf of employees.

   (e) Cash receipts and cash payment of an insurance enterprise for premiums and claims annuities and other policy benefits.

   (f) Cash payments or refund of income taxes unless they can be specifically identified with financing and investing activities. and

   (g) Cash receipts and payments relating to future contracts, forward contracts, option contracts and swap contracts when the contracts are held for dealing or trading purposes. The formation about major classes of gross cash receipts and gross cash payments may be obtained either:

      (a) From accounting records of the enterprise; or

      (b) By adjusting sales, cost of sales (interest and similar income and interest expense and similar charges for a financial enterprise) and other items in the statement of profit and loss for;

         (i) Changes during the period in inventories and operating receivables and payables,

         (ii) Other non-cash items, and

         (iii) Other items for which the cash effects are investing or financing cash flows.

Format of Cash Flow Statement: Ind AS-7 has not provided any specific format for preparing a Cash Flows Statement. The Cash Flow Statement should report cash flows during the period classified by operating, investing and financing activities; a widely used format of Cash Flow Statement is given below:

Cash Flow Statement (for the year ended.)

Particulars	(₹)	(₹)
Cash Flows from Operating activities		
Cash receipts from customers	xxx	
Cash paid to suppliers and employees	(xxx)	
Cash generated from operations	xxx	
Income tax paid	(xx)	
Cash flow before extraordinary items	xxx	
Extraordinary items	xxx	
Net cash from (used in) Operating activities		xxx
(Or)		
Net profit before tax and extraordinary items	xxx	
Adjustments for non-cash and non-operating items		
(List of individual items such as depreciation, foreign exchange loss, loss on sale of fixed assets, interest income, dividend income, interest expense etc.)	xxx	
Operating profit before working capital changes	xxx	
Adjustments for changes in current assets and current liabilities		
(List of individual items)	xxx	
Cash generated from (used in) operations before tax	xxx	
Income tax paid	xxx	
Cash flow before extraordinary items	xxx	
Extraordinary items (such as refund of tax)	xxx	
Net Cash from (used in) Operating activities		xxx
Cash Flows from investing activities		
Individual items of cash inflows and outflows from financing activities	xxx	
(such as purchase/sale of fixed assets, purchase or sale of investments, interest received, dividend received etc.	xxx	
Net cash from (used in) investing activities		xxx
Cash Flows from Financing Activities		
Individual items of cash inflows and outflows from financing activities	xxx	
(such as) proceeds from issue of shares, long-term borrowings, repayments of long-term borrowings, interest paid, dividend paid etc.)	xxx	xxx

Particulars	(₹)	(₹)
Net increase (decrease) in cash and cash equivalents		xxx
Cash and cash equivalents at the beginning of the period		xxx
Cash and cash equivalents at the end of the period		xxx

2. **The Indirect Method:** Under the indirect method, the net cash flow from operating activities is determined by adjusting net profit or loss for the effect of :

   (a) Non-cash items such as depreciation, provisions, deferred taxes, and unrealised foreign exchange gains and losses;

   (b) Changes during the period in inventories and operating receivables and payables.

   (c) All other items for which the cash effects are investing or financing cash flows.

   The indirect method is also called reconciliation method as it involves reconciliation of net profit or loss as given in the Profit and Loss Account and the net cash flow from operating activities as shown in the Cash Flow Statement. In other words, net profit or losses adjusted for non-cash and non-operating items which may have been debited or credited to Profit and Loss Account as follows.

Calculation of Cash Flow from Operating Activities

Particulars	(₹)	(₹)
Net profit before tax and extraordinary items		xxx
Add : Non-cash and non-operating items which have already been debited to P.L. Account		
(a) Depreciation	xxx	
(b) Transfer to reserves and provisions	xxx	
(c) Goodwill written off	xxx	
(d) Preliminary expenses written off	xxx	
(e) Other intangible assets written off such as discount or loss on issue of shares / debentures, underwriting commission etc.	xxx	
(f) Loss on sale or disposal of fixed assets	xxx	
(g) Loss on sale of investments	xxx	
(h) Foreign exchange loss	xxx	xxx
Less : Non-cash and non-operating items which have already been credited to Profit and Loss Account		xxx
(a) Gain on sale of fixed assets	xxx	
(b) Profit on sale of investments	xxx	
(c) Income from interest or dividends on investments	xxx	
(d) Appreciation	xxx	

Particulars	(₹)	(₹)
(e) Reserves written back	xxx	
(f) Foreign exchange gain	xxx	xxx

Or

Particulars	(₹)	(₹)
		xxx
Operating Profit Before Working Capital Changes		
Adjustments for changes in current operating assets and liabilities:		
Add : Decrease in Accounts of Current Operating Assets (except cash and cash equivalents) such as :		
Decrease in trade debts	xxx	
Decrease in bills receivables	xxx	
Decrease in inventories / stock-in-trade	xxx	
Decrease in prepaid expenses etc.	xxx	
Add : Increase in accounts of current operating liabilities (except Bank overdraft) such as :		
Increase in creditors	xxx	
Increase in bills payable	xxx	
Increase in outstanding expenses	xxx	xxx
		xxxx
Less : Increase in accounts of current operating assets (as stated above)		xxx
		xxx
Less : Decrease in accounts of current operating liabilities (as stated above)		xxx
Cash generated from (used in) operations before tax		xxx
Less : Income tax paid		xxx
Cash flows before extraordinary items		xxx
Add / Less : Extraordinary items if any		xxx
Net cash flow from (used in) operating activities		xxx

Need of Preparing Cash Flow Statement

Cash flow statement shows the changes in cash position between two balance sheet dates. It provides the details in respect of cash generated through operating, investing and financial activities and utilised for operating, investing and financial activities. The transactions which increase the cash position of the business are known as Inflows

of cash (Example : Sale of current and fixed assets, Issue of shares and debentures etc.) The transactions which decrease the cash position are known as outflows (example : Purchase of Current and Fixed Assets, redemption of Debentures, and Preference Shares and other long-term debts). Cash Flow Statement concentrates on transactions that have a direct impact on cash. This statement depicts factors responsible for such inflow and outflow of cash.

(i) Cash flow statement reveals the causes of changes in cash balances between two balance sheet dates.

(ii) This statement helps the management to evaluate its ability to meet its obligations i.e., payment to creditors, the payment of bank loan, payment of interest, taxes, dividend etc.

(iii) It throws light on causes for poor liquidity in spite of good profits and excessive liquidity in spite of heavy losses.

(iv) It helps the management in understanding the past behaviour of cash cycle and in controlling the use of cash in future.

(v) Cash Flow Statements helps the management in planning repayment of loans, replacement of assets etc.

(vi) This statement is helpful in short-term financial decisions relating to liquidity.

(vii) This statement helps the management in preparing the cash budgets properly.

(viii) This statement helps the financial institution who lends advances to business concerns in estimating their repaying capacities.

(ix) Since a cash flow statement is based on the cash basis of accounting it is very useful in evaluation of cash position of a firm.

(x) Cash flow statement discloses the complete story of cash movement. The increase in, or decrease of cash and the reason therefore can be known.

(xi) Cash flow statement provides information of all activities such as operating, investing, and financing activities separately.

(xii) Since cash flow statement provides information regarding the sources and utilisation of cash during a particular period, it is easy for the management to plan carefully for the cash requirements in the future, for the purpose of redeeming long-term liabilities or / and replacing some fixed assets.

(xiii) A projected cash flow statement reveals the future cash position of a concern. Through this cash flow statement the firm can know how much cash it can generate and how much cash will be needed to make various payments.

(xiv) Cash flow statement prepared according to the Ind AS-7 is more suitable for making comparison than the funds flow statements as there is no standard formats used for the same.

Limitations of Cash Flow Statement

Cash flow statement suffers from the following limitations:

(i) A cash flow statement only reveals the inflow and outflow of cash. The cash balance disclosed by the Cash flow statement may not represent the real liquid position of the concern.

(ii) Cash flow statement is not suitable for judging the profitability of a firm as non-cash changes are ignored while calculating cash flows from operating activities.

(iii) Cash flow statement is not a substitute for income statement or funds flow statement. Each of them has a separate function to perform. Net cash flow disclosed by cash flow statement does not necessarily be the net income of the business, because net income is determined by taking into account both cash and noncash items.

(iv) Cash flow statement is based on cash accounting. It ignores the basic accounting concept of a accrual basis.

(v) Cash flow statement reveals the movement of cash only. In preparation, it ignores most liquid current assets (example: sundry debtors, bills receivable etc.)

(vi) It is difficult to precisely define the term cash. There are controversies among accountants over a number of near cash items like cheques, stamps, postal orders etc., to be included in cash.

(vii) Cash flow statement does not give a complete picture of financial position of the concern.

3.4.3 Differences between Funds Flow Statement and Cash Flow Statement

The following are the main differences between a Funds Flow Statement and a Cash Flow Statement:

Funds Flow Statement	Cash Flow Statement
1. Funds flow statement reveals the change in working capital between two Balance Sheet dates.	Cash flow statement reveals the changes in cash position between two balance sheet dates.
2. Funds flow statement is based on accounting.	Cash flow statement is based on cash basis of accounting
3. In the case of funds flow statement a schedule of changes in working capital is prepared.	No such schedule of changes in working capital is prepared for a cash flow statement.
4. Funds flow statement is useful in planning, Intermediate and long-term financing.	Cash flow statement as a tool of financial analysis is more useful for short-term analysis and cash planning.
5. Funds flow statement deals with all components of working capital.	Cash flow statement deals only with cash and cash equivalents.
6. Funds flow statement reveals the sources and application of funds. The difference represents net increase or decrease in working capital.	Cash flow statement is prepared by taking into consideration the inflows and outflows in terms of operating, investing and financing activities. The net difference represents the net increase or decrease in cash and cash equivalents.

Illustration 13

From the information contained in Income Statement and Balance Sheet of 'A' Ltd. prepare Cash flow statement.

Income Statement for the year ended March 31, 2024.

	(₹)
Net Sales (A)	2,52,00,000
Less: Cash cost of sales	1,98,00,000
Depreciation	6,00,000
Salaries and Wages	24,00,000
Operating Expenses	8,00,000
Provision for Taxation	8,80,000

	(₹)
(B)	2,44,80,000
Net Operating Profit (A – B)	7,20,000
Non-recurring Income – Profits on sale of equipment	1,20,000
	8,40,000
Retained earnings and Profits brought forward	15,18,000
	23,58,000
Dividends declared and paid during the year	7,20,000
Profit and Loss A/c balance as on March 31, 2024	16,38,000

Balance Sheet **(₹)**

Assets	March 31, 2023	March 31, 2024
Fixed Assets:		
Land	4,80,000	9,60,000
Buildings and Equipment	36,00,000	57,60,000
Current Assets:		
Cash	6,00,000	7,20,000
Debtors	16,80,000	18,60,000
Stock	26,40,000	9,60,000
Advances	78,000	90,000
	90,78,000	**1,03,50,000**

Liabilities and Equity **(₹)**

Share Capital	36,00,000	44,40,000
Surplus in Profit and Loss A/c	15,18,000	16,38,000
Sundry Creditors	24,00,000	23,40,000
Outstanding Expenses	2,40,000	4,80,000
Income – Tax payable	1,20,000	1,32,000
Accumulated Depreciation on Buildings and Equipment	12,00,000	13,20,000
	90,78,000	**1,03,50,000**

The original cost of equipment sold during the year 2023-24 was ₹ 7,20,000.

Solution :

Working Notes:

1. Cash receipt from customers: **(₹)**

Sales revenue	2,52,00,000
Add: Debtor at beginning	16,80,000
	2,68,80,000
Less: Debtors at the end	18,60,000
Total cash receipt from customers	2,50,20,000

2. Income tax paid: **(₹)**

Tax payable at beginning	1,20,000
Add: Provision for taxation	8,80,000
	10,00,000
Less: Tax payable at the end	1,32,000
Tax paid during the year	8,68,000

3. Cash paid to supplier and employees **(₹)**

Cost of goods sold		1,98,00,000
Add: Operating expenses		8,00,000
Add: Salary and wages		24,00,000
		2,30,00,000
Add: Creditor at the beginning	24,00,000	
Stock at the end	9,60,000	
Advance at the end	90,000	
Outstanding exp. at the beginning	2,40,000	36,90,000
		2,66,90,000
Less: Creditors at the end	23,40,000	
Stock at the beginning	26,40,000	
Advance at the beginning	78,000	
Outstanding expenses at the end	4,80,000	55,38,000
Total Cash Paid		**2,11,52,000**

4. Accumulated depreciation on equipment sold **(₹)**

Accumulated depreciation at beginning	12,00,000
Add: Depreciation for the year	6,00,000
	18,00,000
Less: Accumulated depreciation at the end	13,20,000
Accumulated depreciation on equipment sold	4,80,000

5. Sale price of equipment **(₹)**

Cost Price	7,20,000
Less: Accumulated depreciation	4,80,000
	2,40,000
Add: Profit on sale	1,20,000
Sale price	3,60,000

6. Purchase of building and equipments **(₹)**

Opening balance	36,00,000
Less: Cost of equipment sold	7,20,000
	28,80,000
Balance at end of the year	57,60,000
Purchase during the year	28,80,000

Cash Flow Statement of A Ltd. for the year ended 31st March 2024

		(₹)	(₹)
(A)	**Cash flow from Operating Activities:**		
	Cash receipts from customers	2,50,20,000	
	Less: Cash paid to supplier & employees	2,11,52,000	
	Cash generated from operations	38,68,000	
	Less: Income tax paid	(8,68,000)	
	Net cash from operating activities		30,00,000
(B)	**Cash flow from Investing Activities:**		
	Purchase of land	(4,80,000)	
	Purchase of building & equipment	(28,80,000)	
	Sale of equipment	3,60,000	
	Net cash used in financing activities		(30,00,000)
(C)	**Cash flow from Financing Activities:**		
	Issue of share capital	8,40,000	
	Dividends paid	(7,20,000)	
	Net cash from financing activities		1,20,000
	Net increase in cash & cash equivalents		1,20,000
	Cash & cash equivalent at beginning		6,00,000
	Cash & cash equivalent at the end		7,20,000

Illustration 14

Balance Sheets of a company as on 31st March, 2023 and 2024 are as follows:

Liabilities	31.03.23	31.0324	Assets	31.03.23	31.03.24
Equity share capital	10,00,000	10,00,000	Goodwill	1,00,000	80,000
8% Pref. Share capital	2,00,000	3,00,000	Land and Building	7,00,000	6,50,000
General Reserve	1,20,000	1,45,000	Plant and Machinery	6,00,000	6,60,000
Securities Premium	--	25,000	Investments (non trading)	2,40,000	2,20,000
Profit & Loss A/c.	2,10,000	3,00,000	Stock	4,00,000	3,85,000
11% Debentures	5,00,000	3,00,000	Debtors	2,88,000	4,15,000
Creditors	1,85,000	2,15,000	Cash and Bank	88,000	93,000
Provision for tax	80,000	1,05,000	Prepaid Expenses	15,000	11,000
Proposed Dividend	1,36,000	1,44,000	Premium on Redemption of debenture	--	20,000
	24,31,000	**25,34,000**		**24,31,000**	**25,34,000**

Additional Information:

1. Investments were sold during the year at a profit of ₹ 15,000.
2. During the year an old machine costing ₹ 80,000 was sold for ₹ 36,000. Its written down value was ₹ 45,000.
3. Depreciation charged on Plant and Machinery @ 20% on the opening balance.
4. There was no purchase or sale of Land and Building.
5. Provision for tax made during the year was ₹ 96,000.
6. Preference shares were issued for consideration of cash during the year. You are required to prepare:
   (a) Cash Flow Statement as per Ind AS 7.
   (b) Schedule of changes in Working Capital.

Solution:

Cash Flow Statement for the year ending 31st March, 2024

	Particulars	(₹)	(₹)
A	**Cash flow from Operating Activities**		
	Profit and Loss A/c as on 31.3.2024		3,00,000
	Less: Profit and Loss A/c as on 31.3.2023		2,10,000
			90,000

	Particulars	(₹)	(₹)
	Add: Transfer to General Reserve	25,000	
	Provision for Tax	96,000	
	Proposed Dividend	1,44,000	2,65,000
	Profit before Tax		3,55,000
	Adjustment for Depreciation		
	Land and Building	50,000	
	Plant and Machinery	1,20,000	1,70,000
	Profit on Sale of Investments		(15,000)
	Loss on Sale of Plant and Machinery		9,000
	Goodwill written off		20,000
	Interest on Debenture		33,000
	Operating Profit before Working Capital changes		5,72,000
	Adjustment for Working Capital changes:		
	Decrease in Prepaid Expenses		4,000
	Decrease in Stock		15,000
	Increase in Debtors		(1,27,000)
	Increase in Creditors		30,000
	Cash generated from Operations		4,94,000
	Income tax paid		(71,000)
	Net Cash Inflow from Operating Activities (A)		**4,23,000**
B	**Cash flow from Investing Activities**		
	Sale of Investment		35,000
	Sale of Plant and Machinery		36,000
	Purchase of Plant and Machinery		(2,25,000)
	Net Cash Outflow from Investing Activities (B)		**(1,54,000)**
C	**Cash flow from Financing Activities**		
	Issue of Preference Shares		1,00,000
	Premium received on issue of securities		25,000
	Redemption of Debentures at a premium		(2,20,000)
	Dividend paid		(1,36,000)
	Interest paid to Debenture holders		(33,000)

Particulars	(₹)	(₹)
Net Cash outflow from Financing Activities (C)		**(2,64,000)**
Net increase in Cash and Cash Equivalents during the year (A + B + C)		5,000
Cash and Cash Equivalents at the beginning of the year		88,000
Cash and Cash Equivalents at the end of the year		93,000

Working Notes:

1. Dr. Provision for the Tax Account Cr.

Particulars	Amount (₹)	Particulars	Amount (₹)
To, Bank (paid)	71,000	By, Balance b/d	80,000
To, Balance c/d	1,05,000	By, Profit and Loss A/c	96,000
	1,76,000		**1,76,000**

2. Dr. Investment Account Cr.

Particulars	Amount (₹)	Particulars	Amount (₹)
To, Balance b/d	2,40,000	By, balance (bal fig)	35,000
To, profit and loss (profit on sale)	15,000	By, balance c/d	2,20,000
	2,55,000		**2,55,000**

3. Dr. Plant and Machinery Account Cr.

Particulars	Amount (₹)	Particulars	Amount (₹)
To, Balance b/d	6,00,000	By, Bank (sale)	36,000
To, Bank A/c (Purchase)	2,25,000	By, Profit and Loss A/c (loss on sale)	9,000
		By, Depreciation	1,20,000
		By, Balance c/d	6,60,000
	8,25,000		**8,25,000**

Note:

In this question, the date of redemption of debentures is not mentioned. So, it is assumed that the debentures are redeemed at the beginning of the year.

4. Schedule of Changes in Working Capital

Particulars	31 March 2023 (₹)	31 March 2024 (₹)	Changes in Working Capital	
			Increase (₹)	Decrease (₹)
Current Assets				
Stock	4,00,000	3,85,000	-	- 15,000
Debtors	2,88,000	4,15,000	1,27,000	
Prepaid Expenes	15,000	11,000		- 4,000
Cash and Bank	88,000	93,000	5,000	
Total (A)	**7,91,000**	**9,04,000**		
Current Liabilities				
Creditors	1,85,000	2,15,000		30,000
Total (B)	**1,85,000**	**2,15,000**		
Working Capital (A-B)	6,06,000	6,89,000		
Increase in Working Capital	83,000	--	--	83,000
	6,89,000	**6,89,000**	**1,32,000**	**1,32,000**

Illustration 15

The Balance Sheets of a company as on 31st March, 2023 and 2024 are given below: (₹)

Liabilities	31.03.23	31.03.24	Assets	31.03.23	31.03.24
Equity Share Capital	14,40,000	19,20,000	Fixed Assets	38,40,000	45,60,000
Capital Reserve	--	48,000	Less: Depreciation	(11,04,000)	(13,92,000)
General Reserve	8,16,000	9,60,000		27,36,000	31,68,000
Profit & Loss A/c	2,88,000	3,60,000	Investment	4,80,000	3,84,000
9% Debentures	9,60,000	6,72,000	Sundry Debtors	12,00,000	14,00,000
Sundry Creditors	5,50,000	5,90,000	Stock	1,40,000	1,84,000
Bills Payable	26,000	34,000	Cash in hand	4,000	--
Proposed Dividend	1,44,000	1,72,800	Preliminary Expenses	96,000	48,000
Provision for tax	4,32,000	4,08,000			
Unpaid dividend	--	19,200			
	46,56,000	**51,84,000**		**46,56,000**	**51,84,000**

Additional Information:

During the year ended 31st March, 2024 the company:

1. Sold a machine for ₹ 1,20,000; the cost of machine was ₹ 2,40,000 and depreciation provided on it was ₹84,000.

2. Provided ₹ 4,20,000 as depreciation on fixed assets.
3. Sold some investment and profit credited to capital reserve.
4. Redeemed 30% of the debenture @ 105.
5. Decided to write off fixed assets costing ₹ 60,000 on which depreciation amounting to ₹ 48,000 has been provided.

You are required to prepare Cash Flow Statement as per Ind AS-7.

Solution:

Cash Flow Statement for the year ending 31st March, 2024

	Particulars	(₹)	(₹)
A	**Cash Flows from Operating Activities**		
	Profit and Loss A/c		72,000
	(₹ 3,60,000 – ₹ 2,88,000)		
	Adjustments:		
	Increase in General Reserve	1,44,000	
	Depreciation	4,20,000	
	Provision for Tax	4,08,000	
	Loss on Sale of Machine	36,000	
	Premium on Redemption of Debentures	14,400	
	Proposed Dividend	1,72,800	
	Preliminary Expenses written off	48,000	
	Fixed Assets written of	12,000	
	Interest on Debentures	60,480	13,15,680
	Funds from Operations		13,87,680
	Increase in Sundry Creditors	40,000	
	Increase in Bills Payable	8,000	
		48,000	
	Increase in Sundry Debtors	(2,00,000)	
	Increase in Stock	(44,000)	(1,96,000)
	Cash generated from operation		11,91,680
	Less: Income Tax paid		4,32,000
	Net Cash in flows from Operating Activities		**7,59,680**

	Particulars	(₹)	(₹)
B	**Cash flows from Investing Activities**		
	Purchase of Fixed Assets	(10,20,000)	
	Sale of Investment	1,44,000	
	Sale of Fixed Assets	1,20,000	
	Net Cash out flows from Investing Activities		**(7,56,000)**
C	**Cash flow from Financing Activities**		
	Issue of share capital	4,80,000	
	Redemption of Debentures	(3,02,400)	
	Dividend Paid (1,44,000 – 19,200)	(1,24,800)	
	Interest on Debentures	(60,480)	
	Net Cash outflow from Financing Activities		**(7,680)**
	Net Increase in Cash and Cash Equivalents during the year (A+B+C)		(4,000)
	Cash and Cash Equivalents at the beginning of the year		4,000
	Cash and Cash Equivalents at the end of the year		Nil

- It is presumed that the 30% debentures have been redeemed at the beginning of the year.

Working Note:

Dr. **Fixed Assets Account** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To, Balance b/d	27,36,000	By, Cash	1,20,000
To, Purchases (balance figure)	10,20,000	By, Loss on sales	36,000
		By, Depreciation	4,20,000
		By, Assets written off	12,000
		By, Balance c/d	31,68,000
	37,56,000		**37,56,000**

Solved Case 1

Presently, the current assets and current liabilities of a company are ₹ 16 lakh and ₹ 8 lakh respectively. Calculate the effect of each of the following transactions individually and totally on the current ratio of the company.

1. Cash purchase of new machinery for ₹ 5 lakh.
2. Purchase of new machinery for ₹ 10 lakh on a medium-term loan from the bank, with 20% margin.
3. Payment of dividend of ₹ 2 lakh.
4. Receipt of a shipment of new materials at landed cost of ₹ 5 lakh, against which the bank finance obtained, is ₹ 3 lakh.

Solution :

Existing Current Ratio (CR) = ₹ 16 lakh / ₹ 8 lakh = 2.

The effect of various transactions individually on the CR will be as under:

1. The CR will decrease, that is CR = ₹ 11 lakh / ₹ 8 lakh = 1.38
2. CR = ₹ 14 lakh / ₹ 8 lakh = 1.75 (decrease)
3. CR = ₹ 14 lakh / ₹ 6 lakh = 2.33 (increase)
4. Current assets will increase, ₹ 16 lakh + ₹ 5 lakh - ₹ 2 lakh = ₹ 19 lakh.

   Current liabilities will increase : ₹ 8 lakh + ₹ 3 lakh = ₹ 11 lakh

   CR = ₹19 lakh / ₹11 lakh = 1.73 (decrease)

Total effect on CR:	(₹)
Current assets	16 Lakh
Less: Cash (purchase of machinery)	5
Cash (paid for machinery purchased)	2
Cash (payment of dividend)	2
Cash (paid for inventory purchased)	2
Add: Inventory (purchased)	5
	10
Current liabilities (present)	8
Less: Dividend payable	2
Add: Bank overdraft	3
	9

The current ratio after these changes would be ₹10 lakh / ₹9 lakh = 1.11

Solved Case 2

A partial list of trend and common-size percentages for ABC Ltd. is given below.

	March, current year	March, previous year
Trend percentages:		
Sales (net)	120	100
Cost of goods sold	?	100
Gross profit on sales	?	100
Operating expenses and income taxes	?	100
Net income	?	100
Common-size percentages:		
Sales (net)	100	100
Cost of goods sold	?	?
Gross profit on sales	40	?
Operating expenses and income taxes	20	25
Net income	20	10

Determine the missing trend and common-size percentages.

Solution :

Determination of common-size percentages and missing trends

Particulars	Common-size percentages		Trend percentages	
	March current year	March previous year	March current year	March previous year
Sales (net)	100	100	120	100
Cost of goods sold	60	65	110.76	100
Gross profit on sales	40	35	137.14	100
Operating expenses and income taxes	20	25	96	100
Net income	20	10	240	100

Solved Case 3

ABC Ltd. finds that its opening bank balance of ₹ 1,80,000 as on April 1, 2023 has been converted into an overdraft of ₹ 75,000 by the end of the year. From the information given below, prepare a statement to show how this happened.

	Year beginning (₹)	Year-end (₹)
Fixed assets	7,50,000	11,20,000
Stock in trade	1,90,000	3,30,000
Book debts	3,80,000	335000
Trade creditors	2,70,000	3,50,000
Share capital	250000	3,00,000
Share premium		25,000
Bills receivable	87,500	95,000

The profit before depreciation and income tax was ₹ 2,40,000. During the year, income tax to the extent of ₹1,37,500 was paid. Dividend paid were (i) final on the capital as on April 1, 2023 at 10% and (ii) interim at 5% on the year-end capital.

Solution:

Cash Flow Statement	(₹)
Sources of cash	
Cash from business operations	2,17,500
Issue of long-term liabilities:	
Share capital	75,000
Total cash received	2,92,500
Uses of cash	
Purchase of fixed assets	3,70,000

Cash Flow Statement		(₹)
Recurring payments to investors:		
Interim dividends [₹3,00,000 × 0.05] =	₹15,000	
Final dividends [₹2,50,000 × 0.10] =	₹25,000	40,000
Miscellaneous payments:		1,37,500
Income tax		5,47,500
Total cash paid		2,55,000
Decrease in cash (sources-uses)		1,80,000
That is, balance in the beginning		75,000
Add: overdraft		2,55,000

Working Notes:

Cash from business operations	(₹)	(₹)
Profit before depreciation and taxes		2,40,000
Add: increase in cash (–CA or +CL):		
Trade creditors	80,000	
Book debts	45,000	1,25,000
Less: decrease in cash (+CA or –CL):		
Bills receivable	7,500	
Stock	1,40,000	1,47,500
Total		2,17,500

Exercise

A. Theoretical Questions:

⊙ Multiple Choice Questions

1. Accounting Ratios are important tools used by –
   (a) Managers
   (b) Researchers
   (c) Investors
   (d) All of the above

2. Net Profit Ratio Signifies:
   (a) Operational Profitability
   (b) Liquidity Position
   (c) Big-term Solvency
   (d) Profit for Lenders.

3. Working Capital Turnover measures, the relationship of Working Capital with:
   (a) Fixed Assets
   (b) Sales
   (c) Purchases
   (d) Stock

4. In Ratio Analysis, the term Capital Employed refers to:
   (a) Equity Share Capital
   (b) Net worth
   (c) Shareholders' Funds
   (d) Current Assets

5. Dividend Pay-out Ratio is:
   (a) PAT Capital
   (b) DPS ÷ EPS
   (c) Pref. Dividend ÷ PAT
   (d) Pref. Dividend ÷ Equity Dividend.

6. DuPont Analysis deals with:
   (a) Analysis of Current Assets
   (b) Analysis of Profit

(c) Capital Budgeting

(d) Analysis of Fixed Assets.

7. In Net Profit Ratio, the denominator is:

(a) Net Purchases

(b) Net Sales

(c) Credit Sales

(d) Cost of goods sold.

8. Inventory Turnover measures the relationship of inventory with:

(a) Average Sales

(b) Cost of Goods Sold

(c) Total Purchases

(d) Total Assets.

9. The term 'EVA' is used for:

(a) Extra Value Analysis

(b) Economic Value Added

(c) Expected Value Analysis

(d) Engineering Value Analysis.

10. Return on Investment may be improved by:

(a) Increasing Turnover

(b) Reducing Expenses

(c) Increasing Capital Utilization

(d) All of the above.

11. In Current Ratio, Current Assets are compared with:

(a) Current Profit

(b) Current Liabilities

(c) Fixed Assets

(d) Equity Share Capital.

12. ABC Ltd. has a Current Ratio of 1.5: 1 and Net Current Assets of ₹ 5,00,000. What are the Current Assets?
    (a) ₹ 5,00,000
    (b) ₹ 10,00,000
    (c) ₹ 15,00,000
    (d) ₹ 25,00,000

13. There is deterioration in the management of working capital of XYZ Ltd. What does it refer to?
    (a) That the Capital Employed has reduced
    (b) That the Profitability has gone up
    (c) That debtors collection period has increased
    (d) That Sales has decreased.

14. Which of the following does not help to increase Current Ratio?
    (a) Issue of Debentures to buy Stock
    (b) Issue of Debentures to pay Creditors
    (c) Sale of Investment to pay Creditors
    (d) Avail Bank Overdraft to buy Machine.

15. Debt to Total Assets Ratio can be improved by:
    (a) Borrowing More
    (b) Issue of Debentures
    (c) Issue of Equity Shares
    (d) Redemption of Debt.

16. Ratio of Net Income to Number of Equity Shares known as:
    (a) Price Earnings Ratio
    (b) Net Profit Ratio
    (c) Earnings per Share
    (d) Dividend per Share.

17. Trend Analysis helps comparing performance of a firm -
    (a) With other firms
    (b) Over a period of firm
    (c) With other industries
    (d) With other companies

18. A Current Ratio of less than one means:
    (a) Current Liabilities < Current Assets
    (b) Fixed Assets > Current Assets
    (c) Current Assets < Current Liabilities
    (d) Share Capital > Current Assets.

19. A firm has Capital of ₹ 10,00,000; Sales of ₹ 5,00,000; Gross Profit of ₹ 2,00,000 and Expenses of ₹ 1,00,000. What is the Net Profit Ratio?
    (a) 20%
    (b) 50%
    (c) 10%
    (d) 40%.

20. XYZ Ltd. has earned 8% Return on Total Assests of ₹ 50,00,000 and has a Net Profit Ratio of 5%. Find out the Sales of the firm.
    (a) ₹ 4,00,000
    (b) ₹ 2,50,000
    (c) ₹ 80,00,000
    (d) ₹ 83,33,333.

21. Suppliers and Creditors of a firm are interested in:
    (a) Profitability Position
    (b) Liquidity Position
    (c) Market Share Position
    (d) Debt Position.

22. Which of the following is a measure of Debt Service capacity of a firm?
    (a) Current Ratio
    (b) Acid Test Ratio
    (c) Interest Coverage Ratio
    (d) Debtors Turnover.

23. Gross Profit Ratio for a firm remains same but the Net Profit Ratio is decreasing. The reason for such behavior could be:
    (a) Increase in Cost of Goods Sold
    (b) If Increase in Expense

(c) Increase in Dividend

(d) Decrease in Sales.

24. Which of the following statements is correct?

(a) A Higher Receivable Turnover is not desirable

(b) Interest Coverage Ratio depends upon Tax Rate

(c) Increase in Net Profit Ratio means increase in Sales

(d) Lower Debt-Equity Ratio means lower Financial Risk.

25. Debt to Total Assets of a firm is 2. The Debt to Equity would be:

(a) 0.80

(b) 0.25

(c) 1.00

(d) 0.75

26. Which of the following helps analysing return to equity Shareholders?

(a) Return on Assets

(b) Earnings Per Share

(c) Net Profit Ratio

(d) Return on Investment.

27. Return on Assets and Return on Investment Ratios belong to:

(a) Liquidity Ratios

(b) Profitability Ratios

(c) Solvency Ratios

(d) Turnover.

28. XYZ Ltd. has a Debt Equity Ratio of 1.5 as compared to 1.3 Industry average. It means that the firm has:

(a) Higher Liquidity

(b) Higher Financial Risk

(c) Higher Profitability

(d) Higher Capital Employed.

29. Ratio Analysis can be used to study liquidity, turnover, profitability, etc. of a firm. What does Debt-Equity Ratio help to study?

(a) Solvency

(b) Liquidity

(c) Profitability

(d) Turnover,

30. In Inventory Turnover calculation, what is taken in the numerator?

(a) Sales

(b) Cost of Goods Sold

(c) Opening Stock

(d) Closing Stock.

31. Statement of cash flows are included in –

(a) Ind AS – 3

(b) Ind AS – 6

(c) Ind AS – 7

(d) Ind AS – 113

32. The capital of RG Limited is as follows :

90% preference shares of ₹ 10 each ₹ 3,00,000

Equity shares of ₹ 10 each ₹ 8,00,000

Following further information is available :

Profit after Tax ₹ 2,70,000

Equity Dividend paid 20%

The market price of equity shares ₹ 40 each

Then the EPS and PE ratio are :

(a) ₹ 3.12 and 10.80

(b) ₹ 3.33 and 10.34

(c) ₹ 4.51 and 12.56

(d) ₹ 3.04 and 13.16

33. The ratio of current assets (₹3,00,000) to current liabilities (₹2,00,000) is 1.5 : 1. The accountant of this firm is interested in maintaining a current ratio of 2 : 1 by paying some part of current liabilities. Hence, the amount of current liabilities which must be paid for this purpose is

(a) ₹ 1,00,000

(b) ₹ 2,00,000

(c) ₹ 2,50,000

(d) ₹ 1,50,000

34. The P/V ratio of a firm dealing in precision instruments is 50% and margin of safety is 40%. Calculate net profit, if the sales volume is ₹ 50,00,000.

    (a) ₹ 1,00,000

    (b) ₹ 5,00,000

    (c) ₹ 10,00,000

    (d) ₹ 6,00,000

35. Return on Equity (ROE) is computed as

    (a) (NP Ratio × Assets Turnover Ratio) ÷ Equity Multiplier

    (b) (NP Ratio x Assets Turnover Ratio) × Equity Multiplier

    (c) (NP Ratio x Equity Multiplier) + Assets Turnover Ratio

    (d) (NP Ratio + Assets Turnover Ratio) + Equity Multiplie

36. The ratio of Current Assets (₹9,00,000) to Current liabilities (₹6,00,000) is 1.5 :1. The accountant of this firm is interested in maintaining a current ratio of 2:1 by paying some part of current liabilities. Hence, the amount of current liabilities which must be paid for this purpose is

    (a) ₹ 3,00,000

    (b) ₹ 2,00,000

    (c) ₹ 6,00,000

    (d) ₹ 4,00,000

37. A firm has a capital of ₹ 10 lakhs, sales of ₹ 5 lakhs, gross profit of ₹ 2 lakhs and expenses of ₹1 lakh. The Net Profit Ratio is:

    (a) 50%

    (b) 40%

    (c) 20%

    (d) 10%

38. In Net Profit Ratio, the denominator is:

    (a) Credit Sales

    (b) Net Sales

    (c) Cost of Sales

    (d) Cost of Goods Sold

39. ROI (Return on Investment) can be decomposed into the following ratios:

    (a) Overall Turnover Ratio and Current Ratio

    (b) Net Profit Ratio and Fixed Assets Turnover

(c) Working Capital Turnover Ratio and Net Profit Ratio

(d) Net Profit Ratio and Overall Turnover Ratio

40. Which of the following does not help to increase Current Ratio?

(a) Issue of Debentures to buy Stock

(b) Issue of Debentures to pay Creditors

(c) Sale of Investment to pay Creditors

(d) Avail Bank Overdraft to buy Machine

41. Which of the following statements is correct?

(a) A higher Receivable Turnover is not desirable.

(b) Interest Coverage Ratio depends upon Tax Rate.

(c) Increase in Net Profit Ratio means increase in Sales.

(d) Lower Debt-Equity Ratio means lower Financial Risk.

42. Which of the following is a Profitability Ratio?

(a) Proprietary Ratio

(b) Debt-Equity Ratio

(c) Price-Earning Ratio

(d) Fixed Asset Ratio

43. The 'Dividend-Payout Ratio' is equal to

(a) The Dividend yield plus the capital gains yield

(b) Dividends per share divided by Earning per Equity Share

(c) Dividends per share divided by par value per share

(d) Dividends per share divided by current price per share

44. What does Debt-Equity Ratio help to study?

(a) Solvency

(b) Liquidity

(c) Profitability

(d) Turnover

45. Of the product of which two ratios is the ROI composed?

(a) Overall Turnover Ratio and Current Ratio

(b) Net Profit Ratio and Fixed Assets Turnover

(c) Working Capital Turnover Ratio and Net Profit Ratio

(d) Net Profit Ratio and Overall Turnover Ratio

46. Profitability and Liquidity ratios are used for :

(a) Normative purposes only

(b) Predictive purposes only

(c) Both Normative and Predictive purposes

(d) None of these

47. G Ltd. Is a manufacturing company having asset turnover ratio of 2 and debt- asset ratio of 0.60 for the year ended 31st March ,2009 . If its net profit margin is 5%, the Return on Equity(ROE) of the company will be :

(a) 20%

(b) 25%

(c) 16.7%

(d) data insufficient

48. A firm seeks to increase its current ratio 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.

49. The dividends distributed to the shareholders and taxes paid during the year are shown as application of funds when provision for dividends and provision for taxes are treated as :

(a) Current liabilities

(b) Non-current liabilities

(c) Fund items

(d) Non-fund items

50. The total asset-turnover ratio and total asset to net-worth of LEENZA LTD. are 2 and 1.75 respectively. If the net-profit margin of the company is 8%, What will be its Return on Equity (ROE)?

(a) 28.0%

(b) 25.5%

(c) 20.0%

(d) 26.4%

51. The total asset – turnover ratio and total asset to net- worth ratio of a company are 2.10 and 2.50 respectively. If the net profit margin of the company is 6%, what would be the return on equity?

    (a) 30.50%

    (b) 31.50%

    (c) 30.00%

    (d) 32.50%

52. X Ltd has an ROA of 10% and a profit margin of 2%. The Company's total asset turnover is

    (a) 5%

    (b) 20%

    (c) 12%

    (d) 8%

53. High proportion of gearing will increase:

    (a) Financial risk

    (b) Business risk

    (c) Cost of funds

    (d) Shareholders equity

54. IG Ltd. has a gearing of 30%. Its cost of equity is 21% and the cost of debt is 15%. The company's WACC is:

    (a) 14.3%;

    (b) 19.2%;

    (c) 14.7%;

    (d) 4.5%.

55. Y Ltd has an ROA of 10% and a profit margin of 2%. The Company's total asset turnover is

    (a) 5

    (b) 20

    (c) 12

    (d) 8

56. Current Assets ₹ 20,00,000; Current Liabilities ₹ 10,00,000 and Stock ₹ 2,00,000, then what is liquid ratio?

    (a) 2 times

    (b) 1.8 times

    (c) 1.4 times

    (d) None of these

57. PAT of a company ₹ 100 lakhs and number of equity shares of ₹ 10 each is ₹ 50 lakhs, then EPS is:
    (a) ₹ 2
    (b) ₹ 1
    (c) ₹ 10
    (d) None of these

58. _____ ratio is the indicator of the firm's commitment to meet its short term liabilities.
    (a) Super quick ratio
    (b) Current ratio
    (c) Proprietary ratio
    (d) Quick ratio

59. _____ ratio is also termed as Acid test ratio.
    (a) Defensive interval ratio
    (b) Current ratio
    (c) Proprietary ratio
    (d) Quick ratio

60. The dividend-payout ratio is equal to
    (a) the dividend yield plus the capital gains yield.
    (b) dividends per share divided by earnings per share.
    (c) dividends per share divided by par value per share.
    (d) dividends per share divided by current price per share.

61. Liquidity ratios are expressed in
    (a) Pure ratio form
    (b) Percentage
    (c) Rate or time
    (d) None of the above

62. When the concept of ratio is defined in respected to the items shown in the financial statements, it is termed as
    (a) Accounting ratio
    (b) Financial ratio
    (c) Costing ratio
    (d) None of the above

63. Profit for the objective of calculating a ratio may be taken as

(a) Profit before tax but after interest

(b) Profit before interest and tax

(c) Profit after interest and tax

(d) All of the above

64. Current Assets ₹ 20,00,000 ; Current Liabilities ₹10,00,000 and Stock ₹4,00,000, then what is liquid ratio?

(a) 2 times

(b) 1.6 times

(c) 1.4 times

(d) None of these

65. A ratio of ___ is considered satisfactory by the financial institutions the greater debt service coverage ratio indicates the better debt servicing capacity of the organization.

(a) 1

(b) 2

(c) 3

(d) 4

66. Liquid Liability = Current Liability – Bank Overdraft – __.

(a) Cash Credit

(b) Trade Credit

(c) Credit Payable

(d) None of the Above

67. Ratio analysis is the process of determining and interpreting numerical relationships based on _.

(a) Financial values

(b) Financial statements

(c) Financial numerical information

(d) All of the above

68. Ratio analysis is based on _____ measure.

(a) Relative

(b) absolute

(c) Both of the above

(d) None of the above

69. The persons interested in the analysis of financial statements can be grouped as _____

(a) Owners or investors

(b) Creditors

(c) Financial executives

(d) All of the above

70. The term 'Operating Profit' means profit before _.

(a) Interest

(b) tax

(c) interest and tax

(d) interest or tax

71. Debt- equity Ratio is an example of _____.

(a) Short term solvency Ratio

(b) Long term solvency Ratio

(c) Profitability Ratio

(d) None of the above

72. In Cash Flow Statement, Cash includes_.

(a) cash on hand

(b) demand deposits with banks

(b) cash on hand and demand deposits with banks

(d) cash on hand or demand deposits with banks

73. The treatment of interest and dividends received and paid depends upon the nature of the enterprise. For this purpose, the enterprises are classified as .

(a) (i) Financial enterprises, and (ii) Operating enterprises.

(b) (i) Financial enterprises, and (ii) Other enterprises.

(c) (i) Financial enterprises, and (ii) Non-Financial enterprises.

(d) (i) Trading enterprises, and (ii) Non - Trading enterprises.

74. Cash Flow Statement is _____for Income Statement or Funds Flow Statement.

(a) not a substitute

(b) substitute

(c) depends on situation

(d) None of the above

75. Funds Flow Statement reveals the change in ____between two Balance Sheet dates.

(a) Working capital

(b) Internal capital

(c) Share capital

(d) Both (a) & (c)

Answers

1	2	3	4	5	6	7	8	9	10
d	a	a	d	b	b	b	b	b	d
11	12	13	14	15	16	17	18	19	20
b	c	c	d	d	c	b	c	a	c
21	22	23	24	25	26	27	28	29	30
b	c	b	d	b	b	b	b	a	b
31	32	33	34	35	36	37	38	39	40
c	d	a	c	b	b	c	b	d	d
41	42	43	44	45	46	47	48	49	50
d	c	b	a	d	c	b	c	b	a
51	52	53	54	55	56	57	58	59	60
b	a	a	b	a	b	d	b	d	b
61	62	63	64	65	66	67	68	69	70
a	a	d	b	b	a	d	a	d	c
71	72	73	74	75					
b	c	b	a	a					

⊙ State True or False

1. Cash from business operations can be determined from income statement.
2. Working capital from business operations can be determined from profit and loss account.
3. Sources of cash should always be more than uses of cash, in the context of cash flows statement.
4. Interest paid on debentures is a part of operating activities.
5. Interest received on two-month deposits in bank is shown under investing activities.

6. Sources of cash and uses of cash are to be equal
7. Cash flows are inflows and outflows of cash and cash-equivalents.
8. Revaluation of building affects cashflows.
9. Sale proceeds from machinery, being a source of finance, form part of financing activities.
10. Cash flows statement is mandatory for all business firms.
11. In normal circumstances, a firm has positive cash from operations and negative cash flow from investing activities.
12. Current ratio and acid-test ratio of a business firm are virtually the same; this implies that the firm has low investment in inventory.
13. A company's current ratio is 2.0. If it uses cash to pay creditors, this transaction would cause a decrease in current ratio.
14. Solvency ratios measure the firm's ability to cater to the obligations arising out of long-term debt.
15. Equity funds are greater than equity capital in a loss-incurring firm.
16. In general, low turnover ratios are desirable.
17. Earnings yield is determined dividing EPS by acquisition price per equity share.
18. Return on equity funds is determined by dividing EAT by average net worth.
19. Internal growth rate is the maximum rate at which the firm can grow without external financing of any kind.
20. The sustainable growth rate is the maximum rate at which the company can grow by using retained earnings.
21. It is conceptually correct to determine stock turnover ratio (finished goods) by dividing cost of goods sold by average stock.

Answer:

1	**F**	**2**	**T**	**3**	**F**
4	**F**	**5**	**F**	**6**	**F**
7	**T**	**8**	**F**	**9**	**F**
10	**F**	**11**	**F**	**12**	**T**
13	**F**	**14**	**T**	**15**	**F**
16	**F**	**17**	**F**	**18**	**F**
19	**T**	**20**	**F**	**21**	**T**

⊙ Fill in the Blanks

1. Cash flows statement (based on Ind AS-7) indicates change in _____.
2. Decrease in creditors _____ cash.
3. Interest received on long-term investments is shown under _____.

4. Decrease in inventory _____ cash.
5. Increase in pre-paid expenses _____ cash.
6. Cash payments to suppliers for goods and services are shown under _____.
7. Cash-flow statement (based on Ind AS-7) for listed companies should be presented as per the _____ method.
8. Cash payments to acquire long-term assets form part of _____ activities.
9. Buy back of shares is shown under _____ activities).
10. Dividends paid to shareholders are classified as _____ activities).
11. An analyst applied the DuPont System to the following data of a company: (a) equity turnover 4.2, (b) net profit margin 5.5%, (c) total assets turnover 2.0 and (d) dividend payout ratio 30%; the company's rate of return on equity is _____.
12. Four-times stock turnover ratio implies _____ months inventory holding period.
13. The following information is given about a company: (a) current assets ₹ 900 lakh and current liabilities ₹ 450 lakh in current year and (b) current assets ₹ 1,100 lakh and current liabilities ₹ 530 in previous year. The approximate percentage decrease in current ratio is _____.
14. Presently, current assets and current liabilities of a company are ₹ 16 lakh and ₹ 8 lakh respectively. The current ratio will _____ on purchase of new machinery of ₹ 6 lakh.
15. Purchase of treasury bills will _____acid-test ratio.
16. Assume that the company's existing debt-equity ratio is 2:1, the ploughing back of profits by a company will _____ it.
17. A two-months debtor collection period implies that debtors turnover ratio is _____.
18. _____ is a more rigorous test of the solvency position of a business firm.
19. ROR on shareholders' equity is computed dividing EAT by _____.
20. Issue of 12% preference shares will _____ debt-equity ratio of a corporate enterprise.

Answers:

1	Cash and Cash Equivalents
4	Increases
7	Indirect
10	Financing
13	4.0%
16	Decrease
19	Shareholders' Funds

2	Decreases
5	Decreases
8	Investing
11	23.1%
14	Decrease
17	6 Times
20	Decrease

3	**Investing Activities**
6	**Operating**
9	**Financing**
12	**3**
15	**Not affect**
18	**Debt Service Coverage Ratio**

Short Essay Type Qestions

1. What are the basic objectives of financial analysis or financial statement analysis?
2. Discuss the importance and benefits of Financial Analysis.
3. Discuss the different types of Financial Analysis.
4. Mention differences between traditional approach and modern approach of FSA.
5. What do you mean by Comparative Financial Analysis? Explain.
6. What do you mean by Common-Size Financial Statements? Explain.
7. What is Trend Analysis? Discuss.
8. Mention the uses of Ratio Analysis.
9. Classify Ratios in view of Financial Analysis.
10. What is capital gearing ratio?
11. Discuss Beneish M Score model.
12. Explain Piotroski F Score model.
13. State the significance of Funds Flow Statement.
14. Mention the limitations of Funds Flow Statement Analysis.
15. What are the sources and uses or application of funds?

Essay Type Questions

1. State the important methods or tools used in analysis of financial statements.
2. Distinguish between funds flow statement and cash flow statement.
3. 'Cash Flow Statement reveals the causes of changes in cash position of business concern between two dates of Balance Sheets.'- Explain.
4. Discuss the limitations of cash flow statement.
5. Discuss the need of preparing cash flow statement.
6. Write short notes on funds flow statement and cash flow statement.
7. There are four groups of financial ratios; liquidity, leverage, activity, and profitability. Financial analysis is conducted by four types of analysts: management, equity investors, long-term creditors and short-term creditors. You are required to (a) explain each type of ratio, (b) explain the emphasis of each type of analyst, (c) state if the same basic approach to financial analysis should be taken by each group of analysts.
8. Briefly discuss the importance of the following accounting ratios: (a) Liquidity ratio, (b) Debt-equity ratio, (c) Stock-turnover rate, and (d) Ratio of debtors to turnover.
9. Explain the procedure that you would adopt to study the liquidity of a business firm.
10. How would you analyze the financial position of a company from the point of view of (a) an investor, (b) a creditor, and (c) a financial executive of the company?
11. Discuss the importance of ratio analysis for interfirm and intrafirm comparisons, including circumstances responsible for its limitations. If any.

12. Distinguish between percentage analysis and ratio analysis relating to the interpretation of financial statements. What is the value of these two types of analysis?
13. How does the acid-test ratio differ from the current ratio? How are they similar? What is the usefulness of the defensive interval ratio?
14. What is the relationship of the assets turnover rate to the rate of return on total assets?
15. Two companies have the same amount of working capital. The current debt paying ability of one company is much weaker than that of the other. Explain how this could occur.
16. (a) Discuss some inherent limitations of single-year financial statements for purposes of analysis and interpretation. (b) To what extent are these limitations overcome by the use of comparative statements?
17. What are the limitations of financial ratios as a technique for appraising the financial position of a company?
18. 'A uniform system of accounts, including identical forms for balance sheets and income statements is a prerequisite of inter firm comparisons.' Elucidate.
19. Discuss Altman's Z Score Model with criticism.

A. Numerical Questions:

⊙ Comprehensive Numerical Problems

1. You have been furnished with the financial information of Aditya Mills Ltd for the current year.

Balance sheet, March 31, current year				
Liabilities	**Amount (₹ thousand)**	**Assets**		**Amount (₹ thousand)**
Equity share capital (₹100 each)	1,000	Plant and equipment		640
Retained earnings	368	Land and buildings		80
Sundry creditors	104	Cash		160
Bills payable	200	Sundry debtors	360	
Other current liabilities	20	Less: Allowances	40	320
		Stock		480
		Prepaid insurance		12
	1,692			**1,692**

Statement of profit year ended March 31, current year	
Particulars	**(₹ Thousand)**
Sales	4,000
Less: Cost of goods sold	3,080
Gross profit on sales	920
Less: Operating expenses	680
Net profit	240
Less: Taxes (0.35)	84
Net profit after taxes	156

Sundry debtors and stock at the beginning of the year were ₹ 3,00,000 and ₹ 4,00,000 respectively.

(a) Determine the following ratios of the Aditya Mills Ltd: (i) Current ratio, (ii) Acid-test ratio, (iii) Stock turnover, (iv) Debtors turnover, (v) Gross profit ratio, (vi) Net profit ratio, (vii) Operating ratio, (viii) Earnings per share, (ix) Rate of return on equity capital, and (x) Market value of the shares if P/E ratio is 10 times,

(b) Indicate for each of the following transactions whether the transaction would improve, weaken or have an effect on the current ratio of the Aditya Mills Ltd: (i) Sell additional equity shares, (ii) Sell 10% debentures, (iii) Pay bills payable, (iv) Collect sundry debtors, (v) Purchase additional plant, (vi) Issuing bills payable to creditors, (vii) Collecting bills receivable from debtors, (viii) Purchase of treasury bills, and (ix) Writing off bad debt.

2. The following is the summary of the financial ratios of a company relating to its liquidity position:

	Year 1	Year 2	Year 3
Current ratio	2	2.13	2.28
Acid test ratio	1.20	1.10	0.90
Debtors turnover	10	8	7
Stock turnover	6	5	4

The current ratio is increasing, while the acid-test ratio is decreasing. Explain the contributing factor(s) for this apparently divergent trend.

3. Below are selected ratios for two companies in the same industry, along with industry average:

	A	B	Industry
Current ratio	221	561	241
Acid-test ratio	121	301	131
Debt-asset ratio	36	5	35
Operating expenses ratio	18	17.5	20
Number of times interest earned	6	12	5
Stock turnover	8.5	6.5	7.0
Debtors' turnover	11.0	15.0	11.4
Rate of return on total assets	17	10	13.5

Can we say on the basis of above ratios and information that company B is better than company A because its ratios are better in six out of eight areas (all except stock turnover and rate of return on total assets)? The company B is better than the industry average in the same six categories.

Answer:

1	(a) (i) 3:1 (ii) 1.48:1 (iii) 7 times (iv) 12.12 times (v) 23 % (vi) 3.9 % (vii) 94 % (viii) ₹15.6 (ix) 11.4% (x) ₹156 (b) (i) Improve (ii) Improve (iii) Improve (iv) No effect (v) Weaken (vi) No effect (vii) No effect (viii) No effect (ix) Weaken
2	The contributing factor for the divergent trend is the accumulation of stocks with the company over the years.
3	B need not necessarily be better than A.

Unsolved Case(s)

1. The comparative income statements and balance sheets for MN Ltd. for the years ending December 31, 2024 and 2023, are given here.

Income Statements of MN Ltd.

For the years ended December 31, 2024 and 2023

	2024 (₹)	2023 (₹)
Net sales	600,000	575,000
Cost of goods sold	500,000	460,000
Gross margin	100,000	115,000
Expenses:		
Selling and administrative expenses	66,000	60,000
Interest expense	4,000	3,000
Total expenses	70,000	63,000
Income before taxes	30,000	52,000
Income taxes	12,000	21,000
Net income	18,000	31,000
Earnings per share	1.80	3.10

2. Comparative income statements for RR Ltd. for 2024 and 2023 are given below.

Income Statements of RR Ltd.

For the years ended December 31, 2024 and 2023

	2024 (₹)	2023 (₹)
Sales	800,000	450,000
Cost of goods sold	(510,000)	(240,000)
Gross profit on sales	290,000	210,000
Selling and general expenses	(100,000)	(80,000)
Operating income	190,000	130,000
Interest expense	(40,000)	(30,000)

Income before income tax	150,000	100,000
Income tax expense	(45,000)	(30,000)
Net income	105,000	70,000

(a) Prepare common-size income statements for RR Ltd. for 2024 and 2023.

(b) Return on sales for RR Ltd. is lower in 2024 than in 2023. What expense or expenses are causing this lower profitability?

3. 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.

   You have been asked by the Management of the WS Ltd. to project the Trading Profit & Loss Account and the Balance Sheet on the basis of the following estimated figures and ratios for the next financial year ending 31st December, 2024.

Ratio of gross profit	20%
Stock turnover ratio	5 times
Average debt collection period	3 months
Creditors' velocity	3 months
Current ratio	2
Proprietary ratio (Fixed assets to capital employed)	75%
Capital gearing ratio	30%
Net profit to issued capital (equity)	10%
General reserve & P/L to equity shareholders' fund	20%
Preference share capital to debentures	2:1
Cost of sales consists of 50% for materials	
Gross profit	₹ 6,25,000

4. The following are the summarized Balance Sheets of ABC Ltd. as on 31st December, 2022 and 31st December, 2023.

	31.12.2022 (₹)	31.12.2023 (₹)
Liabilities		
Equity shares of ₹ 10 each	4,00,000	4,80,000
Securities premium account	-	20,000

General reserve	60,000	1,00,000
Profit & Loss account	96,000	1,36,000
12% Debentures	1,00,000	-
Trade payables	2,60,000	2,80,000
Proposed dividend	40,000	48,000
Provision for depreciation on plant & machinery	2,80,000	3,00,000
Provision for depreciation on equipment	12,000	8,000
	12,48,000	13,72,000
Assets		
Freehold land & buildings	2,10,000	2,80,000
Plant & machinery at cost	5,80,000	6,40,000
Equipment at cost	18,000	20,000
Stocks	2,60,000	2,10,000
Debtors	1,50,000	1,70,000
Cash	30,000	52,000

Note:

The plant and machinery which cost ₹ 40,000 and in respect of which ₹ 26,000 had been written off as depreciation was sold during the year 2023 for ₹ 6,000.

Equipment which costs ₹ 10,000 and in respect of which ₹ 8,000 had been written off as depreciation was sold for ₹ 4,000 during 2023.

The dividend which was declared in 2022 was paid during 2023.

You are required to prepare:

(a) A statement showing the change in working capital during 2023.

(b) A statement showing the sources and application of working capital (Fund Flow Statement) during 2023.

[Decrease in working capital ₹ 28,000; Fund from operations ₹ 1,84,000; Sources and applications of fund ₹ 2,94,000 and ₹ 3,22,000]

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Sources of Finance and Cost of Capital

4

This Module Includes

4.1 Sources of Finance

4.2 Cost of Capital

Sources of Finance and Cost of Capital

SLOB Mapped against the Module:

To develop critical thinking and problem-solving competencies so that students can assist the management in selecting a suitable capital structure that caters to a balanced approach towards risk, return and value.

Module Learning Objectives:

After studying this module, the students will be able to –

- Provide an introduction to the different sources of finance available to management, both internal and external;
- Identify the Long-term, medium term and short-term sources of finance;
- Provide an overview of the advantages and disadvantages of the different sources of funds;
- Discuss different international sources of finance;
- Describe how to finance to startups in modern days;
- Identify alternative investment funds for startups;
- Explain the concept of crowdfunding;
- Discuss the advantages and disadvantages of startup financing;
- Understand the concept and relevance cost of capital;
- Know the different types of cost of capital involved in financing;
- Determine the specific cost of long-term debt, Preference share capital, Equity share capital and retained earnings;
- Equip themselves with detail understanding of computing the Weighted Average Cost of Capital (WACC);
- Equip themselves with detail understanding of computing the Marginal Cost of Capital.

Sources of Finance

4.1

To start any business, raising of funds or collection of funds is very much needed because without money one cannot do anything. So, we need to know about different sources of funds either long-term or short-term based on the requirement of the firm.

Sources of Finance – Classification

The sources of capital are classified into three broad categories, where some sources may be internationally financed. However, these are —

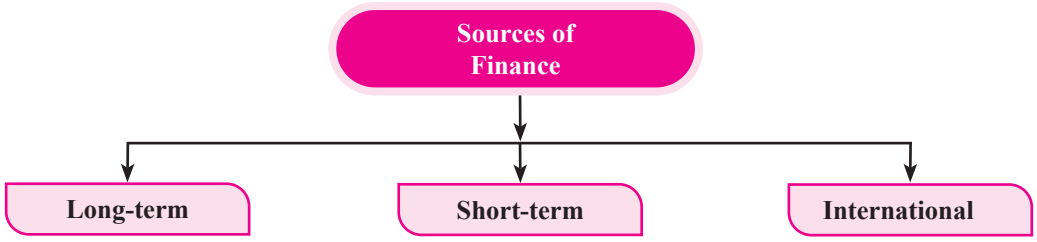


Figure 4.1: Types of Sources of Finance

The above sources are discussed below:

4.1.1 Long-Term and Short-Term Sources of Finance

A. Long-Term Sources of Finance

Long-term financing means capital requirements for a period of more than 5 years to 10 or 15 or 20 years based on other factors. Long-term sources of finance are required for capital expenditures in fixed assets like plant and machinery, land and building, etc. Long-term financing sources can be in the form of any of them:

(i) Equity Share Capital

(ii) Preference Share Capital

(iii) Term Loans

(iv) Debenture /Bond Capital

(v) Lease Capital or Leasing

(vi) Retained Earnings

(vii) Venture Capital

The above sources of long-term finance are discussed below:

(i) Equity Share Capital

Equity share capital is a basic source of finance for any firm. It represents the ownership interest in the company. The characteristics of equity share capital are a direct consequence of its position in the company's control, income and assets. Equity share capital does not have any maturity and there is no compulsion to pay dividend. The equity share capital provides funds, more or less, on a permanent basis. It also works as a base for creating the debt and loan capacity of the firm.

The advantages and disadvantages of equity share capital may be summarized as follows:

Advantages of Equity Share Financing

(a) It is a permanent source of funds.

(b) The new equity share capital increases the corporate flexibility for the point of view of capital structure planning.

(c) Equity share capital does not involve any mandatory payments to shareholders.

(d) It may be possible to make further issue of share capital by using a right offering. In general, selling right shares involves no change in the relationship between ownership and control.

Disadvantages of Equity Share Financing

(a) Cost of capital is the highest of all sources.

(b) Equity share capital has a burden of Corporate Dividend Tax (CDT) on the company.

(c) New issue of equity capital may reduce the EPS.

(ii) Preference Share Capital

The preference share capital is also owner's capital but it has a maturity period. In India, the preference shares must be redeemed within a maximum period of 20 years from the date of issue. The rate of dividend payable on preference shares is also fixed. As against the equity share capital, the preference shares have two references:

(a) Preference with respect to payment of dividend, and

(b) Preference with reference to repayment of capital in case of liquidation of company.

However, the preference share capital represents an ownership interest and not a liability of the company. The preference shareholders have the right to receive dividends in priority over the equity shareholders. Indeed, it is this preference which distinguishes preference shares from equity shares. A dividend need not necessarily be paid on either type of shares. However, if the directors want to pay equity dividend, then the full dividend due on the preference shares must be paid first. Failure to meet commitment of preference dividend is not a ground for liquidation. The advantages and disadvantages of the preference share capital are as follows:

Advantages of Preference Share Financing:

(a) The preference shares carry limited voting right though they are a part of the capital.

(b) The cost of capital of preference shares is less than that of equity shares.

(c) The preference share financing may also provide a hedge against inflation.

(d) A company does not face liquidation or other legal proceedings if it fails to pay the preference dividends.

Limitations of Preference Share Financing:

(a) The cost of capital of preference shares is higher than cost of debt.

(b) Non-payment of dividend may adversely affect the value of the firm.

(c) The compulsory redemption of preference shares after 20 years will entail a substantial cash outflow from the company.

(iii) Term Loans

Term loans are also known as term or project finance. This is also an important source of long-term financing for expansion, diversification and modernization of business. There are different financial institutions like banks and other financial institutions to provide term loans. The maturity period of term loans is typically longer in the range of 6-10 years in comparison to 3-5 years of bank advances.

(iv) Debenture/Bond

A bond or a debenture is the basic debt instrument which may be issued by a borrowing company for a price which may be less than, equal to or more than the face value. A debenture also carries a promise by the company to make interest payments to the debenture holders of specified amount, at specified time and also to repay the principal amount at the end of a specified period. These instruments have some or the other common features as follows:

(a) **Credit Instrument:** A debenture holder is a creditor of the company and is entitled to receive payments of interest and the principal and enjoys some other rights.

(b) **Interest Rate:** In most of the cases, the debt securities promise a rate of interest payable periodically to the debt holders. The rate of interest is also denoted as coupon rate.

(c) **Collateral:** Debt issue may or may not be secured and, therefore, debentures or other such securities may be called secured debentures or unsecured debentures.

(d) **Maturity Date:** All debt instruments have a fixed maturity date, when these will be repaid or redeemed in the manner specified.

(e) **Voting Rights:** As the debt holders are creditors of the company, they do not have any voting right in normal situations.

(f) **Face Value:** Every debt instrument has a face value as well as a maturity value.

(g) **Priority in Liquidation:** In case of liquidation of the company, the claim of the debt holders is settled in priority over all shareholders and, generally, other unsecured creditors also.

In practice, different types of debentures have been issued. These are:

On the basis of redemption	On the basis of security	On the basis of conversion	On the basis of registration
(i) Redeemable debentures	(i) Secured debentures	(i) Convertible debentures	(i) Registered debentures
(ii) Irredeemable debentures	(ii) Un-secured debentures	(ii) Non-convertible debentures	(ii) Bearer debentures

(v) Lease Capital or Leasing

Leasing is an arrangement that provides a firm with the use and control over assets without buying and owning the same. It is a form of renting assets. Lease is a contract between the owner of asset (lessor) and the user of the asset (lessee), where by the lessor gives the right to use the asset to the lease over an agreed period of time for a consideration called the lease rental. The contract is regulated by the terms and conditions of the agreement. The lessee pays the lease rent periodically to the lessor as regular fixed payments over a period of time.

There are two basic kinds of leases:

(I) Operating or Service Lease

(II) Financial Lease.

(I) Operating or Service Lease

An operating lease is usually characterized by the following features:

a) It is a short-term lease. The lease period in such a contract is less than the useful life of asset.

b) The lease is usually cancellable at short-notice by the lessee.

c) As the period of an operating lease is less than the useful life of the asset, it does not necessarily amortize the original cost of the asset. The lessor has to make further leases or sell the asset to recover his cost of investment and expected rate of return.

d) The lessee usually has the option of renewing the lease after the expiry of lease period.

e) The lessor is generally responsible for maintenance, insurance and taxes of the asset.

f) As it is a short-term cancellable lease, it implies higher risk to the lessor but higher lease rentals to the lessee.

Operating or service leasing is common to the equipments which require expert technical staff for maintenance and are exposed to technological developments, e.g. computers, vehicles, data processing equipments, communications systems, etc. Operating lessors usually limit their activities to field and engage themselves in the purchase of large number of similar types of machines or equipment. They are able to offer attractive terms to their customers because savings in maintenance costs.

(II) Financial Lease

A lease is classified as financial lease if it ensures the lessor for amortization of the entire cost of investment plus the expected return on capital outlay during the terms of the lease. Such a lease is usually for a longer period and non-cancellable. Financial Leases are commonly used for leasing land, building, machinery and fixed equipments, etc.

A financial lease is usually characterized by the following features:

(a) The present value of the total lease rentals payable during the period of the lease exceeds or is equal substantially the whole of the fair value of the leased asset. It implies that within the lease period, the lessor recovers his investment in the asset along with an acceptable rate of return.

(b) As compared to operating lease, a financial lease is for a longer period of time.

(c) It is usually non-cancellable by the lessee prior to its expiration date.

(d) The lessee is generally responsible for the maintenance, insurance and services of the asset. However, the terms of lease agreement, in some cases may require the lessor to maintain and service the asset. Such an arrangement is called 'maintenance or gross lease'. But usually in an operating lease, it is lessee who has to pay for maintenance and service costs and such a lease is known as "net lease".

(e) A financial lease usually provides the lessee an option of renewing the lease for further period at a normal rent.

(vi) Retained Earnings

The portion of profits not distributed among the shareholders but retained and used in the business is called retained earnings. It is also known as ploughing back of profit or retained capital or accumulated earnings.

(vii) Venture Capital

Venture capital is a form of equity financing especially designed for funding high risk and high reward projects. There is a common perception that venture capital is a means of financing high technology projects.

However, venture capital is investment of long-term financial made in:

(a) Ventures promoted by technically or professionally qualified but unproven entrepreneurs, or

(b) Ventures seeking to harness commercially unproven technology, or

(c) High risk ventures.

The term 'venture capital' represents financial investment in a highly risky project with the objective of earning a high rate of return.

Modes of Finance by Venture Capitalists

(a) Equity

Most of the venture capital funds provide financial support to entrepreneurs in the form of equity by financing 49% of the total equity. This is to ensure that the ownership and overall control remains with the entrepreneur. Since there is a great uncertainty about the generation of cash inflows in the initial years, equity financing is the safest mode of financing. A debt instrument on the other hand requires periodical servicing of dept.

(b) Conditional Loan

From a venture capitalist point of view, equity is an unsecured instrument hence a less preferable option than a secured debt instrument. A conditional loan usually involves either no interest at all or a coupon payment at nominal rate. In addition, a royalty at agreed rates payable to the lender on the sales turnover. As the units picks up in sales levels, the interest rate is increased and royalty amounts are decreased.

(c) Convertible Loans

The convertible loan is subordinate to all other loans which may be converted into equity if interest payments are not made within agreed time limit.

B. Short-Term Sources of Finance

From the financing point of view, short-term financing means financing for a period of less than 1 year. The need for short-term finance arises to finance the current assets of a business like an inventory of raw material and finished goods, debtors, minimum cash and bank balance etc. Short-term financing is also named as working capital financing.

Any organisation requires working capital margin to take up day-to-day operations. The working capital amount is divided into two parts – **(a)** Permanent Working Capital, and **(b)** Temporary Working Capital. The permanent working capital should be financed from long-term sources and temporary working capital should be financed from short-term sources.

Important short-term sources are discussed below:

(i) Trade Credit

When a firm buys goods from another, it may not be required to pay for these goods immediately. During this period, before the payment becomes due, the purchaser has a debt outstanding to the supplier. This debt is recorded in the buyer's balance sheet as creditors; and the corresponding account for the supplier is that of debtors. The amount of such financing depends on the volume of purchases and the payment timing. Small and new firms are usually more dependent on the trade credit, as they find it difficult to obtain funds from other sources. Trade credit may take form of open account or bills payable.

(ii) Accrued Expenses

Another source of short-term financing is the accrued expenses or the outstanding expenses liabilities. The accrued expenses refer to the services availed by the firm, but the payment for which has not yet been made. It is a built-in and an automatic source of finance as most of the services, are paid only at the end of a period. The accrued expenses represent an interest free source of finance. There is no explicit or implicit cost associated with the accrued expenses and the firm can save liquidity by accruing these expenses.

(iii) Commercial Paper

Commercial Paper (CP) is an unsecured promissory note issued by a firm to raise funds for a short period, generally, varying from a few days to a few months. For example, in India, the maturity period of CP varies between 15 days to 1 year. It is a money market instrument and generally purchased by Commercial Banks, money market mutual funds and other financial institutions desirous to invest their funds for a short period. As the CP is unsecured, the firms having good credit rating can only issue the CP.

The interest cost of the CP depends upon the amount involved, maturity period and the prime lending rates of Commercial Banks. The main advantage of CP is that the cost involved is lower than the prime lending rates. In addition to this cost, the borrowing firm has to bear another cost in the form of placement fees payable to the dealer of CP who arranges the sale.

Issue of Commercial Papers in India

CP was introduced as a money market instruments in India in January, 1990 with a view to enable the companies to borrow for short term. Since the CP represents an unsecured borrowing in the money market, the regulation of CP comes under the purview of the Reserve Bank of India:

(a) CP can be issued in multiples of ₹ 5 Lakhs.

(b) CP can be issued for a minimum duration of 15 days and maximum period of 12 months.

(c) For issuing CP the company's net worth should be more than ₹ 4 crores.

(d) CP can neither be redeemed before maturity nor can be extended beyond the maturity period.

(e) CP issue requires a credit rating of P2 from CRISIL or A2 from ICRA.

(iv) Inter-Corporate Deposits (ICDs)

Sometimes, the companies borrow funds for a short-term period, say up to six months, from other companies which have surplus liquidity for the time being. The ICDs are generally unsecured and are arranged by a financier. The ICDs are very common and popular in practice as these are not marred by the legal hassles.

The convenience is the basic virtue of this method of financing. There is no regulation at present in India to regulate these ICDs.

(v) Short-term Unsecured Debentures

Companies have raised short-term funds by the issue of unsecured debentures for periods up to 17 months and 29 days. The rate of interest on these debentures may be higher than the rate on secured long-term debentures. It may be noted that no credit rating is required for the issue of these debentures because as per the SEBI guidelines, the credit ratings required for debentures having maturity period of 18 months or more.

(vi) Bank Credit

In India, banks may give financial assistance in different shapes and forms. The usual form of bank credit is as follows:

(a) Overdraft

(b) Cash Credit

(c) Bills Purchasing and Bills Discounting

(d) Letter of Credit

(e) Working Capital Term Loan

(f) Funded Interest Term Loan

The above sources will be discussed in Module 6 (Working Capital Financing) in details.

(vii) Other sources as Financial Services

1. Hire Purchase System

Hire purchase means a transaction where goods are purchased and sold on the terms that payment will be made in instalments, the possession of the goods is given to the buyer immediately and the property (ownership) in the goods remains with the vendor till the last instalment is paid.

The main characteristics of a hire purchase agreement are as below:

(a) The payment is to be made by the hirer (buyer) to the hiree, usually the vendor, in instalments over a specified period of time.

(b) The possession of the goods is transferred to the buyer immediately.

(c) The property in the goods remains with the vendor (hiree) till the last instalment is paid. The ownership passes to the buyer (hirer) when he pays all instalments.

(d) The hiree or the vendor can reposes the goods in case of default and treat the amount received by way of instalments as hire charged for that period.

(e) The instalments in hire purchase include interest as well as repayment of principal.

(f) Usually, the hire charges interest on flat rate.

2. Forfeiting

The term "a forfeit" means, "relinquish a right". It refers to the exporter relinquishing his right to a receivable due at a future date in exchange for immediate cash payment, at an agreed discount, passing all risks and responsibilities for collecting the debt to the forfeiter.

It is discounting of international trade receivable on a 100% "without recourse" basis. "without recourse" means the client gets full credit protection and all the components of service, i.e. short-term finance, administration of sales ledger are available to the client.

Forfeiting transforms the supplier's credit granted to the importer into cash transaction for the exporter protecting him completely from all the risks associated with selling overseas on credit. It effectively transforms a credit sale into a cash sale.

Procedure

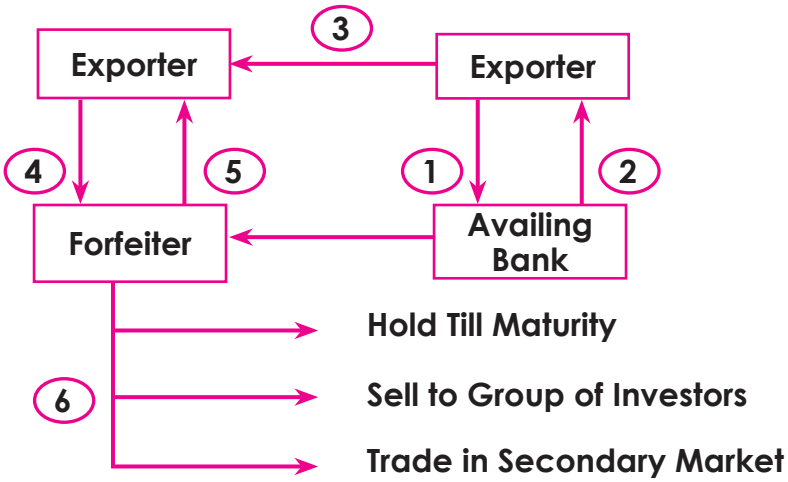
(a) The exporter sells the goods to the importer on a deferred payment basis spread over 3-5 years.

(b) The importer draws a series of promissory notes in favour of the exporter for the payments to be made inclusive of interest charges.

(c) Such promissory notes are availed or guaranteed by a reputed international bank which can also be the importer's banker. (it is endorsed on the promissory note by the guaranteeing bank that it covers any default of payment of the buyer).

(d) The exporter now sells the availed notes to a forfeiter (which may be the exporter's banker) at a discount without recourse.

(e) The forfeiter may hold these notes till maturity or sell them to group of investors interested in taking up such high-yielding unsecured paper.



Graphical representation of Forfeiting

1. = Promissory notes sent for availing to the importer's banker

2. = Availed notes returned to the importer

3. = Availed notes sent to exporter

4. = Availed notes sold at a discount to a forfeiter on a non - recourse basis

5. = Exporter obtains finance

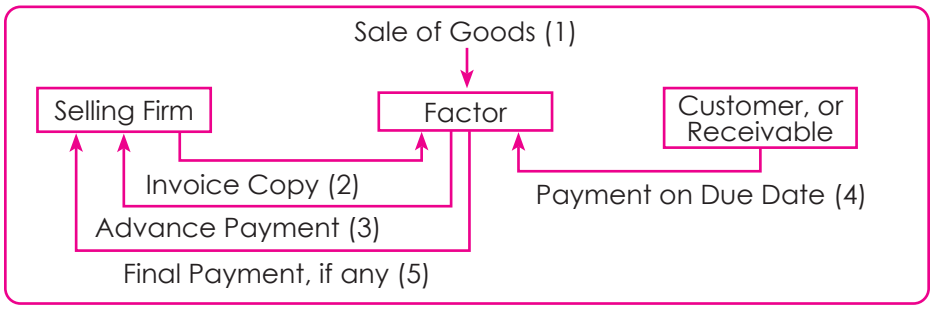
6. = Forfeiter holds the notes till maturity or sells the short-term paper either to a group of investors or to investors in the secondary market.

3. Bill Discounting

The commercial banks provide immediate cash by discounting genuine trade bills. They deduct a certain charge as discount charges from the amount of the bill and the balance is credited to the customer's account and thus, the customer is able to enjoy credit facilities against the discounting of bills. Of course, this discount charges include interest for the unexpired period of the bill plus some service charges. Bill financing is the most liquid one from the banker's point of view since, in time of emergencies, they can take those bills to the Reserve Bank of India (RBI) for rediscounting purposes. Infact, it was viewed primarily as a scheme of accommodation for banks. Now, the situation is completely changed. Today it is viewed as a kind of loan backed by the security of bills.

4. Factoring

Factoring may be defined as the relationship between the seller of goods and a financial firm, called the factor, whereby the latter purchases the receivables of the former and also administer the receivable of the former. Factoring involves sale of receivable of a firm to another firm under an already existing agreement between the firm and the factor.



Modus Operandi

A factor provides finance to his client up to a certain %age of the unpaid invoices which represent the sale of goods or services to approved customers. The modus operandi of the factoring scheme is as follows.

(a) There should be a factoring arrangement (invoice purchasing arrangement) between the client (which sells goods and services to trade customers on credit) and the factor, which is the financing organization.

(b) Whenever the client sells goods to trade customers on credit, he prepares invoices in the usual way.

(c) The goods are sent to the buyers without raising a bill of exchange but accompanied by an invoice.

(d) The debt due by the purchaser to the client is assigned to the factor by advising the trade customers, to pay the amount due to the client, to the factor.

(e) The client hands over the invoices to the factor under cover of a schedule of offer along with the copies of invoices and receipted delivery challans or copies of R/R or L/R.

(f) The factor makes an immediate payment upto 80% of the assigned invoices and the balance 20% will be paid on realization of the debt.

Basic Types of Factoring

(i) Full-Service Factoring

Under this type, a factor provides all kinds of services discussed above. Thus, a factor provides finance, administers the sales ledger, collects the debts at his risk and renders consultancy service. This type of factoring

is a standard one. If the debtors fail to repay the debts, the entire responsibility falls on the shoulders of the factor since he assumes the credit risk also. He cannot pass on this responsibility to his client and, hence, this type of Factoring is also called 'Without Recourse' Factoring.

(ii) With Recourse Factoring or Pure Factoring

As the very name suggests, under this type, the factor does not assume the credit risk. In other words, if the debtors do not repay their dues in time and if their debts are outstanding beyond a fixed period, say 60 to 90 days from the due date, such debts are automatically assigned back to the client. The client has to take up the work of collection of overdue account by himself. If the client wants the factor to go on with the collection work of overdue accounts, the client has to pay extra charges called 'Refactoring Charges'.

Benefits of Factoring

The benefits of factoring can be summarized as follows:

(a) Better Cash Flows

The seller can offer credit to the customers, within the terms approved by the factor, and can receive promptpayments as soon as, or shortly after invoicing. This may be cheaper than financing by means of bank credit. The factoring is an alternative source of financing and can be availed if the firm expects a liquidity problem on a regular basis. In fact, the factoring ensures a definite pattern of cash inflows from the credit sales.

(b) Better Assets Management

The security for such financial assistance is the receivable itself and, therefore, the assets will remain available as security for other borrowings.

(c) Better Working Capital Management

Since the finance available from factoring moves directly with the level of the receivables, the problem of additional working capital required to match the sales growth does not come at all. However, a close interaction among working capital components implies that efficient management of one component can have positive benefits on other components.

(d) Better Credit Administration

The debt management services which factors provide relieve the seller of the burden of credit administration and the seller can concentrate on the cost of staff and office space. In other words, it enables the seller to concentrate on developing his business.

(e) Better Evaluation

The debt management service may include formal or informal advice on credit standing. Factors hold large amounts of information about the trading histories of firms. This can be valuable to those who are using factoring services and can thereby avoid doing business with customers having bad payment record.

(f) Better Risk Management

In case of non-recourse factoring, the seller will have the advantages of repositioning the risk of customers not properly paying due bills. This will cost more than with recourse factoring and thereby allows the seller to escape the potentially dire consequences of customer's default.

Difference between Factoring and Bill Discounting

Factoring differs from discounting in many respects. Some of them are:

(a) Factoring is a broader term covering the entire trade debts of a client whereas discounting covers only those trade debts which are backed by account receivables.

(b) Under factoring, the factor purchases the trade debt and thus becomes a holder for value. But, under discounting the financier acts simply as an agent of his customer and he does not become the owner. In other words, discounting is a kind of advance against bills whereas factoring is an outright purchase of trade debts.

(c) The factors may extend credit without any recourse to the client in the event of non-payment by customers. But, discounting is always made with recourse to the client.

(d) Account Receivables under discount are subject to rediscounting whereas it is not possible under factoring.

(e) Factoring involves purchase and collection of debts, management of sales ledger, assumption of credit risk, provision of finance and rendering of consultancy services. But discounting involves simply the provision of finance alone.

(f) Bill discounting finance is a specific one in the sense that it is based on an individual bill arising out of an individual transaction only. On the other hand, factoring is based on the 'whole turnover' i.e. a bulk finance is provided against a number of unpaid invoices.

(g) Under discounting, the drawee is always aware of the bank's charge on receivables. But, under undisclosed factoring everything is kept highly confidential.

(h) Bill financing through discounting requires registration of charges with the Registrar of companies. In fact, factoring does not require such registration.

(i) Discounting is always a kind of 'in-balance sheet financing'. That is, both the amount of receivables and bank credit are shown in the balance sheet itself due to its 'with recourse' nature. But factoring is always "off-balance sheet financing".

Differences between Factoring and Forfeiting

Both factoring and forfeiting are used as tools of financing. But there are some differences:

(a) Factoring is always used as a tool for short-term financing whereas forfeiting is for medium-term financing at a fixed rate of interest.

(b) Factoring is generally employed to finance both the domestic and export business. But, forfeiting is invariably employed in export business only.

(c) The central theme of factoring is the purchase of the invoice of the client whereas it is only the purchase of the export bill under forfeiting.

(d) Factoring is much broader in the sense it includes the administration of the sales ledger, assumption of credit risk, recovery of debts and rendering of consultancy services. On the other hand, forfeiting mainly concentrates on financing aspects only and that too in respect of a particular export bill.

(e) Under factoring, the client is able to get only 80% of the total invoice as 'credit facility' whereas the 100% of the value of the export bill (of course deducting service charges) is given as credit under forfeiting.

(f) Forfeiting is done without recourse to the client whereas it may or may not be so under factoring.

(g) The bills under forfeiting may be held by the forfeiter till the due date or they can be sold in the secondary market or to any investor for cash. Such a possibility does not exist under factoring.

(h) Forfeiting is a specific one in the sense that it is based on a single export bill arising out of an individual transaction only. But Factoring is based on the "whole turnover' i.e. a bulk finance is provided against a number of unpaid invoices.

5. Securitization

Securitization of debt or asset refers to the process of liquidating the illiquid and long-term assets like loans and receivables of financial institutions like banks by issuing marketable securities against them. In other words, debt securitization is a method of recycling of funds. It is a process whereby loans and other receivables are underwritten and sold in form of asset. It is thus a process of transforming the assets of a lending institution into negotiable instrument for generation of funds.

Process of Debt Securitization:

The process of debt securitization is as follows:

(a) The loans are segregated into relatively homogeneous pools.

(b) The basis of pool is the type of credit, maturity pattern, interest rate, risk etc.

(c) The asset pools are then transferred to a trustee.

(d) The trustee then issues securities which are purchased by investors.

(e) Such securities (asset pool) are sold on the undertaking without recourse to seller.

In this way, we see that conversion of debts to securities is known as debt securitization.

The main advantages of securitisation are as follows:

(a) It converts the debt into securities.

(b) It converts the non-liquid asset into liquid ones.

(c) The assets are shifted from the balance sheet, giving the borrower an opportunity of off-balance sheet funding.

(d) It thus helps in better balance sheet management.

(e) It enhances the borrower's credit rating.

(f) It opens up new investment avenues

(g) The securities are tied up in definite assets.

C. International Sources of Finance

1. Depository Receipts (DRs)

A DR means any instrument in the form of a depository receipt or certificate created by the Overseas Depository Bank outside India and issued to the non-resident investors against the issue of ordinary shares. A DR is a negotiable instrument evidencing a fixed number of equity shares of the issuing company generally denominated by US dollars. DRs are commonly used by those companies which sell their securities in international market and expand their shareholdings abroad. These securities are listed and traded in International Stock Exchanges. These can be either American Depository Receipt (ADR) or Global Depository Receipt (GDR). ADRs are issued in case the funds are raised through retail market in United States. In case of GDR issue, the invitation to participate in the issue cannot be extended to retail US investors. As the DRs are issued in overseas capital markets, the funds to the issuer are available in foreign currency, generally in US $.

(i) Global Depository Receipt (GDR)

A GDR is a negotiable instrument, basically a bearer instrument which is traded freely in the international market either through the stock exchange or over the counter or among Qualified International Buyers (QIB). It is denominated in US Dollars and represents shares issued in the local currency.

Characteristics of GDR

(a) The shares underlying the GDR do not carry voting rights.

(b) The instruments are freely traded in the international market.

(c) The investors earn fixed income by way of dividend.

(d) GDRS can be converted into underlying shares, depository/ custodian banks reducing the issue.

Modus Operandi of GDR

The GDR operates in the following ways –

(a) An Indian company issues ordinary equity shares.

(b) These shares are deposited with a custodian bank (mostly domestic bank)

(c) The custodian bank establishes a link with a depository bank overseas.

(d) The depository bank, in turn issues depository receipts in dollars.

(e) Funds are raised when the foreign entities purchase those depository receipts at an agreed price.

(f) The dividends on such issues are paid by the issuing company to the depository bank in local currency.

(g) The depository bank converts the dividends into US Dollars at the ruling exchange rate and distributes it among the GDR holders.

Advantages of GDR

(a) The Indian companies are able to tap global equity market to raise currency.

(b) The exchange risk borne by the investors as payment of the dividend is made in local currency.

(c) The voting rights are vested only with depository.

(ii) American Depository Receipt (ADR)

The depository receipt in the US market is called ADR. ADRs are those which are issued and listed in any of the stock exchanges of US. It is an investment in the stock of non- US corporation trading in the US stock exchange.

Characteristics of ADR

(a) The ADRs may or may not have voting rights.

(b) These are issued in accordance with the provisions laid by SEC, USA.

(c) These are bearer negotiable instrument and the holder can sell it in the market.

(d) The ADRs once sold can be re- issued.

(e) The operation of ADR- similar to that of GDR.

Advantages of ADR

(a) The ADRs are an easy cost-effective way for individuals to hold and own shares in a foreign country.

(b) They save considerable money by reducing administration cost and avoiding foreign taxes on each transaction.

2. Foreign Currency Convertible Bonds (FCCBs)

The FCCB means bonds issued in accordance with the relevant scheme and subscribed by a non-resident in foreign currency and convertible into ordinary shares of the issuing company in any manner, either in whole or in part, on the basis of any equity related warrants attached to debt instruments. The FCCBs are unsecured, carry a fixed rate of interest and an option for conversion into a fixed number of equity shares of the issuer company.

Interest and redemption price (if conversion option is not exercised) is payable in dollars. Interest rates are very low by Indian domestic standards. FCCBs are denominated in any freely convertible foreign currency.

3. External Commercial Borrowings (ECB)

Indian promoters can also borrow directly from foreign institutions, foreign development bank, World Bank, etc. It is also known as Foreign Currency Term loans. Foreign institutions provide foreign currency loans and financial assistance towards import of plants and equipments. The interest on these loans is payable in foreign currency. On the payment date, interest amount is converted into domestic currency at the prevailing foreign exchange rate. The borrowings, repayment and interest payments can be tailor-made in view of the cash flow position of the project.

4. Other Sources

In addition to the sources discussed above, there are some sources which may be availed by a promoter on casual basis. Some of these are:

(a) **Deferred Credit:** Supplier of plant and equipment may provide a credit facility and the payment may be made over number of years. Interest on delayed payment is payable at agreed terms and conditions.

(b) **Bills Discounting:** In this scheme, a bill is raised by the seller of equipment, which is accepted by the buyer/ promoter of the project. The seller realizes the sales proceeds by getting the bill discounted by a commercial bank which, in turn gets the bill rediscounted by IDBI.

(c) **Seed Capital Assistance:** At the time of availing loan from financial institutions, the promoters have to contribute seed capital in the project. In case, the promoters do not have seed capital, they can procure the seed capital from 'Seed Capital Assistance Schemes'. Two such schemes are:

(i) Risk Capital Foundation Scheme: The scheme was promoted by IFCI to provide seed capital upto ₹ 40 lakhs to the promoters.

(ii) Seed Capital Assistance Scheme: Under this scheme, seed capital for smaller projects is provided upto 15 lakhs by IDBI directly or through other financial institutions.

4.1.2 Financing a Start-up – Alternative Investment Funds and Crowd Funding

Meaning and Concept of Startup Financing

India aspires to become 5 trillion-dollar economy by 2024. To reach the mark, it needs to expand entrepreneurial activities in the form of startup activities. To start the startup business, funding or financing is very important. Funding refers to the money required to start and run a business. It is a financial investment in a company for product development, manufacturing, expansion, sales and marketing, office spaces, and inventory.

Financing of startups is something different from traditional financing. Many startups choose to not raise funding from third parties and are funded by their founders only (to prevent debts and equity dilution). However, most startups do raise funding, especially as they grow larger and scale their operations. No matter how great your business idea is, one essential element of startup success is your ability to obtain sufficient funding to start and grow the business. A startup might require funding for one, a few, or all of the following purposes. It is important that an entrepreneur is clear about why they are raising funds. Founders should have a detailed financial and business plan before they approach investors.

Stage-wise Sources of Finance for Startups

Financing is needed to start a business and ramp it up to profitability. There are several sources to consider when looking for startup financing. But first one need to consider how much money you need and when (at what stage) you will need it. However, the stage-wise requirement of sources of finance are discussed below –

Stage 1: Idea Generation

This stage where the entrepreneur has an idea and is working on bringing it to life. At this stage, the amount of funds needed is usually small. Additionally, at the initial stage in the startup lifecycle, there are very limited and mostly informal chanels available for raising funds.

Stage 2: Pre-Seed Stage

(i) Bootstrapping / Self-financing

Bootstrapping a startup means growing the business with little or no venture capital or outside investment. It means relying on your savings and revenue to operate and expand. This is the first recourse for most entrepreneurs as there is no pressure to pay back the funds or dilute control of your startup.

(ii) Friends and Family

This is also a commonly utilized channel of funding by entrepreneurs still in the early stages. The major benefit of this source of investment is that there is an inherent level of trust between the entrepreneurs and the investors. This is the prize money/grants/financial benefits that are provided by institutes or organizations that conduct business plan competitions and challenges. Even though the quantum of money is not generally large, it is usually enough at the idea stage. What makes the difference at these events is having a good business plan.

Stage 3: Validation

At this stage, a startup has a prototype ready and needs to validate the potential demand of the startup's product/ service. This is called conducting a 'Proof of Concept (POC)', after which comes the big market launch.

Stage 4: Seed Stage

A startup will need to conduct field trials, test the product on a few potential customers, onboard mentors, and build a formal team for which it can explore the following funding sources:

(i) Incubators

Incubators are organizations set up with the specific goal of assisting entrepreneurs with building and launching their startups. Not only do incubators offer a lot of value-added services (office space, utilities, admin & legal assistance, etc.), they often also make grants/debt/equity investments. One can refer to the list of incubators here.

(ii) Government Loan Schemes

The government has initiated a few loan schemes to provide collateral-free debt to aspiring entrepreneurs and help them gain access to low-cost capital such as the Startup India Seed Fund Scheme and SIDBI Fund of Funds.

(iii) Angel Investors

Angel investors are individuals who invest their money into high-potential startups in return for equity. Reach out to angel networks such as Indian Angel Network, Mumbai Angels, Lead Angels, Chennai Angels, etc., or relevant industrialists for this. One can connect with investors by the Network Page.

(iv) Crowdfunding

Crowdfunding refers to raising money from a large number of people where each contribute a relatively small amount. This is typically done via online crowdfunding platforms.

Stage 5: Early Traction Stage

At the Early Traction stage startup's products or services have been launched in the market. Key performance indicators such as customer base, revenue, app downloads, etc. become important at this stage.

Funds are raised at this stage to further grow the user base, product offerings, expand to new geographies, etc. Common funding sources utilized by startups in this stage are:

(i) Venture Capital Funds

Venture capital (VC) funds are professionally managed investment funds that invest exclusively in high growth startups. Each VC fund has its investment thesis – preferred sectors, stage of the startup, and funding amount – which should align with the startup. VCs take startup equity in return for their investments and actively engage in the mentorship of their investee startups.

(ii) Banks/Non-Banking Financial Companies (NBFCs)

Formal debt can be raised from banks and NBFCs at this stage as the startup can show market traction and revenue to validate its ability to finance interest payment obligations. This is especially applicable for working capital. Some entrepreneurs might prefer debt over equity as debt funding does not dilute equity stake.

(iii) Venture Debt Funds

Venture Debt funds are private investment funds that invest money in startups primarily in the form of debt. Debt funds are typically invested along with an angel or VC round in different areas..

Stage 6: Scaling Stage

At this stage, the startup is experiencing a fast rate of market growth and increasing revenues. Common funding sources utilized by startups in this stage are:

(i) Venture Capital Funds

VC funds with larger ticket sizes in their investment provide funding for late-stage startups. It is recommended to approach these funds only after the startup has generated significant market traction. A pool of VCs may come together and fund a startup as well.

(ii) Private Equity/Investment Firms

Private equity/Investment firms generally do not fund startups however, lately some private equity and investment firms have been providing funds for fast-growing late-stage startups who have maintained a consistent growth record.

Steps to Startup Fund Raising

The entrepreneur must be willing to put in the effort and have the patience that a successful fund-raising round requires. The fund-raising process can be broken down into the following steps:

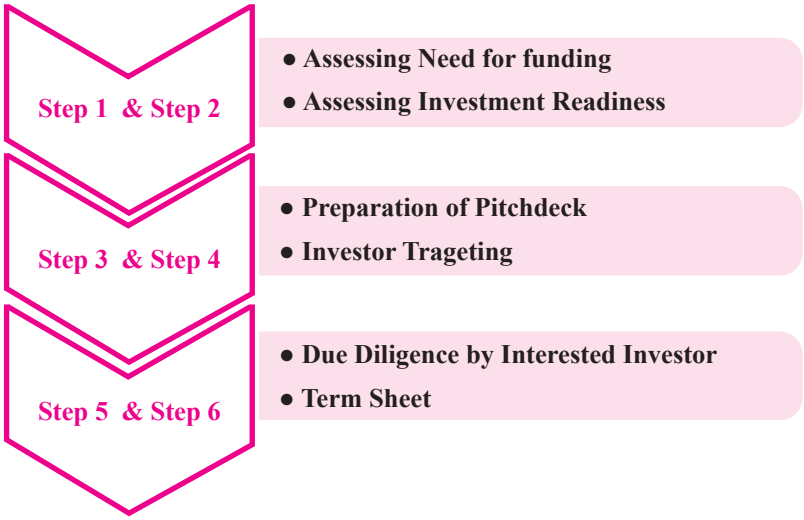


Figure 4.2: Steps to Startup fund raising

The startup needs to assess why the funding is required, and the right amount to be raised. The startup should develop a milestone-based plan with clear timelines regarding what the startup wishes to do in the next 2, 4, and 10 years. A financial forecast is a carefully constructed projection of company development over a given time period, taking into consideration projected sales data, as well as market and economic indicators. The cost of Production, Prototype Development, Research, Manufacturing, etc. should be planned well. Basis this, the startup can decide what the next round of investment will be for.

Methods of Financing to Startups

Different popular methods or alternatives of financing to startups are discussed below:

A. Self-funding

Self-funding, also known as bootstrapping, is an effective way of startup financing, especially when you are just starting your business. Self-funding or bootstrapping should be considered as a first funding option. First-time entrepreneurs often have trouble getting funding without first showing some traction and a plan for potential success. You can invest from your own savings or can get your family and friends to contribute. This will be easy to raise due to less formalities/compliances, plus less costs of raising. In most situations, family and friends are flexible with the interest rate. Different methods of self-financing are Trade credit, Factoring, Leasing etc.

B. Alternative Investment Funds

As per the SEBI (Alternative Investment Funds) Regulations, 2012, 'Alternative Investment Fund or AIF means any fund established or incorporated in India which is a privately pooled investment vehicle which collects funds from sophisticated investors, whether Indian or foreign, for investing it in accordance with a defined investment policy for the benefit of its investors.'

AIF does not include funds covered under the SEBI (Mutual Funds) Regulations, 1996, SEBI (Collective Investment Schemes) Regulations, 1999 or any other regulations of the Board to regulate fund management activities.

Categories of Alternative Investment Funds (AIF)

As per Regulation 3(4), AIF is classified into three categories:

Category I AIF:

AIFs which invest in startup or early-stage ventures or social ventures or SMEs or infrastructure or other sectors or areas which the Government or regulators consider as socially or economically desirable and shall include venture capital funds, SME funds, social venture funds, infrastructure funds and such other.

Alternative Investment Funds as may be specified. [Regulation 3(4)(a)]

- Venture Capital Funds (Including Angel Funds)
- SME Funds
- Social Venture Funds
- Infrastructure funds

Category II AIF

As per the AIF Regulation 3(4)(b), AIFs which do not fall in Category I and III and which do not undertake leverage or borrowing other than to meet day-to-day operational requirements and as permitted in the SEBI (Alternative Investment Funds) Regulations, 2012.

Various types of funds such as real estate funds, private equity funds (PE funds), funds for distressed assets, etc. are registered as Category II AIFs.

Category III AIF

AIFs which employ diverse or complex trading strategies and may employ leverage including through investment in listed or unlisted derivatives. [Regulation 3(4)(c)]

Various types of funds such as hedge funds, PIPE Funds, etc. are registered as Category III AIFs.

(i) Angel Financing

Angel investors are individuals with surplus cash and a keen interest to invest in upcoming startups. They also work in groups of networks to collectively screen the proposals before investing. They can also offer mentoring or advice alongside capital. Angel investors have helped to start up many prominent companies, including Google, Yahoo and Alibaba. This alternative form of investing generally occurs in a company's early stages of growth, with investors expecting a upto 30% equity. They prefer to take more risks in investment for higher returns. Some of popular Angel Investors in India are Indian Angel Network, Mumbai

Angels, Hyderabad Angels etc. Angel Investment as a funding option has its shortcomings too. Angel investors invest lesser amounts than venture capitalists.

(ii) Venture Capital

Venture Capitals **(VCs)** are professionally managed funds who invest in companies that have huge potential. They usually invest in a business against equity and exit when there is an IPO or an acquisition. VCs provide expertise, mentorship and acts as a litmus test of where the organisation is going, evaluating the business from the sustainability and scalability point of view. A venture capital investment may be appropriate for small businesses that are beyond the startup phase and already generating revenues.

(iii) Funding From Business Incubators and Accelerators

Early-stage businesses can consider Incubator and Accelerator programs as a funding option. Found in almost every major city, these programs assist hundreds of startup businesses every year. Though used interchangeably, there are few fundamental differences between the two terms. Incubators are like a parent to a child, who nurtures the business providing shelter tools and training and network to a business. Accelerators so more or less the same thing, but an incubator helps/assists/nurtures a business to walk, while accelerator helps to run/ take a giant leap.

These programs normally run for 4-8 months and require time commitment from the business owners. You will also be able to make good connections with mentors, investors and other fellow startups using this platform. In India, popular names of incubators and accelerators are Amity Innovation Incubator, AngelPrime, CIIE, IAN Business Incubator, Villgro, Startup Village and TLabs.

(iv) Funds by Winning Contests

An increase in the number of contests has tremendously helped to maximize the opportunities for fund raising. It encourages entrepreneurs with business ideas to set up their own businesses. In such competitions, you either have to build a product or prepare a business plan.

(v) Credit Cards

Business credit cards are among the most readily available ways to finance a startup and can be a quick way to get instant money. If you are a new business and do not have a sufficient money, you can use a credit card. However, keep in mind that the interest rates and costs on the cards can build very quickly, and carrying that debt can be detrimental to a business owner's credit.

Government Initiatives

SIDBI Fund of Funds Scheme

The Government of India formed a fund of ₹ 10,000 crore to increase capital availability as well as to catalyze private investments and thereby accelerate the growth of the Indian start-up ecosystem. The Fund was set up as a Fund of Funds for Start-ups (FFS), approved by the Cabinet and established by the Department for Promotion of Industry and Internal Trade (DPIIT) in June 2016. FFS does not invest in start-ups directly but provides capital to SEBI-registered Alternate Investment Funds (AIFs), known as daughter funds, who in turn invest money in high-potential Indian start-ups. SIDBI has been given the mandate of managing the FFS through the selection of daughter funds and overseeing the disbursal of committed capital. The fund of funds makes downstream investments in venture capital and alternative investment funds that in turn invest in start-ups. The fund has been formed in a way that creates a catalyzing effect. Funding is provided to start-ups across different life cycles. As of 31st May, 2021, SIDBI has committed ₹ 5,409.45 crore to 71 AIFs further ₹ 1,541.79 crore has been distributed to 51 AIFs. A total of ₹ 5,811.29 crore has been injected to boost 443 start-ups.

Startup India Seed Fund Scheme

The Department for Promotion of Industry and Internal Trade (DPIIT) has created Startup India Seed Fund Scheme (SISFS) with an outlay of ₹ 945.00 crore, which aims to provide financial assistance to startups for proof of concept, prototype development, product trials, market-entry, and commercialization. This would enable these startups to graduate to a level where they will be able to raise investments from angel investors or venture capitalists or seek loans from commercial banks or financial institutions. The scheme will support an estimated 3,600 entrepreneurs through 300 incubators in the next 4 years. The Seed Fund will be disbursed to eligible startups through eligible incubators across India.

C. Crowdfunding

Crowdfunding is a collaborative funding model that one can collect small contributions from many individuals (the crowd). There are two main types of crowdfunding. The donation model is what most people think of when crowdfunding is mentioned. Funders donate money to a cause in exchange for products, special pricing on items, or rewards. Beyond the perks, donation funders do not have the opportunity to get anything in return for their money. Kickstarter and Indiegogo are examples of donation crowdfunding. A more recent model is investment crowdfunding. Businesses sell ownership stakes in the form or equity or debt so funders (more accurately, investors) become shareholders in a sense, and they have the potential for financial return.

Some of the popular crowdfunding sites in India are Indiegogo, Wishberry, Ketto, Fundlined and Catapooolt. In US, Kickstarter, RocketHub, Dreamfunded, Onevest, DonorBox and GoFundMe are popular crowdfunding platforms.

Advantages of Crowdfunding

Crowdfunding is a great alternative way to fund a venture, and it can be done without giving up equity or accumulating debt. However, here are some advantages that crowdfunding offers an entrepreneur.

These are –

(a) Marketing Technique

In spite of being an investment tool, crowdfunding also works as a marketing tool. As mass people are involved in crowdfunding, you can reach them with your startup's whereabouts. Raising of funds and reaching the probable customers as well as advertisement both are possible in case crowdfunding.

(b) Indication of proof of Business Concept

Showing investors and convincing yourself that your venture has received sufficient market validation at an early stage is hard. However, crowdfunding makes this possible. A successful crowdfunding campaign may be the indication of proof of business concept. This shows trust and integrity towards a venture and will allow verification throughout the journey that one is on the right track.

(c) Less Risky

In addition to finding enough funding, there will always be unpredictable fees, market validation challenges, and others looking to get your business off the ground. Launching a crowdfunding campaign prevents these risks. Crowdfunding today enables entrepreneurs to gain market acceptance and avoid giving up equity before committing to bringing a product concept to market.

(d) Brainstorming

One of the biggest challenges for small businesses and entrepreneurs is to collect feedback about business's performance at an early stage. Through crowdfunding campaigns, entrepreneurs have the opportunity to interact with the crowd and get comments, feedback, and ideas.

(e) Information about Prospective Loyal Customers

Crowdfunding campaigns not only allow entrepreneurs to showcase their companies and products, but also give them the opportunity to share the information and purpose behind them. People who see an entrepreneur's campaign and decide to contribute believe in the long-term success of the company. Essentially, these people are early adopters. Early adopters are very important to any business because they help spread the word in the first place without asking for anything in return. These people care about the company's brand and message and are likely to be loyal customers throughout its lifespan.

(f) Easier than Traditional Applications

Applying for a loan or pursuing other capital investments are two of the most painful processes that every entrepreneur has to go through, especially during the early stages of the startup. But the application process for crowdfunding is easier compared to these traditional methods.

(g) Opportunity of Pre-selling

Launching a crowdfunding campaign gives an entrepreneur the ability to pre-sell a product or concept that they haven't yet taken to market. This is a good way to gauge user reaction and analyze the market in order to decide whether to pursue or pivot on a given concept.

(h) No Penalty

On all or nothing crowdfunding platforms (meaning that you only get the funds raised if you reach 100% or more of your funding goal) there are so many benefits, and no fee to participate. If an entrepreneur sets a goal and doesn't reach it, there is no penalty.

In essence, crowdfunding is an excellent way for entrepreneurs to receive the financing and exposure they need in order to verify, execute, and help their ventures grow.

Disadvantages of Crowdfunding

There are two sides to every coin, and so it is with crowdfunding. Accordingly, some disadvantages of the crowdfunding are –

(a) Inflexible

One downside to crowdfunding is the inability to make alterations to a campaign once it's launched. This means the description, terms and conditions, and allotted completion time cannot be changed. So, these are static in that sense. If entrepreneurs are forced to make changes to the campaign, they could find the project null and void and be required to give investors a refund.

(b) False and Negative Results

Another common disadvantage of crowd funded campaigns is conclusions based on false-negative results. This is particularly true when looking at idea validation. For example, entrepreneurs could falsely conclude that the project failed because the product didn't meet a market need. However, in truth, its failure was largely down to poor marketing and a lack of understanding of what the product did. It does meet a market need – but just needs to be 'marketed' a little better.

(c) Time Consuming

Many entrepreneurs fail to appreciate the time, effort, and planning a successful crowdfunding campaign requires. Regular communication with investors, detailed financial reports, forecasts, POA (Plan of Action) for the invested funds, etc.

(d) Administration and Accounting

This is more of a warning than a negative, but entrepreneurs need to consider the administrative and accounting challenges they will face.

(e) Idea Theft

Arguably the biggest drawback of publicly crowd funded campaigns is idea theft. This is very common picture in the periphery of startup business. Entrepreneurs are incredibly vulnerable to copycats swooping in, stealing their ideas, and taking them to other investors or corporations.

(f) Difficult for Non-Consumer Projects

Currently, crowdfunding campaigns are largely successful in the B2C (Business-to-Consumer) marketplace. It's not common to see the same success for B2B (Business-to-Business) ventures. This is largely down to the investment community. When they see a product that has a clear, tangible impact on consumers they can immediately identify with it. Its purpose is clear and they're more willing to invest. Services and other forms of non-consumer ventures are more difficult to interpret, and their value unclear.

(g) Lack of Transparency

Not everybody is keen on opening up financial and other sensitive information to the public. However, if an entrepreneur is looking to raise funding through one of these platforms, investors are going to need access to this material to make informed decisions. This is not for everybody, so think carefully before committing to a campaign.

(f) Access To Funds

One of the drawbacks to crowdfunding campaigns is that you have to wait until the allotted time is up before receiving the funds. Depending on the duration of the campaign this could be anywhere between 60-90 days, so definitely worth taking into consideration.

Types of Crowdfunding

As per IOSCO Staff Working Paper, crowdfunding can be divided into four categories: donation crowdfunding, reward crowdfunding, peer-to-peer crowdfunding and equity crowdfunding.

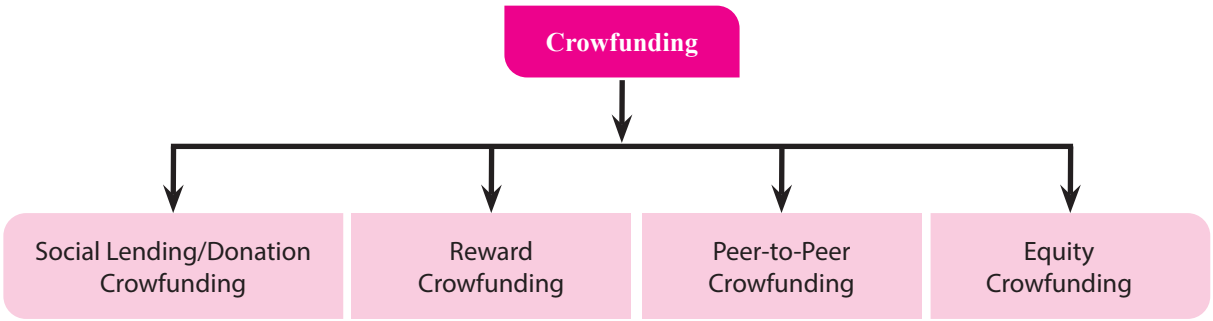


Figure 4.3: Types of Crowfunding

Source: IOSCO Staff Working Paper - Crowdfunding: An Infant Industry Growing Fast , 2014.

(a) Social Lending/Donation Crowdfunding: Donation crowdfunding denotes solicitation of funds for social, artistic, philanthropic or other purpose, and not in exchange for anything of tangible value. For example, Kickstarter, Indiegogo are some of the platforms that support donation-based crowdfunding.

(b) Reward Crowdfunding: Reward crowdfunding refers to solicitation of funds, wherein investors receive some existing or future tangible reward (such as an existing or future consumer product or a membership rewards scheme) as consideration. Most of the websites which support donation crowdfunding, also enable reward crowdfunding, e.g. Kicktstarter, Rockethub etc.

(c) Peer-to-Peer Lending Crowfunding: In Peer-to-Peer lending, an online platform matches lenders/investors with borrowers/issuers in order to provide unsecured loans and the interest rate is set by the platform. Some Peer-to-Peer platforms arrange loans between individuals, while other platforms pool funds which are then lent to small and medium-sized businesses. Some of the leading examples from the US are Lending Club, Prosper etc. and from UK are Zopa, Funding Circle etc.

(d) Equity Crowdfunding: Equity Crowfunding refers to fund raising by a business, particularly early-stage funding, through offering equity interests in the business to investors online. Businesses seeking to raise capital through this mode typically advertise online through a crowdfunding platform website, which serves as an intermediary between investors and the start-up companies.

Cost of Capital

4.2

The cost of capital is the most important and controversial area in financial management. Capital budgeting decisions have a major impact on the firm, and cost of capital is used as a criterion to evaluate the capital budgeting decisions i.e. whether to accept or reject a project. The cost of capital is also equally important for financing decision.

4.2.1 Meaning of Cost of Capital

Definition of Cost of Capital

The cost of capital is an integral part of investment decisions as it is used to measure the worth of investment proposal. It is used as a discount rate in determining the present value of future cash flow associated with capital projects. Conceptually, it is the minimum rate of return that a firm must earn on its investments so as to leave market price of its. It is also referred to as cut-off rate, target rate, hurdle rate, required rate of return and so on.

According to **James C. Van Horne**, 'Cost of capital is 'a cut-off rate for the allocation of capital to investments of projects. It is the rate of return on a project that will leave unchanged the market price of the stock.'

Soloman Ezra stated that 'Cost of capital is the minimum required rate of earnings or the cut-off rate of capital expenditure.'

So, the cost of capital is the rate of return that a firm must eearn on its project investments to maintain its market value and attracts funds.

Assumptions of Cost of Capital

The theory of cost of capital is based on certain assumptions. These are –

(a) A basic assumption of traditional cost of capital analysis is that the firm's business and financial risks are unaffected by the acceptance and financing of projects.

(b) The capital budgeting decision determines the business risk complexion of the firm. The financing decision determines financial risk. In general, the greater the proportion of long-term debt in the capital structure of the firm, the greater is the financial risk because there is a need for a larger amount of periodic interest payment and principal repayment at the time of maturity.

(c) For the purpose of capital budgeting decisions, benefits from undertaking a proposed project are evaluated on an after-tax basis. In fact, only the cost of debt requires tax adjustment as interest paid on debt is deductible expense from the point of view of determining taxable income whereas dividends paid either to preference shareholders or to equity-holders are not eligible items as a source of deduction to determine taxable income.

Cost of capital (k) consists of the following three components:

(a) The riskless cost of the particular type of financing, rj

(b) The business risk premium, b; and

(c) The financial risk premium, f

Or, k = rj + b + f

Business risk is the risk to the firm of being unable to cover fixed operating costs. Financial risk is the risk of being unable to cover required financial obligations such as interest and preference dividends.

Importance or Significance of Cost of Capital

The cost of capital is an important element, as basic input information for taking decision in the field of capital budgeting, capital structure, dividend policy and for appraisal of performance management, etc. The correct cost of capital helps in the following areas:

(a) Capital Budgeting Decision or Investment Evaluation

Cost of capital is usually taken as the cut-off rate or minimum required rate of return for an investment project. In the Net Present Value (NPV) method, an investment is accepted if it has a positive NPV. The projects NPV are calculated by discounting its cash flows by the cost of capital. The cost of capital is the minimum required rate of return on the investment project that keeps the present wealth of shareholders unchanged. So, for a profitable investment project, the NPV should be greater than zero.

Again, when Internal Rate of Return (IRR) method is used, the computed IRR is compared with the cost of capital and the investment proposal is accepted if it has an IRR greater than cost of capital. So, it provides a benchmark to measure the worth of investment proposal and perform the role of accept reject criterion. That is why, cost of capital is also called as cut-off rate, target rate, hurdle rate, minimum required rate of return, standard return, etc.

(b) Capital Structure Decision

Cost of capital plays an important role in designing the capital structure and debt policy of a firm. The decision about debt equity mix in the capital structure is taken with reference to the impact of the same on the average cost of capital. Debt helps to save taxes, as interest on debt is a tax-deductible expense. The interest tax shield as a result of use of debt in capital reduces the overall cost of capital, but it also increases the financial risk of the firm. On deciding the proportion of the debt and equity in the capital structure, the firm aims at maximising the firm value by minimising the overall cost of capital.

(c) Appraisal of Financial Performance

The financial performance of the top management can be appraised by using the cost of capital. The performance of a project or business i.e., the return from the business is compared against the cost of capital to evaluate the profitability of the project investment. If the management has been able to earn higher return over its cost of capital, the management will be treated as an efficient one and vice-versa.

(d) Designing of Optimum Credit Policy

Credit sale is an integrated part of today's business and the decision of credit period to be allowed to the customers is an important one. To achieve the optimum credit policy, the cost of allowing credit period is compared against the benefits or profit earned by providing credit to customers. While doing this, cost of capital is used to arrive at the present value of cost and benefits received.

(e) Inventory Management

While taking the decision regarding the inventory management cost of capital can be used as a guide to evaluate financial cost of carrying inventory.

(f) Dividend Decision

The dividend policy of the firm can also be formulated after considering the cost of capital. Here, internal rate of return (r) is compared with the cost of capital (k) for fixing up the %age of dividend to be distributed to the shareholders.

Determining Factors of Cost of Capital

Cost of capital, like all other costs, is a variable term, subject to changes in a number of factors. The various factors that play a part in determination of cost of capital are described below:

(a) Risk Profile of the Project

Given a particular set of economic conditions, the cost of capital might vary between industries and between firms in the same industry. This happens because of variation in the risk profile of the firm. A project considered risky would attract capital at a higher cost than a project in the same industry having lesser risk.

(b) Market Conditions

If the security is not readily marketable when the investor wants to sell, or even if a continuous demand for the security exists but the price varies significantly, an investor will require a relatively high rate of return.

Conversely, if a security is readily marketable and its price is reasonably stable, the investor will require a lower rate of return and the company's cost of capital will be lower.

(c) General Economic Conditions

The structure of interest rates is linked to the general economic conditions prevalent in the economy. Cost of capital, in turn, is related to the interest rate structure. Fluctuation in interest rates occurs as a result of changes in the demand supply equilibrium of investible funds. When investment demand is more than the supply, the rate of interest tends to rise and hence the cost of capital is also more during these periods. On the other hand, during times of slack investment demand, the cost of capital declines due to available supply of funds being more than the demand. The fluctuation in the cost of capital may not be as frequent as the changes in interest rates because the deployment of funds in the debt component of capital is for a longer period of time.

(d) Amount of Financing

As the financing requirements of the firm become larger, the weighted cost of capital increases for several reasons. For instance, as more securities are issued, additional flotation costs, or the cost incurred by the firm from issuing securities, will affect the percentage of cost of the funds to the firm. Also, as management approaches the market for large amounts of capital relative to the firm's size, the investors' required rate of return may rise. Suppliers of capital become hesitant to grant relatively large sums without evidence of management's capability to absorb this capital into the business.

Classification of Costs

Costs can be classified as follows:

A. Historical Cost and Future Cost: Historical cost is the cost which has already been incurred for financing a particular project. It is based on the actual cost incurred in the previous project. Historical cost is useful for analyzing the existing capital structure of the firm.

Future cost is the estimated cost for the future. In financing decision, the future cost is more important than the historical cost as most of the financing decision are related with the future or proposed project that are taken in future period. But at the same time, the future cost is estimated on the basis of previous experience or historical data, so both are related.

B. Specific Cost and Composite Cost: The cost of each component or source of capital is known as the specific cost or component cost. The cost of finance is the minimum return expected by the investors which again depend on the degree of risk involved in the investment.

When all the specific cost of individual source are combined together to get a single cost of capital of the firm, it is known as overall or composite or combined or weighted average cost of capital (WACC). Composite cost is commonly referred as the firm's cost of capital. It represents the minimum return that a firm must earn on its existing investment or asset base to satisfy its creditors, owners and other providers of capital.

C. Explicit and Implicit Cost: Explicit cost of any source of finance is the discount rate which equates the present value of cash inflows with the present value of cash outflows. **Van Horne** defined explicit cost as – 'the discount rate that equates the present value of the funds received by the firm, net of underwriting and other cost, with the present value of expected outflows.' These outflows are interest payment, repayment of principal or dividends, etc.

Implicit cost, also known as the opportunity cost is the cost of the opportunity foregone in order to take up a particular project. The implicit cost can be defined as "the rate of return associated with the best investment opportunity for the firm and its shareholders that would be foregone, if the projects presently under consideration by the firm were accepted." For example, the implicit cost of retained earnings is an opportunity cost or implicit cost of capital to the shareholders as they could have invested the fund in anywhere else if the retained earnings were distributed to them as dividend.

Now, it can be said that explicit cost arises where funds are raised, whereas the implicit cost arises when funds are used.

D. Average Cost and Marginal Cost: An average cost is the combined cost or weighted average cost of various source of capital. When the aggregate of the cost of capital of each such source is divided by the aggregate of the weight of sources, the average cost of capital is obtained. The weight represents the proportion of each source of in the capital structure.

Marginal cost refers to the average cost of new additional funds required by a firm. It is simply the cost of additional fund raised. Marginal cost of capital is an important tool for evaluating a new project. The return of the new project is compared with the marginal cost of capital to decide on the acceptance or rejection of the project.

4.2.2 Computation of Weighted Average Cost of Capital

The term cost of capital, as a decision criterion, is the overall cost. This is the combined cost of the specific costs associated with specific sources of financing. The cost of the different sources of financing represents the components of the combined cost. The computation of the cost of capital, therefore, involves two steps: (I) the computation of the different elements of the cost in terms of the cost of the different sources of finance (specific costs), and (II) the calculation of the overall cost by combining the specific costs into a composite cost.

(I) Computation of Specific Sources of Capital

The first step in the measurement of the cost of capital of the firm is the calculation of the cost of individual sources of raising funds. Apart from its relevance to the measurement of the combined cost, the specific cost will also indicate the relative cost of pursuing one line of financing rather than another. From the viewpoint of

capital budgeting decision, the long-term sources of funds are relevant as they constitute the major sources of financing of fixed assets. In calculating the cost of capital, therefore, the focus is on long-term funds. In other words, the specific costs have to be calculated for (A) long-term debt (including debentures); (B) preference shares; (C) equity capital; and (D) retained earnings.

A. Cost of Debt Capital (k_d)

Cost of debt capital is the required rate of return on investment of the lenders of a company. Long-term debt means Long-term loans from financial institutions, capital from issuing debentures or bonds, etc. These Long-terms debts do not have ownership to the providers of finance. The providers of debt finance do not participate in the affairs of the firm but they enjoy the charge on profit before tax. This means they are paid before the payment to the preference shareholders or equity shareholders.

For calculation of cost of debt, first we have to compute ***'Net cash proceed'*** out of the issue and ***'Net cash outflow'***. Net cash proceeds are the funds actually received from the sale of securities. Debt like debenture may be issued at a premium or discount and sometime the issue involve floatation cost like underwriting, brokerage, etc. So, the amount of discount, premium or floatation cost should be adjusted for calculation of 'net cash proceed'.

Net Cash Proceeds = Face value of the debt – Floatation cost – Discount allowed at the time of issue (if any) + Premium charged at the time of issue (if any)

The 'net cash outflow' is the amount of periodic interest and repayment of principal in installment or in lump-sum at maturity.

The calculation of cost of loan from a financial institution is similar to that of redeemable debenture. So, the discussion is mainly on debenture and bonds. Financing through debenture or bonds have some specific feature and some benefits also.

A debenture or bond may be issued at par or at discount as at premium as compared to its face value. Again, the debenture as bond may be redeemable or irredeemable (perpetual) in nature.

Perpetual / Irredeemable Debt:

Debts may be issued for perpetuity. The debentures which are not redeemed by the issuer is known as irredeemable debentures. Practically, a firm follows the policy of maintaining a given proportion of debt in its capital structure.

Individual debts may be repaid but they are replaced by new ones. So, debts are never really paid. So, the permanent part of the debt capital continues for perpetuity.

Formula

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

Where,

k_d = Cost of debt after tax

I = Annual interest payment

NP = Net proceeds of debentures or current market price

t = Tax rate

The cost of debt will be different if the bonds or debentures are issued (i) at par or (ii) at discount or (iii) at premium. The following example will make it clear.

When Debentures are issued (i) at par or (ii) at discount or (iii) at premium –

Illustration 1

X Ltd. has 10% perpetual debt of ₹ 1,00,000. The tax rate is 35 %. Determine the cost of capital (before tax as well as after tax) assuming the debt is issued at (i) par, (ii) 10% discount, and (iii) 10% premium.

Solution:

(i) Debt issued at par –

Before-tax cost, $k_i = ₹ \frac{10,000}{1,00,000} = 10.00\%$

After-tax cost, $k_d = k_i(1-t) = 10\%(1-0.35) = 6.5\ \%$

(ii) Issued at discount –

Before-tax cost, $k_i = ₹ \frac{10,000}{90,000} = 11.11\%$

After-tax cost, $k_d = 11.11\%(1-0.35) = 7.22\ \%$

(iii) Issued at premium –

Before-tax cost, $k_i = ₹ \frac{10,000}{1,10,000} = 9.09\%$

After-tax cost, $k_d = 9.09\%\ (1-0.35) = 5.91\ \%$

When both net Proceed of issue and market price of debenture are given –

Illustration 2

Five years ago, KPM Ltd issued 12% irredeemable debentures at ₹ 105, a ₹ 5 premium to their par value of ₹ 100. The current market price of these debentures is ₹ 95. If the company pays corporate tax at a rate of 35 % what is its current cost of debenture capital?

Solution:

Cost of irredeemable debenture:

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

k_d = Cost of debt after tax

I = Annual interest payment = ₹12

NP = Net proceeds of debentures or current market price = ₹95

t = Tax rate = 35%

$k_d = ₹ \frac{12(1-0.35)}{95} = 0.08211$ or 8.21%

Student Note: If both net proceed and market price of the debenture or bond is given, the market price to be taken for computation of cost of debt.

When Coupon is mentioned, Issued at Premium or Discount –

Illustration 3

XYZ Limited keeps a perpetual fixed amount of debt in its books. It pays coupon of 15%. Its debt sells at par in the market. What is the cost of debt if the firm pays 35% tax? What is the cost of debt if it sells (a) at 5% premium (b) at 5% discount to the face value?

Solution:

Cost of perpetual (non-redeemable) debt is calculated by using following formula:

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

Here,

I = Coupon rate =15%

NP = Market price = ₹100 (as sold at par)

t = Tax = 35%

Cost of debt = k_d = ₹ $\frac{15(1-0.35)}{100}$ = 9.75%

(a) If the market price is at 5% premium to the face value (₹105); then

Cost of debt = k_d = ₹ $\frac{15(1-0.35)}{105}$ = 9.25%

(b) If the market price is at 5% discount to the face value (₹95); then

Cost of debt = k_d = ₹ $\frac{15(1-0.35)}{95}$ = 10.26%

Cost of Redeemable Debenture

The cost of debenture (k_d) will be calculated as below:

$$\text{Cost of debenture} = k_d = \frac{I(1\text{-}t)+\frac{RV - NP}{n}}{\frac{RV + NP}{2}}$$

Where,

I = Interest payment

NP = Net proceeds from debentures in case of new issue of debt or current market price in case of existing debt

RV = Redemption value of debentures

t = Tax rate applicable to the company

n = Life of debentures

The above formula to calculate cost of debt is used where only interest on debt is tax deductable. Sometimes, debts are issued at discount and/or redeemed at a premium. If discount on issue and/ or premium on redemption are tax deductible, the following formula can be used to calculate the cost of debts.

$$\text{Cost of debenture} = k_d = \frac{I + \frac{RV - NP}{n}}{\frac{RV + NP}{2}}(1 - t)$$

In absence of any specific information, students may use any of the above formulae to calculate the cost of debt (k_d) with logical assumption.

When Net Proceed of Debenture is given –

Illustration 4

ABC Ltd. issued 5,000, 12% debentures of ₹ 100 each at a premium of 10% on 1.4.2018 to be matured on 1.4.2023. The debentures will be redeemed on maturity. Compute the cost of debentures assuming 35% as tax rate.

Solution:

The cost of debenture (k_d) will be calculated as below:

$$\therefore \text{ Cost of debenture } (k_d) = \frac{I\,(1\text{-}t) + \frac{RV - NP}{n}}{\frac{RV + NP}{2}}$$

Here,

I = Interest on debenture = 10% of ₹ 100 = ₹ 12

NP = Net proceeds = 110% of ₹ 100 = ₹ 110

RV = Redemption value = ₹ 100

n = Period of debenture = 5 Years

t = Tax rate = 35 % or 0.35

$$\therefore k_d = \frac{12\,(1\text{-}0.35) + \frac{(100 - 110)}{5 \text{ years}}}{\frac{100 + 110}{2}}$$

$$\text{or,} \quad k_d = \frac{12 \times 0.65 - 2}{105} = \frac{5.8}{105} = 0.05524 \text{ or } 5.52\%$$

When Market Price of Debenture is given –

Illustration 5

PQR Ltd. issued 5,000, 12% debentures of ₹ 100 each on 1.4.2018 to be matured on 1.4.2023. The market price of the debenture is ₹ 80. Compute the cost of existing debentures assuming 35% tax rate.

Solution:

$$\text{Cost of debenture } (k_d) = \frac{I\,(1\text{-}t) + \frac{RV - NP}{n}}{\frac{RV+NP}{2}}$$

I = Interest on debenture = 10% of ₹ 100 = ₹ 12

NP = Net proceeds = ₹ 80

RV = Redemption value = ₹ 100

n = Period of debenture = 5 Years

t = Tax rate = 35 % or 0.35

$$\therefore k_d = \frac{12\,(1\text{-}0.35) + \dfrac{100\text{ -}80}{5}}{\dfrac{100\text{ +}80}{2}}$$

$$k_d = \frac{12 \times 0.65 + 4}{90} = \frac{11.8}{90} = 13.111 = 13.11\%$$

When issue of Debenture involved Floatation Cost –

Illustration 6

Rima & Co. has issued 12% debenture of face value ₹ 100 for ₹ 10 lakh. The debenture is expected to be sold at 5% discount. It will also involve flotation cost of ₹ 5 per debenture. The debentures are redeemable at a premium of 5% after 10 years. Calculate the cost of debenture if the tax rate is 50%.

Solution:

After tax cost of debenture (k_d) may be calculated as follows:

$$\text{Cost of debenture } (k_d) = \frac{I(1\text{-}t) + \dfrac{RV\text{- }NP}{n}}{\dfrac{RV\text{ + }NP}{2}}$$

Where,

k_d = Cost of debt after tax

I = Rate of interest i.e., 12% or ₹ 12 per debenture

t = Tax rate i.e. 50% or 0.50

n = Number of years in which debenture is to be redeemed i.e. 10 years

RV = Principal value at the time of redemption i.e. ₹ 100 + (5% of ₹ 100) or ₹ 105 per debenture

NP = Net cash proceeds at the time of issue i.e. ₹ 100 – (5% of ₹ 100) – ₹ 5 or ₹ 90 per debenture

Amortisation of Bond

A bond may be amortised every year i.e. principal is repaid every year rather than at maturity. In this situation, the principal will go down with annual payments and interest will be computed on the outstanding amount. The cash flows of the bonds will be uneven.

The formula for determining the value of a bond or debenture that is amortised every year is as follows :

$$V_a = \frac{C_1}{(1+k_d)^1} + \frac{C_2}{(1+k_d)^2} + \ldots\ldots + \frac{C_n}{(1+k_d)^n}$$

$$V_a = (x+a)^n = \sum_{i=1}^{n} \frac{C_i}{(1+k_d)^i}$$

Illustration 7

X Ltd. is proposing to sell a 5-year bond of ₹ 10,000 at 10 % rate of interest per annum. The bond amount will be amortised equally over its life. What is the bond's present value for an investor if he expects a minimum rate of return of 6 %?

Solution:

The amount of interest will go on declining as the outstanding amount of bond will be reducing due to amortization. Since X Ltd. will have to return ₹ 2,000 every year, the outstanding amount of bond will be zero at the end of fifth year. The outflows every year will consist of interest payment and repayment of principal as follows:

Year	Amount of Interest	Interest and Payment of Princpal
First year	₹ 10,000 × 0.10 = 1,000	= (2,000 + 1,000) = ₹ 3,000
Second year	(₹ 10,000 - ₹ 2000) × 0.10 = 800	= (2,000 + 800) = ₹ 2,800
Third year	(₹ 8,000 - ₹ 2,000) × 0.10 = 600	= (2,000 + 600) = ₹ 2,600
Fourth year	(₹ 6,000 - ₹ 2000) × 0.10 = 400	= (2,000 + 400) = ₹ 2,400
Fifth year	(₹ 4,000 - ₹ 2000) × 0.10 = 200	= (2,000 + 200) = ₹ 2,200

The above cash flows of all five years will be discounted with the cost of capital. Here the expected rate i.e. 6% will be used.

$$V_B = \frac{C_1}{(1+k_d)^1} + \frac{C_2}{(1+k_d)^2} + \ldots\ldots + \frac{C_n}{(1+k_d)^n}$$

Where,

k_d = 6% = 0.06

Value of the bond is calculated as follows:

$$V_B = \frac{₹\,3,000}{(1.06)^1} + \frac{₹\,2,800}{(1.06)^2} + \frac{₹\,2,600}{(1.06)^3} + \frac{₹\,2,400}{(1.06)^4} + \frac{₹\,2,200}{(1.06)^5}$$

$$= \frac{₹\,3,000}{1.06} + \frac{₹\,2,800}{1.1236} + \frac{₹\,2,600}{1.1910} + \frac{₹\,2,400}{1.2624} + \frac{₹\,2,200}{1.3382}$$

= ₹ 2830.18 + ₹ 2491.99 + ₹ 2183.04 + ₹ 1901.14 + ₹ 1643.99

= ₹ 11,050.34

Cost of Convertible Debenture

A convertible debenture is a type of loan issued by a company that can be converted into stock. Holders of the convertible debentures has the option to either get the debentures redeemed into the cash or get specified numbers of companies shares in leiu of cash. The calculation of cost of convertible debentures is very much similar to the redeemable debentures. While determining the redeemable value of the debentures, it is assumed that all the debenture holders will chose the option which has the higher value and accordingly it is considered to calculate cost of debt.

Illustration 8

RR Ltd. issued 10,000, 12% convertible debentures of ₹ 100 each with a maturity period of 5 years. At maturity, the debenture holders will have the option to convert the debentures into equity shares of the company in the ratio of 1:10 (10 shares for each debenture). The current market price of the equity shares is ₹ 14 each and historically the growth rate of the shares are 5% per annum. Compute the cost of debentures assuming 35% tax rate.

Solution:

Determination of Redemption value:

Higher of,

(i) The cash value of debentures = ₹ 100

(ii) Value of equity shares = 10 shares × ₹ $14(1+0.05)^5$

= 10 shares × 17.868 = ₹178.68

Therefore, ₹ 178.68 will be taken as redemption value as it is higher than the cash option and attractive to the investors.

Calculation of Cost of Convertible Debenture (using approximation method):

$$\frac{I(1-t)+\frac{RV-NP}{n}}{\frac{RV+NP}{2}} = \frac{12(1-0.35)+\frac{178.68-100}{5}}{\frac{178.68+100}{2}} = \frac{7.8+15.736}{139.34} = 0.1689 = 16.89\%$$

Student Note: In practice, the corporate are normally likely to have multiple debt issues most likely subject to different interest rates. To determine the overall cost of debt, cost of each debt issue is to be separately computed. The weighted average of costs of all debt issues would be cost of debt of the firm as a whole. (Khan & Jain, 2011)

Cost of Redeemable Debt:

While calculating the cost of redeemable debt, it is necessary to consider the repayment of the principal in addition to interest payments. The cost of redeemable debt can be calculated by using the following formula :

After - tax cost of Debt i.e., $k_d = \frac{I(1-t)+\frac{(F-S)}{n}}{\frac{(F+S)}{2}}$

Where,

I = Annual Interest charge

t = Tax rate

n = Number of years

F = Redeemable value of the debt at the time of maturity

S = Net sale proceeds from the issue of debt (face value-expenses)

B. Cost of Preference Capital (k_p)

The preference shares are those shares which carry the right to receive dividend at a fixed %age before any dividend is paid on equity shares. The dividend payable to the preference shareholders are to be treated as the cost of preference share capital. The payment of dividend to the preference shareholders are not charged as expenses but treated as appropriation of after-tax profit. So, dividend paid to preference shareholders does not reduce the tax liability of the firm. Hence, for preference share before tax cost of preference share capital is considered not the after-tax cost. The costs of preference share capital are of two types (a) Cost of Redeemable Preference Share Capital (b) Cost of Irredeemable Preference Share Capital.

Redeemable Preference Share Capital

The preference shares capital which are redeemed after a certain period of times which was mentioned in the terms of issue, are known as redeemable preference shares. The cost of redeemable preference share capital –

Cost of Preference Shares (k_p)

$$k_d = \frac{D + \frac{RV - NP}{n}}{\frac{RV + NP}{2}}$$ [when dividend tax is not considered]

$$k_d = \frac{D(1 + D_t) + \frac{RV - NP}{n}}{\frac{RV + NP}{2}}$$ [when dividend tax is considered]

Where-

k_p = Cost of Preference Share Capital

D = Annual Preference Dividend

D_t = Dividend Tax

RV = Redeemable Value

NP = Net Proceeds of the Share

n = No. of Years

Computation of Dividend Tax :		
Tax on Dividend	000	
Add: Surcharge (to be calculated on the Tax on Dividend)	000	000
Add: Education cess (to be calculated on the sum total of Tax on Dividend and Surcharge)	000	
Add: Secondary and Higher Education cess (to be calculated on the sum total of Tax on Dividend and Surcharge)	000	
Dividend Tax (D_t)	000	000

Illustration 9

BP Ltd. issued 60,000 12% Redeemable Preference Share of ₹ 100 each at a premium of ₹ 5 each, redeemable after 10 years at a premium of ₹ 10 each. The floatation cost of each share is ₹ 3. You are required to calculate cost of preference share capital ignoring dividend tax.

Solution:

Calculation of cost of preference shares (k_p)

Preference Dividend (PD)	= ₹100 × 60,000 shares × 0.12	= ₹ 7,20,000
Flotation Cost	= 60,000 shares × ₹ 3	= ₹ 1,80,000
Net Proceeds (NP)	= ₹ 105 × 60,000 shares - 1,80,000	= ₹ 61,20,000
Redemption Value (RV)	= 60,000 shares × ₹ 110	= ₹ 66,00,000

$$\text{Cost of Redeemable Preference Shares } (k_p) = \frac{PD + \frac{(RV - NP)}{n}}{\frac{RV + NP}{2}}$$

$$k_p = ₹ \frac{7,20,000 + \frac{(66,00,000 - 61,20,000)}{10}}{\frac{66,00,000 + 61,20,000}{2}} = \frac{7,20,000 + \frac{4,80,000}{10}}{\frac{1,27,20,000}{2}} = \frac{7,20,000 + 48,000}{63,60,000}$$

$$= \frac{7,68,000}{63,60,000} = 0.1208 = 12.08\%$$

When Dividend Tax is considered –

Illustration 10

Y Co. Ltd. issues 10,000 12% preference shares of ₹ 100 each at a premium @ 10% but redeemable at a premium @ 20% after 5 years. The company pays under writing commission @ 5%. If tax on dividend is 12.5%, surcharge is 2.5% and education cess is 3%, calculate the cost of preference share capital.

Solution:

The cost of capital of redeemable preference share Kp may be computed as follows:

$$k_d = \frac{D(1 + D_t) + \frac{RV - NP}{n}}{\frac{RV + NP}{2}}$$

Where,

k_p = Cost of preference share capital;

D = Annual preference dividend, i.e. ₹ 12 per share

RV = Redeemable value; i.e. , ₹ 100 + (20% of ₹ 100)= ₹120

NP = Net Proceeds of the share; ₹ 100 + (10% of ₹100) – 5% of ₹ 110

= 1104.50

N = No. of years to redemption, i.e. 5 years

D_t = Dividend tax = 12.5 + Surcharge @ 2.5% + Education cess @ 3%

= 12.5 + 2.5% of (12.5) + 3% of (12.5 + 0.3125) = 12.5 + 0.3125 + 0.3844

= 13.1969% or 0.1319

$$\text{Therefore, } k_p = \frac{12(1+0.1319)+\frac{120-104.50}{5}}{\frac{120+104.50}{2}} = \frac{12(1.1319)+3.1}{112.25} = 0.1486 \text{ or } 14.86\%$$

Cost of Irredeemable Preference Share Capital

The preference shares capital which are not redeemed before the winding up of the company, are known as irredeemable preference shares. The cost of irredeemable preference share capital –

Cost of preference shares $k_P = \frac{D}{NP}$ **[when dividend tax is not considered]**

$$k_P = \frac{D(1+D_1)}{NP} \text{ [when dividend tax is considered]}$$

Where,

K_p = Cost of preference share capital;

D = Annual preference dividend;

D_t = Dividend tax

NP = Net proceeds of the share;

Student Note: Issuance of irredeemable preference shares are not allowed as per the Companies Act, 2013, but for the academic knowledge purpose it has been presented here.

When Preference Shares are issued (i) at par, (ii) at 10% premium and (iii) at 10% discount

Illustration 11

Simond Ltd. issues 10% irredeemable preference share of ₹ 100 each for ₹ 10,00,000. What will be the cost of preference share capital (kp), if preference shares are issued: (i) at par, (ii) at 10% premium and (iii) at 10% discount. Assume that there is no dividend distribution tax.

Solution:

The cost of Preference share kp will be –

The cost of Preference share k_p will be –

$k_P = \frac{D}{NP}$ **[as there is no dividend distribution tax]**

(i) When shares are issued at par i.e. at ₹100 per share –

D =10

NP =100

$\therefore\ k_P = \frac{10}{100} = 10$ or 10%

(ii) When shares are issued at 10% premium i.e. at ₹ 110 per share –

D = 10

NP = 110

$\therefore\ k_P = \frac{10}{110} = 0.0909$ or 9%

(iii) When shares are issued at 10% discount i.e. at ₹ 90 per share –

D = 10

NP = 90

$\therefore\ k_P = \frac{D}{NP}$

$\therefore\ k_P = \frac{10}{90} = 0.1111$ or 11.11%

C. Cost of Equity Share Capital (k_e)

The cost of equity capital is most difficult to compute. Some people argue that the equity capital is cost free as the company is not legally bound to pay the dividends to equity shareholders. But this is not true. Shareholders will invest their funds with the expectation of dividends. The market value of equity share depends in the dividends expected by shareholders. Thus, the required rate of return which equates the present value of the expected dividends with the market value of equity share is the cost of equity capital. The cost of equity capital may be expressed as the minimum rate of return that must be earned on new equity share capital financed investment in order to keep the earnings available to the existing equity shareholders of the firm unchanged.

It may be computed in the following methods:

1. Dividend Yield / Price Approach
2. Earnings Price Approach
3. Dividend Growth Approach or Gordon's Model
4. Realised Yield Approach
5. CAPM Approach.

1. Dividend Yield/Price Approach

According to this approach the cost of equity capital (ke) is defined as the discount rate that equates the present value of all expected future dividends per share with the net proceeds of the sale (or the current market price) of a share. This method is based on the assumption that the market price per share is the present value of its future dividends. According to this method, there is a direct relation between market value of equity shares and future dividends. Another assumption of this approach is that future dividend is constant means there is zero growth in dividend. This method can be used in constant and variable growth situations and also in no-growth companies for estimation of cost of equity. This approach is based on the following assumptions:–

Assumptions:

(a) Market values of the shares are directly related to the future dividends on the shares.

(b) Future dividend per share is expected to be constant and the company is expected to earn at least this yield over a period of time.

Limitations:

There are certain limitations in this approach. The limitations are:

(a) This method does not consider any growth rate i.e. future dividend assumed to be constant. But practically, shareholders used to expect that the return on their equity investment would grow over time.

(b) It does not include the effect of future earnings or retained earnings.

(c) This approach can lead to ignore the capital appreciation of value of share.

Formula: $k_e = \frac{D}{P_0}$

Where,

k_e = Cost of equity share capital

D = Expected divined per share

P_0 = Current market price per share

When it is expected that dividend to be received at a uniform rate over the years –

Illustration 12

MNC Ltd. paid dividend per share of ₹ 4 and the current market price of equity share is ₹ 20.

Calculate the cost of equity share capital k_e.

Solution:

$$k_e = \frac{D}{P_0}$$

Where,

k_e = ?

D = ₹ 4

P_0 = ₹ 20

$$k_e = \frac{₹\ 4}{₹\ 20} \times 100 = 20\%$$

Illustration 13

AB Ltd. issued shares of ₹ 100 each at a premium of 10%. The issue involved underwriting commission of 5%. The rate of dividend expected by the shareholders is 12%. Determine the cost of equity capital (k_e).

Solution:

Cost of equity capital = $k_e = \frac{D}{P_0}$

D = Divined per share = 100 ×12% = ₹12

P_0 = Current market price per share = Issue price = 100 + 100 × 10% = ₹110

Selling price of the share = 110 – 5% of 110 = ₹104.50

$k_e = \frac{₹\ 12}{₹\ 104.5} = 0.1148 = 11.48\%$

2. Earnings Price Approach

According to this approach, the cost of equity share capital is determined by dividing the earnings per share by the current market price per share. The cost of equity share is determined on the basis of earning per share. Earnings per share is calculated by dividing the earnings available to equity shareholder by the number of equity shares. Again, earnings available to equity share holder are computed after giving the preference dividend to the Preference shareholders. When firm has no need of debt capital in its capital structure, firm uses this method to determine the cost of equity share capital. This method depends on the assumption that even if the firm is not distributing it's earning as dividend, means the earning is kept as the retained earnings. These retained earnings will lead to future growth of the earnings and as a result the future market price of the share will increase.

Formula

$k_e = \frac{E}{P}$

k_e = Cost of equity share capital

E = Earnings per share

P = Current market price per share

Illustration 14

The earnings available to the shareholders amount to ₹ 40,000. Firm is represented by 10,000 equity shares and the current market price of equity share is ₹ 25. Calculate the cost of equity share capital.

Solution:

$k_e = \frac{E}{P} \times 100$

k_e = ?

E = ₹ 40,000/ 10,000 equity shares = ₹ 4

P = ₹ 25

$k_e = \frac{₹\ 4}{₹\ 25} \times 100 = 16\%$

Illustration 15

Mamon Ltd. is expected to earn ₹ 30 per share. Company follows fixed payout ratio of 40%. The market price of its share is ₹ 200. Find the cost of existing equity if dividend tax of 15 % is imposed on the distributed earnings when:

(a) current level of dividend amount is maintained.

(b) dividend to the shareholders is reduced by the extent of dividend tax.

Solution:

(a) When dividend net of tax to shareholders maintained at same level, such policy would reduce the retained earnings which in turn reduces the growth.

t = Dividend tax = 15%

D1= Dividend = (₹ 30 × 40%) = ₹ 12

Amount of tax = (Dividend 12 × 15% tax) = ₹ 1.8

Retained earnings = (₹ 30 - ₹ 12 - ₹ 1.8) = ₹ 16.2

Growth,

$$g = b \times r = \frac{\text{Net Profit (after dividend paid)}}{\text{Net Profits}} \times \frac{\text{Net Profit}}{\text{Book value of capital employed}}$$

$$= \frac{\text{Net Profit (after dividend paid)}}{\text{Book Value of capital employed}} = \frac{\text{Retained Earnings}}{\text{Price}} = \frac{₹\ 16.2}{₹\ 200} = 0.081 = 8.1\%$$

Cost of Equity

$$k_e = \frac{D_1}{P} + g = \frac{12}{200} + 0.081 = 0.141 = 14.1\%$$

(b) When dividend (gross of tax) to shareholders is maintained at the same level, such policy would keep the level of retained earnings and growth same but the amount of dividend to the shareholders would reduce by the extent of dividend tax.

t = Dividend tax = 15%

Amount of tax = (Dividend ₹ 12 × 15% tax) = ₹ 1.8

D_1 = Dividend (net of tax) = (₹ 12-1.8) = ₹ 10.2

Retained earnings = (₹ 30-12) = ₹ 18

$$g = b \times r = \frac{\text{Net Profit (after dividend paid)}}{\text{Net Profits}} \times \frac{\text{Net Profit}}{\text{Book value of capital employed}}$$

$$= \frac{\text{Net Profit (after dividend paid)}}{\text{Book Value of capital employed}} = \frac{\text{Retained Earnings}}{\text{Price}} = \frac{₹\ 18}{₹\ 200} = 0.09 = 9\%$$

$$k_e = \frac{D_1}{P} + g = \frac{₹\ 10.2}{₹\ 200} + 0.09 = 0.141 = 14.1\%$$

3. Dividend Growth Approach or Gordon's Model

Every equity shareholder expects dividend to increase year after year and not to remain constant. In this case the expected growth in dividend is taken into consideration for computation of cost of equity. The growth in expected dividend in future may be either at a uniform normal rate or it may vary. Therefore, the dividend growth approach takes into account expected dividend under different growth assumptions. This approach is based on certain assumptions.

Assumptions

(a) The current market price of share depends on future expected dividend.

(b) The initial dividend D0 is greater than 0.

(c) The dividend payout ratio is constant.

Formula : $k_e = \frac{D_1}{P} + g$

Where,

k_e = Cost of equity share capital

D_1 = Next expected divined $=[D_0 (1 + g)]$

P_0 = Current market price per share

g = Constant growth rate of dividend

If flotation cost is considered in case of newly issued equity shares then cost of equity under this approach will be calculated as below

$$k_e = \frac{D_1}{P_0 - F} + g$$

Where,

F = Flotation cost

When dividend are expected to grow at a uniform rate in each year –

Illustration 16

XYZ Company's share is currently quoted in the market at ₹ 20. The company pays a dividend of ₹ 2 per share and the investors expect a growth rate of 5% per year. You are required to calculate (a) cost of equity capital of the company and (b) the market price per share if the anticipated growth rate dividend is 7%.

Solution:

(a) The cost of equity capital (k_e) may be ascertained as follows:

$$k_e = \frac{D_1}{P_0} + g$$

Where,

D_1 = Dividend per share at the end of the current year i.e. ₹ 2

P_0 = Market price per share i.e. ₹ 20

g = Expected growth rate of dividend i.e. 5% or 0.05

Therefore,

$$k_e = \frac{₹\ 2}{₹\ 20} + 0.05 = 0.01$$

(b) We know, $k_e = \frac{D}{P_0} + g$

Here, D_1 = ₹ 2, k_e = 0.15, g= 0.07

$$k_e = 0.15 = \frac{2}{P_0} + 0.07$$

$$\text{or, } P_0 = \frac{₹\ 2}{0.15 - 0.07} = \frac{₹2}{.08} = ₹\ 25 \text{ per share}$$

Illustration 17

Using Dividend Growth Model, calculate cost of equity (k_e) in the following case:

Equity share capital (shares of ₹10 each)	₹ 2,00,000
Earnings for 2023	₹ 60,000
Current market price per share	₹ 180

Dividends per share:

	₹)
2020	7
2021	8
2022	10
2023	11

Solution:

For Equity Share Capital (k_e) :

$$k_e = \frac{DPS_1}{MPS} + g$$

Where,

DPS_1 = Dividend per share at the end of the current year i.e. ₹ 11

MPS = Market price per share i.e. ₹ 180

g = Expected growth rate of dividend i.e. 0.1643 or 16.43% which may be calculated as under –

Growth Rate in 2021 $= \frac{(₹\ 8 - ₹\ 7)}{₹\ 7} \times 100 = 14.29\%$

Growth Rate in 2022 $= \frac{(₹\ 10 - ₹\ 8)}{₹\ 8} \times 100 = 25\%$

Growth Rate in 2023 $= \frac{(₹\ 11 - ₹\ 10)}{₹\ 10} \times 100 = 10\%$

Simple Average $= \frac{14.29 + 25 + 10}{3} = \frac{49.29}{3} = 16.43\%$ or 0.1643

Therefore, $k_e = \frac{₹\ 11}{₹\ 180} + 0.1643 = 0.2254$ or 22.54%

Derivation of future growth 'g'

Two methods are used to determine the growth rate.

(i) Average Method: Growth rate can be calculated using this method as follows:

$$\text{Current Dividend } (D_0) = D_n (1+g)^n$$

Or

$$\text{Growth rate} = \sqrt[n]{\frac{D_0}{D_n}} - 1$$

Where,

D_0 = Current dividend,

D_n = Dividend in n years ago

(ii) Gordon's Growth Model

According to this method, a growing stream of future dividends arises from a growing level of investment by the firm in profitable projects, and it will, therefore, be this rate of investment which will partially determine the growth rate. This model is based on the following assumptions:

(a) The firm is an all-equity firm.

(b) Only source of additional investment is retained earnings.

(c) Every year firm re-invested a constant portion of retained earnings.

(d) Retained earnings produce a constant of annual return

It can be calculated as below:

Growth **(g) = b × r**

Where

g = Future dividend growth rate

b = Constant portion of retained earnings each year*

r = Average rate of return fund invested

*Proportion of earnings available to equity shareholders which is not distributed as dividend.

$$b = \frac{\text{Net Profit (after dividend paid)}}{\text{Net Profit}}$$

$$r = \frac{\text{Net Profit}}{\text{Book value of capital employed}}$$

4. Realized Yield Approach

It is the easy method for calculating cost of equity capital. Under this method, cost of equity is calculated on the basis of return actually realized by the investor in a company on their equity capital.

$k_e = PVf \times D$

Where,

k_e = Cost of equity capital

PVf = Present value of discount factor

D = Dividend per share

5. Capital Assets Pricing Model (CAPM) Approach

The Capital Asset Pricing Model (CAPM) was developed by William F. Sharpe and John Linter in the 1960s. This model is useful for measuring the cost of equity capital of the firm, it shows the relationship between the unavoidable risk and expected return from a security. The model is based on the following assumptions:

(a) The capital markets are highly efficient.

(b) No investor is large enough to affect the market.

(c) All investors have the same expectations about the risk and return.

(d) There are negligible restrictions on investment.

(e) There are two types of investment opportunities i.e. risk-free security and market portfolio of common stock.

According to CAPM,

$k_e = R_f + \beta (R_m - R_f)$

Where, k_e = Expected rate of return to the investors, or cost of equity capital

R_f = Risk free rate of return

R_m = Market rate of return

β = Beta coefficient by which the market risk is determined

Illustration 18

From the following information, determine the cost of equity capital using the CAPM approach.

(a) Required rate of return on risk-free security, 8%.

(b) Required rate of return on market portfolio of investment is 13%.

(c) The firm's beta is 1.6.

Solution:

In mathematical terms,

$k_e = R_f + \beta (k_m - R_f)$

$= 0.08 + 1.6 (0.13 - 0.08)$

$= 16\ \%$

Illustration 19

The beta coefficient of Target Ltd. is 1.4. The company has been maintaining 8 % rate of growth in dividends and earning. The last dividend paid was ₹ 4 per share. The return on government securities is 10 % while the return on market portfolio is 15 %. The current market price of one share of Target Ltd. is ₹ 36.

(a) What will be the equilibrium price per share of Target Ltd?

(b) Would you advise for purchasing the share?

Solution:

(a) The required rate of return $(k_e) = R_f + \beta (k_m - R_f)$

$= 10\% + 1.4 (15\% - 10\%)$

$= 17\ \%$

Equilibrium price per share $(P_0) = \dfrac{D_1}{k_e - g}$

$= \dfrac{₹\ 4(1.08)}{17\% - 8\%} = ₹\ 48$

(b) The share of Target Ltd. is worth buying as it is undervalued.

Illustration 20

Calculate the cost of equity capital of Mamon 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:

$k_e = R_f + \beta (R_m - R_f)$

$= 0.10 + 1.75 (0.15 - 0.10)$

$= 0.10 + 1.75 (0.05)$

$= 0.1875$ or $18.75\ \%$

Illustration 21

If the risk free rate of return and the market rate of return of an investment are 14% and 18% respectively, calculate the cost of equity share capital if (a) $\beta = 1$, (b) $\beta = 2/3$ and (c) $\beta = 5/4$.

Solution:

We know,

We know,

$k_e = R_f + \beta (R_m - R_f)$

Where, k = Expected rate of return to the investors, or cost of capital

R_f = Risk free rate of return i.e. 14%

R_m = Market rate of return i.e. 18%

β = Beta coefficient by which the market risk is determined

(a) When $\beta = 1$,

k_e = 14% + 1 (18% – 14%)

= 14% + 4%

= 18%

(b) When $\beta = 2/3$,

k_e = 14% + 2/3 (18% – 14%)

= 14% + 2.6667

= 16.6667%

(c) When $\beta = 5/4$,

k_e = 14% + 5/4 (18% – 14%)

= 14% + 5%

= 19%

Illustration 22

From the following information in respect of a company, you are required to calculate the cost of equity using CAPM approach:

(a) Risk-free rate of return 12%

(b) Expected market price of equity shares at the year end is ₹ 1,400

(c) Initial price of investment in equity shares of the company is ₹ 1,200

(d) Beta risk factor of the company is 0.70

(e) Expected dividend at the year end is ₹ 140

Solution:

We know under CAPM approach cost of equity can be calculated as;

$k_e = R_f + \beta (R_m - R_f)$

Where,

R_f = Risk free rate of return i.e. 12% or 0.12

β = Beta coefficient i.e. 0.70

R_m = Expected return on market portfolio, i.e.

$$= \frac{\text{Expected dividend + Capital appreciation}}{\text{Initial Investment}} \times 100$$

$$= \frac{₹\ 140 + ₹\ 200\ (\text{i.e. } ₹\ 1{,}400 - ₹\ 1{,}200)}{₹\ 1{,}200} \times 100$$

$$= 0.2833 \text{ or } 28.33\%$$

k_e $= 0.12 + 0.70\ (0.2833 - 0.12)$

$= 0.23431$ or 23.43%

D. Cost of Retained Earnings (k_r)

Retained earnings, as a source of finance for investment proposals, differ from other sources like debt, preference shares and equities. The use of debt is associated with a contractual obligation to pay a fixed rate of interest to the suppliers of funds and, often, repayment of principal at some predetermined date. An almost similar kind of stipulation applies to the use of preference shares also. In the case of ordinary shares, although there is no provision for any predetermined payment to the shareholders, yet a certain expected rate of dividend provides a starting point for the computation of cost of equity capital. That retained earnings do not involve any formal arrangement to become a source of funds is obvious. In other words, there is no obligation, formal or implied, on a firm to pay a return on retained earnings. Apparently, retained earnings may appear to carry no cost since they represent funds which have not been raised from outside. The contention that retained earnings are free of cost, however, is not correct. On the contrary, they do involve cost like any other source.

The alternative use of retained earnings is based on 'external-yield criterion'. In brief, the cost of retained earnings represents an opportunity cost in terms of the return on their investment in another enterprise by the firm whose cost of retained earnings is being considered. The opportunity cost given by the external-yield criterion which can be consistently applied can be said to measure the k_r which is likely to be equal to the k_e. Therefore, k_e should be used as k_r but the latter would lower than the former due to differences in flotation cost and due to dividend payment tax.

The part of the distributable profit which is set aside without distributing among the shareholders in order to strengthen the financial position of the business is called retained earnings. Though these funds do not cost anything there is an opportunity cost involved. The opportunity cost of retained earnings is simply the dividend foregone by the shareholders. The two methods for measuring this cost is as follows:

(a) It assumes that the shareholders would have invested the dividend on receipt. So, the cost of equity is to be adjusted by the marginal tax rate and the applicable commission, brokerage, etc. The formula for calculating k_r would be

$$k_r = k_e\ (1\text{-}t)\ (1\text{-}C)$$

Where, k_e = Cost of equity

t = Marginal tax rate

C = Commission, brokerage, etc.

(b) The second method assumes the retained earnings as the investment of existing shareholders in the firm itself. So, the retained earnings may be treated at par with the equity share capital. This is known as the external yield criterion. The cost of retained earnings may be measured in the same way as that of equity share capital.

Illustration 23

A firm's k_e (return available to shareholders) is 10%, the average tax rate of shareholders is 30% and it is expected that 2% is brokerage cost that shareholder will have to pay while investing their dividends in alternative securities. What is the cost of retained earnings?

Solution:

Cost of Retained Earnings, $k_r = k_e (1 – t) (1 – b)$

Where,

k_e = rate of return available to shareholders

t = tax rate

b = brokerage cost

Therefore,

k_r = 10% (1–0.5) (1–0.02)

= 10%×0.5×0.98

= 4.9%

Illustration 24

AKS Ltd. retains ₹ 10,00,000 out of its current earnings. The expected rate of return to the shareholders, if they had invested the funds elsewhere is 10%. The brokerage is 2% and the shareholders come in 30% tax bracket. Calculate the cost of retained earnings.

Solution:

Computation of cost of Retained Earnings (k_r)

$k_r = k(1-t_p)$ – Brokerage

Where,

k = Opportunity cost;

t_p = Shareholders' personal tax

k_r = 0.10(1 – 0.30) - 0.02

= 0.07-0.02 = 0.05

= 5%

Alternatively,

Cost of Retained earnings is equal to opportunity cost for benefits forgone by the shareholders.

	(₹)
Earning before tax (10% of ₹ 10,00,000)	1,00,000
Less: Tax (30% of ₹ 1,00,000)	30,000
After Tax Earnings	70,000
Less: Brokerage (2% of ₹ 10,00,000)	20,000
Net Earnings	50,000
Total Investment	10,00,000

$$\therefore \text{ Effective Cost of Retained Earnings} = \left(\frac{50,000}{10,00,000} \times 100\right) = 5\%$$

(II) Weighted Average Cost of Capital (WACC)

The term cost of capital is used to denote composite or weighted average or overall cost of capital. Once the component costs have been calculated, they are multiplied by the proportions of the respective source of capital to obtain the weighted average cost of capital (WACC). Here, weighted average concept is used not the simple average. The simple average cost of capital is not appropriate to use because firms hardly use various sources of funds equally in the capital structure. It is also important to remember that the weighted average after tax costs of the individual component of capital is to be taken not the before tax weighted average cost.

The main reason behind the computation of overall cost of capital is to use this rate as the decision criterion in capital budgeting or investment decision. Generally, it may be stated that this cost of capital is taken to be the cut-off rate for determining the profitability of proposed projects.

Steps taken for calculation of WACC

Step-1: Compute the specific cost of each source of capital.

Step-2: Calculate the proportion (or %) of each source of capital to the total capital (weight)

Step-3: Multiply the cost of each source by its proportion in the capital structure.

Step-4: Add the weighted component cost to get the WACC.

This is noted that the weighted average cost of capital may change due to (i) change in the cost of each component or (ii) change in the relative important of each companies i.e. the change in proportion or weight or (iii) change in both.

The crucial part of the exercise is the decision regarding appropriate weights and the related aspects. We first illustrate the relevant aspects of the choice of the weights. This is followed by the mechanics of computation of k_0 which is relatively simple.

Assignment of Weights

The aspects relevant to the selection of appropriate weights are (i) Historical weights versus Marginal weights:

(ii) Historical weights can be - (a) Book value weights or (b) Market value weights.

Historical versus Marginal Weights: The first aspect of the decision regarding the selection of appropriate weights for computing the overall cost of capital is: which system of weighting marginal or historical is preferable? The critical assumption in any weighting system is that the firm will raise capital in the specified proportions.

Marginal Weights: The use of marginal weights involves weighting the specific costs by the proportion of each type of fund to the total funds to be raised. The marginal weights represent the %age share of different financing sources the firm intends to raise/employ. The basis of assigning relative weights is, therefore, new/additional/ incremental issue of funds and, hence, marginal weights.

However, WACC can be computed by using the following three types of weight.

(a) Book value weight

(b) Market value weight

(c) Marginal value weight

Book Value Weight

Under this method, weight are computed by taking relative proportions of various sources of capital to the capital structure of the firm. The main advantage of book value weight is that book values are readily available from the published annual accounts or other records. The other advantage is that it depicts the real situation of the firm.

The main advantage of this weight are stated below:

(a) Book value weight is easier to calculate as the book values of various source of finance are readily available from the published annual report of the company.

(b) A firm set capital structure target on the basis of book value rather than market value. Therefore, computation of overall cost of capital on the basis of book value weight provides real situation of the firm

(c) Computation of debt-equity ratio for the purpose of analysing the capital structure also depends on the book values.

(d) If the securities of the company are not listed in the stock exchange, then it is not possible to make available the market value of the sources of finance, or even if is available is not reliable. In such a situation there is no other alternative, rather tp use book value weights for the purpose of computation of weighted average cost of capital.

The main disadvantages of this weight are stated below:

(a) There is no relationship in between book value weight and the market value of various sources of finance.

(b) Management cannot take decision relating to capital budgeting, financing etc. on the basis of book value weight.

(c) Computation of weighted average cost of capital on the basis of book value weight is in conflict with the concept of cost of capital because the latter is computed by considering the market value of various sources of finance.

Market Value Weight

Under this method, the proportion of market values of various sources of capital are assigned as weight in computing the WACC. Book value weight may be operationally convenient but market value is theoretically more consistent sound and better indicatory of firm's capital structure. The desirable practice is to employ market weight

to compute the firm's cost of capital as it aims to maximize the value of the firm.

The main advantage of using market value weights are stated below:-

(a) Costs of specific sources are computed on the basis of their respective market value. Now, if the market values of various source of finance are used as weights in computing the weighted average cost of capital, then a consistency in the approach is maintained.

(b) Use of market value weights are in consistent with the objective of maximization of value of the firm.

(c) Use of market value of various source of finance which constitute the capital structure of the firm will reflect the current cost of capital. Therefore, it will provide a better picture of the firm's cost of capital.

But there are some practical difficulties for using market value weights which are stated below:-

(a) Market value of the securities may change frequently. This will in turn change the overall cost of capital which will make the decision criterion for investment somewhat difficult.

(b) Market value of all sources of finance is not readily available like book value, particularly the market value of retained earnings.

(c) If the securities of the company are not listed in the stock exchange, then market values are not available or even if they are available, are not reliable.

Although market value weights are operationally inconvenient compared to book value weights, but theoretically it is more consistent and sounder in reflecting a better picture of the firm's true capital structure.

Marginal Value Weight

Marginal weight means giving weight to the specific costs by proportion of each type of funds to the total funds to be raised. In the method the value of new or incremental capital is considered rather than the past or current market values.

In using marginal weight, the firm is concerned with the actual amount of each type of financing used in raising additional funds to finance new project by the company. Marginal weight is more helpful/ applicable to the actual process of financing project.

Comparison between Book Value and Market Value Weight

It has been observed that, cost of capital ascertained by using market value weight is higher than the using book value weight. This is mainly due to the fact, equity and preference share capital usually have higher market values than their book values. Thus higher cost of capital resulted due to greater emphasis assigned to these sources of finance.

While book value weights are readily available from the records of the company, the market value weight are not always available, particularly in the case of retained earnings. In brief, while the book value weights areoperationally convenient, market value weights theoretical consistent and sound enough and as such a better indicator of a firms true capital structure.

Book value weights use accounting values to measure the proportion of each type of capital in the firm's financial structure. **Market value weights** measure the proportion of each type of capital at its market value. Market value weights are appealing because the market values of securities closely approximate the actual Rupees to be received from their sale. Moreover, because firms calculate the costs of the various types of capital by using prevailing market prices, it seems reasonable to use market value weights. In addition, the long-term investment cash flows to

which the cost of capital is applied are estimated in terms of current as well as future market values. Market value weights are clearly preferred over book value weights.

Historical versus Target Weight

Historical weights can be either book or market value weights based on actual capital structure proportions. For example, past or current book value proportions would constitute a form of historical weighting, as would past or current market value proportions. Such a weighting scheme would therefore be based on real - rather than desired proportions.

However, **Target weights,** which can also be based on either book or market values, reflect the firm's desired capital structure proportions. Firms using target weights establish such proportions on the basis of the "optimal" capital structure they wish to achieve. When one considers the somewhat approximate nature of the calculation of weighted average cost of capital, the choice of weights may not be critical. However, from a Long-term perspective, the preferred weighting scheme should be target market value proportions.

Illustration 25

AKS Ltd. has the following capital structure on October 31, 2023:

Source of Capital	(₹)
Equity Share Capital (1,00,000 shares of ₹10 each)	10,00,000
Reserve & Surplus	10,00,000
12% Preference Shares	5,00,000
9% Debentures	15,00,000
	40,00,000

The market price of equity share is ₹ 50. It is expected that the company will pay next year a dividend of ₹ 5 per share, which will grow at 7% forever. Assume 30% income tax rate. You are required to compute weighted average cost of capital using market value weights.

Solution:

Workings:

(i) Cost of Equity $k_e = \frac{D_1}{P_0} + g = \frac{5}{50} + 0.07 = 0.1 + 0.07 = 17\%$

(ii) Cost of Debentures $(k_d) = r(1\text{-}t) = 0.09(1 - 0.3) = 0.063$ or 6.3%

Computation of Weighted Average Cost of Capital (using market value weights)

Source of Capital	Market Value of Capital (₹)	Weight Proportion	Cost of Capital (%)	WACC (%)
9% Debentures	15,00,000	0.2143	6.30	1.35
12% Preference Shares	5,00,000	0.0714	12.00	0.86
Equity share Capital (₹50 × 1,00,000) Shares	50,00,000	0.7143	17.00	12.14
Total	70,00,000	1.00		14.35

∵ WACC is 14.35%

Illustration 26

Asianol Ltd. has the following Capital Structure:	₹ (in Lakhs)
Equity Share Capital (10 lakhs shares)	100
12% Preference Share Capital (10,000 shares)	10
Retained Earnings	120
14% Debentures (70,000 Debentures)	70
14 % Term Loan	100
	400

The market price per equity share is ₹ 25. The next expected dividend per share is ₹ 2 and is expected to grow at 8%. The preference shares are redeemable after 7 years at per and are currently quoted at ₹ 75 per share. Debentures are redeemable after 6 years at per and their current market quotation is ₹ 90 per debenture. The tax rate applicable to the firm is 50%.

Solution:

(a) Under Book Value Method

(i) Cost of Equity Shares (k_e)

$$k_e = \frac{\text{Expected dividend per equity share}}{\text{Market price per share}} \times 100 + \text{Expected growth rate}$$

$$= \frac{2}{25} \times 100 + 8\%$$

$$= 16\%$$

(ii) Cost of Preference Shares (k_p)

$$k_p = \frac{\text{Preference dividend (D)} + \frac{(\text{Redeemable Value - Net proceeds})}{\text{No. of years}}}{\frac{\text{Redeemable Value + Net Proceeds}}{2}} \times 100$$

$$k_p = \frac{12 + \frac{(100-75)}{7}}{\frac{(100+75)}{2}} \times 100$$

$$= 17.8\%$$

(iii) Cost of Debentures (k_d)

$$k_d = \frac{\text{Interest (I)} + \frac{(\text{Redeemable Value - Net proceeds})}{\text{No. of years}}}{\frac{\text{Redeemable Value + Net Proceeds}}{2}} \times (1\text{-}t)$$

$$= k_d = \frac{14 + \frac{(100-90)}{6}}{\frac{(100+90)}{2}} \times (1-0.5)$$

= 8.25%

(iv) Cost of Term Loan (k_d)

k_d = Interest (1 – t)

= 14% (1 – 0.5)

= 7%

Computation of WACC of Asianol Ltd.

(Weights under Book Value)

Sources of Finance	Book- value (in ₹ lakhs)	Weights Proportion	Specific Cost	Weighted Cost (%)
Equitys share capital	100	0.250	16.00%	4.000
12% Preference share capital	10	0.025	17.80%	0.446
Retained earnings	120	0.300	16.00%	4.800
14% Debentures	70	0.175	8.25 %	1.443
14% Term Loan	100	0.250	7.00%	1.750
	400	1.000		12.439

Therefore, WACC under book value is 12.439%.

(b) Under Market Value Method

Total Market value of Equity Shares = 10,00,000 shares@ ₹ 25

= ₹ 2,50,00,000

Ratio between equity shares and retained earnings

= 100:120

= 5:6

Market value of equity = ₹ 2,50,00,000 × 5/11

= ₹ 1,13,63,637

Market value of retained earnings = ₹ 2,50,00,000 × 6/11

= ₹ 1,36,36,363

Computation of WACC of Asianol Ltd.

(Weights under Market Value)

Sources of Finance	Market- value (₹)	Weights Proportion	Specific Cost	Weighted Cost (%)
Equity share capital	1,13,63,637	0.2700	16.00%	4.32
12% Pref. share capital	7,50,000	0.0178	17.80%	0.32
Retained earnings	1,36,36,363	0.3243	16.00%	5.20
14% Debentures	63,00,000	0.1498	8.25%	1.24
14% Term loan	1,00,00,000	0.2381	7.00%	1.67
Total	4,20,50,000	1.000		12.75

Therefore, WACC under market value is 12.75%.

Illustration 27

The capital structure and cost of capital of a company are given below:

Source	Book Value (₹/lakh)	After tax cost of capital (%)
Equity	200	16
Retained Earnings	200	?
Debentures	400	7
	800	

Equity shares represent shares of ₹ 10 each. The current market value of each share is ₹ 80 and the corporate tax rate is 40%.

(i) Compute weighted average cost of capital of the company using both book values and market values as weights.

(ii) How would you account for the difference, if any, in the average cost of capital under (i) above?

Solution:

Calculation of specific cost of capital:

(i) For Equity share capital (k_e)

k_e = 16% (given), For Retained Earnings(k_r)

$k_r = k_e$ =16%, assuming external yield criterion

For Debentures (k_d)

Calculation of Weighted Average Cost of Capital (k0) using Book Value and Market values as weights.

Source of Capital	After-tax Cost (%)	Book Value Weights			Market Value Weights		
		Amount (₹)	Weights	Weighted Cost (%)	Amount (₹)	Weights	Weighted Cost (%)
Equity Share Capital	16.00	2,00,00,000	0.25	4.00	8,00,00,000	0.40	6.40
Retained Earnings	16.00	2,00,00,000	0.25	4.00	8,00,00,000	0.40	6.40
Debentures	7.00	4,00,00,000	0.50	3.50	4,00,00,000	0.20	1.40
Total		8,00,00,000	1.00	11.50	20,00,00,000	1.00	14.20

* The total market value of equity of ₹ 16,00,00,000 (i.e. 20,00,000 shares @ ₹ 80 per share) has been divided into equity share capital and retained earnings in the ratio of their book value i.e. 1:1.

Weighted Average Cost of Capital (k_0) using:

Book value as weights = $\frac{11.50}{1}$ or 11.50%

Market value as weights = $\frac{14.20}{1}$ or 14.20%

(ii) It has been observed that the calculation of weighted average cost of capital using market value is higher than that using book value. The reason being that the market value of equity shares is considerably greater than their book value. Therefore, it provides higher specific cost iof capital and given greater emphasis to this source of finance.

Marginal Cost of Capital

Marginal cost of capital may be defined as the cost of raising additional rupee of capital. The weighted average cost of new or incremental capital is also known as marginal cost of capital. The marginal cost of capital is derived when are calculate the weighted average cost of capital by using marginal weight.

This concept is used in capital budgeting decision. It is used as cut-off rate for any investment. To calculate the marginal cost of capital, the intended financing proportion should be applied as weight to marginal component cost. When a firm raises funds in proportional manner and the components cost remains unchanged, there ask be no difference between average cost of capital of the total funds and the marginal cost of capital.

Illustration 28

The following is the capital structure of ABC Ltd. as on 31.12.2023

Sources of Finance	(₹)
Equity Shares: 5,000 shares (of ₹100 each)	5,00,000
10% Preference Shares (of ₹100 each)	2,00,000
12% Debentures	3,00,000
	10,00,000

The market price of the company's share is ₹ 110 and it is expected that a dividend of ₹ 10 per share would be declared for the year 2023. The dividend growth rate is 6%:

(i) If the company is in the 40% tax bracket, compute the weighted average cost of capital.

(ii) Assuming that in order to finance an expansion plan, the company intends to borrow a fund of ₹ 5 lakhs bearing 14% rate of interest, what will be the company's revised weighted average cost of capital? This financing decision is expected to increase dividend form ₹ 10 to ₹ 12 per share. However, the market price of equity share is expected to decline form ₹ 110 to ₹ 105 per share.

Solution:

(i) Computation of the Weighted Average Cost of Capital (using Market Value Weights)

Source of Finance (a)	Market value of capital (₹)	Weight (b)	After tax cost of capital(%) (c)	WACC(%) (d)=(b)×(c)
Equity Share (working note 1) [₹110 × 5,000 shares]	5,50,000	0.5238	15.09	7.9041
10% Preference Share	2,00,000	0.1905	10.00	1.9050
12% Debenture	3,00,000	0.2857	6.00	1.7142
Total	10,50,000	1.0000		11.5233

(ii) Computation of Revised Weighted Average Cost of Capital (using market value weights)

Source of Finance (a)	Market value of capital (₹)	Weight (b)	After tax cost of capital (%) (c)	WACC(%) (d)=(b)×(c)
Equity Share (working note 1) [₹105 × 5000 shares]	5,25,000	0.3443	17.43	6.0011
10% Preference Share	2,00,000	0.1311	10.00	1.3110
12% Debenture	3,00,000	0.1967	6.00	1.1802
14% Loan	5,00,000	0.3279	7.00	2.2953
Total	15,25,000	1.0000		10.7876

Working Notes:

(1) Cost of Equity Shares (k_e)

$$k_e = \frac{\text{Dividend per share } (D_1)}{\text{Market price per share } (P_0)} + \text{Growth rate } (g)$$

$$k_e = \frac{10}{110} + 0.06 = 0.1509 \text{ or } 15.09\%$$

$$k_e = \left(\frac{12}{105} + 0.06\right) = 17.4285 = 17.43\%$$

Illustration 29

XYZ Ltd. has the following book value capital structure:

Equity Capital (in share of ₹ 10 each, fully paid up at par)	₹ 30 crore
10% Preference Capital (in shares of ₹ 100 each, fully paid up at par)	₹ 2 crore
Retained Earnings	₹ 40 crore
14% Debentures (of ₹ 100 each)	₹ 20 crore
15% Term Loans	₹ 25 crore

The next expected dividend on equity shares per share is ₹ 3.60; the dividend per share is expected to grow at the rate of 5%. The market price per share is ₹ 30.

Preference stock, redeemable after six years, are selling at ₹ 80 per debenture.

The income tax rate for the company is 30%.

(i) Required to calculate the current weighted average cost of capital using:

(a) Book value proportions; and

(b) Market value proportions

(ii) Determine the weighted marginal cost of capital schedule for the company, if it raises ₹ 20 crores next year, given the following information:

(a) The amount will be raised by equity and debt in equal proportions;

(b) The company expects to retain ₹ 3 crores earning next year;

(c) The additional issue of equity shares will result in the net price per share being fixed at ₹ 25

(d) The debt capital raised by way of term loans will cost 15% for the first ₹ 5 crores and 16% for the next 5 crores.

Solution:

(i) (a) Statement showing computation of Weighted Average Cost of Capital by using Book value Proportions

Source of Finance	Amount (Book Value) (₹ in crores)	Weight (Book Value Proportion) (A)	Cost of Capital (%) (B)	Weighted Cost of Capital (%) (C)=(A)×(B)
Equity Share (Working note 1)	30.00	0.256	17.00	4.352
10% Preference Share (Working note 2)	2.00	0.017	13.33	0.227
Retained earning (Working note 1)	40.00	0.342	17.00	5.814
14 % Debenture (Working note 3)	20.00	0.171	12.07	2.064
15% Term Loan (Working note 1)	25.00	0.214	10.50	2.247
	117.00	1.0000		14.704

(b) Statement showing computation of Weighted Average Cost of Capital by using market value proportions

Source of Finance	Amount (Book Value) (₹ in crores)	Weight (Book Value Proportion) (A)	Cost of Capital (%) (B)	Weighted Cost of Capital (%) (C)=(A)×(B)
Equity Share (Working note 1)	90.00 (3 crores × ₹ 30)	0.66	17.00	11.350
10% Preference Share (Working note 2)	1.60 (2 lakh × ₹80)	0.012	13.33	0.159
14 % Debenture (Working note 3)	18.00 (20 lakh × ₹ 90)	0.134	12.07	1.617
15% Term Loan (Working note 4)	25.00	0.186	10.50	1.953
	134.60	1.0000		15.085

[Note: Since retained earnings are treated as equity capital for purposes of calculation of cost of specific source of finance, the market value of the ordinary shares may be taken to represent the combined market value of equity shares and retained earnings. The separate market values of retained earnings and ordinary shares may also be worked out by allocating to each of these a %age of total market value equal to their %age share of the total based on book value.**]**

Working Notes:

1. Cost of equity capital and retained earnings (k_e)

$$k_e = \frac{D_1}{P_0} + g$$

Where, k_e = Cost of equity capital

D_1 = Expected dividend at the end of year 1

P_0 = Current market price of equity share

g = Growth rate of dividend

Now, it is given that D_1 = ₹ 3.60, P_0 = ₹30 and g = 5%

$$k_e = \frac{₹3.60}{₹30} + 0.05$$

$k_e = 0.12 + 0.05 = 0.17$

2. Cost of performance capital (k_p)

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

Where,

PD = Preference dividend

RV = Redeemable value of preference shares

NP = Current market price of preference shares

n = Redemption period of preference shares

Now, it is given that PD = 10%, RV = ₹ 100, NP = ₹ 80 and n = 10 years

Therefore $k_p = \frac{10 + \frac{(100 - 80)}{10}}{\frac{100+80}{2}} \times 100 = \frac{10 + 2}{90} \times 100 = 13.33\%$

3. Cost of Debt (k_d)

$$k_d = \frac{I(1+t) + \frac{RV - NP}{n}}{\frac{RV + NP}{2}}$$

Where,

I = Interest Payment

NP = Current market price of debentures

RV = Redemption value of debentures

t = Tax rate applicable to the company

n = Redemption period of debentures

Now it is given that I = 14, t = 30%, RV = ₹ 100, NP = ₹ 90 and n = 6 years

Therefore,

$$k_d = \frac{14\,(1 - 0.30) + \frac{(100 - 90)}{n}}{\frac{(100 - 90)}{2}} \times 100 = \frac{9.8 + 1.667}{95} \times 100 = 12.07\%$$

4. Cost of Term loans (k_t)

$k_t = r(1-t)$

Where r = Rate of interest on term loans

t = Tax rate applicable to the company

Now, r = 15% and t = 30%

Therefore, k_t = 15% (1- 0.30) = 10.50%

(ii) Statement showing weighted marginal cost of capital schedule for the company, if it raises ₹ 20 crores next year, given the following information:

Source of Finance	Amount (₹ in crores)	Weight (a)	After tax cost of capital (%) (b)	Weighted cost of capital (%) (c) = (a) × (b)
Equity shares (Working note 5)	7.00	0.35	19.4	6.79
Retained earnings	3.00	0.15	19.4	2.91
15% Debt (Working note 6)	5.00	0.25	10.5	2.625
16% Debt (Working note 6)	5.00	0.25	11.20	2.8
Total	20.00	1.00		15.125

Working Notes:

5. Cost of equity share (k_e) (including fresh issue of equity shares)

$$k_e = \frac{D_1}{P_0} + g$$

Now, D_1 = ₹ 3.60, P_0 = 25 and g = 0.05

Therefore,

$$k_e = \frac{₹\ 3.60}{25} + 0.05$$

k_e = 19.40%

6. Cost of debt (k_d) = r(1-t)

(For first ₹ 5 crores)

r = 15% and t = 30%

Therefore, k_d = 15(1-0.30) = 10.50%

(For first ₹ 5 crores)

r = 16% and t = 30%

Therefore, k_d = 16(1-0.30) = 11.20%

Solved Case 1

A financial consultant of Hypothetical Ltd. recommends that the firm should estimate its cost of equity capital by applying the capital asset pricing model rather than the dividend yield plus growth model. He has assembled the following facts:

(i) Systematic risk of the firm is 1.4.

(ii) 182-days treasury bills currently yield, 8%.

(iii) Expected yield on the market portfolio of assets is 13%.

Determine the cost of equity capital based on the above data.

Solution:

$k_e = R_f + \beta(R_m - R_f) = 0.08 + 1.4\ (0.13 - 0.08) = 15\%$

Solved Case 2

The following facts relate to Hypothetical Ltd:

Risk-free interest in the market is 10%.

The firm's beta coefficient, b, is 1.5.

Determine the cost of equity capital using the capital asset pricing model, assuming an expected return on the market of 14 % for next year. What would be the k_e, if the b (a) rises to 2, (b) falls to 1.

Solution:

When b is 1.50, $k_e = R_f + b(k_m - R_f) = 0.10 + 1.5\ (0.14 - 0.10) = 16\%$

(a) k_e When b = 2, $= 0.10 + 2\ (0.14 - 0.10) = 18\%$.

(b) k_e When b = 1, $= 0.10 + 1\ (0.14 - 0.10) = 14\%$.

Solved Case 3

Avon Electricals Ltd wishes to determine the weighted average cost of capital for evaluating capital budgeting projects. You have been supplied with the following information to calculate the value of k_0 for the company:

Balance sheet as on March 31, 2024			
Liabilities	**(₹)**	**Assets**	**(₹)**
Current liabilities	9,00,000	Sundry assets	39,00,000
Debentures	9,00,000		
Preference shares	4,50,000		
Equity shares	12,00,000		
Retained earnings	4,50,000		
	39,00,000		39,00,000

Anticipated external financing information:

(i) 20 years, 8% Debentures of ₹ 2,500 face value, redeemable at 5 % premium, sold at par, 2% flotation costs.

(ii) 10 % Preference shares: Sale price ₹ 100 per share, 2% flotation costs.

(iii) Equity shares: Sale price ₹ 115 per share; flotation costs would be ₹ 5 per share.

(iv) The corporate tax rate is 35% and expected equity dividend growth is 5% per year. The expected dividend at the end of the current financial year is ₹ 11 per share. Assume that the company is satisfied with its present capital structure and intends to maintain it.

Solution:

k_d = ₹ 200 (1 – 0.35) + (₹ 2625 – ₹ 2450) / 20 ÷ (₹ 2625 + ₹ 2450) / 2 = 5.47%.

k_p = ₹ 10 ÷ (₹ 100 + ₹ 98) / 2 = 10.1%.

k_e = (₹ 11 ÷ ₹ 110) + 0.05 = 15%.

k_r = (₹11 ÷ ₹115) + 0.05 = 14.57%.

Determination of Weighted Average Cost of Capital

Sources of funds	Amount (₹)	Cost	Total costs (₹)
Debentures	9,00,000	0.0547	₹ 49,230
Preference shares	4,50,000	0.1010	45,450
Equity shares	12,00,000	0.1500	1,80,000
Retained earnings	4,50,000	0.1457	65,565
	30,00,000		3,40,245

k_o = (₹3,40,245 / 30,00,000) × 100 = 11.34%.

Solved Case 4

From the following information, determine the appropriate weighted average cost of capital (WACC), relevant for evaluating long-term investment projects of the company.

Cost of equity	0.18
After tax cost of long-term debt	0.08
After tax cost of short-term debt	0.09

(₹)

Sources of capital	Book value (BV)	Market value (MV)
Equity	5,00,000	7,50,000
Long-term debt	4,00,000	3,75,000
Short-term debt	1,00,000	1,00,000
	10,00,000	12,25,000

Solution:

Determination of weighted average cost of capital			
Sources of capital	**Market value (₹)**	**Specific cost (K)**	**Total costs (MV × K)**
Equity	7,50,000	0.18	1,35,000
Long-term debt	3,75,000	0.08	30,000
	11,25,000		1,65,000

k_o = (₹ 1,65,000 / 11,25,000) × 100 = 14.7%.

Exercise

A. Theoretical Questions:

⊙ Multiple Choice Questions

1. Cost of capital refers to:
   (a) Floting Cost
   (b) Dividend
   (c) Required Rate of Return
   (d) None of the above.

2. Which of the following sources of funds has an implicit cost of capital?
   (a) Equity Share Capital
   (b) Preference Share Capital
   (c) Debentures
   (d) Retained earnings.

3. Which of the following has the highest cost of capital?
   (a) Equity shares
   (b) Loans
   (c) Bonds
   (d) Preference shares.

4. Cost of capital for Government securities is also known as:
   (a) Risk-free Rate of Interest
   (b) Maximum Rate of Return
   (c) Rate of Interest on Fixed Deposits
   (d) None of the above.

5. Cost of capital for bonds and debentures is calculated on:
   (a) Before Tax basis
   (b) After Tax basis
   (c) Risk-free Rate of Interest basis
   (d) Compound interest

6. Weighted Average Cost of Capital (WACC) is generally denoted by:
   (a) k_a
   (b) k_w
   (c) k_0
   (d) k_e,

7. Which of the following cost of capital require tax adjustment?
   (a) Cost of Equity Shares
   (b) Cost of Preference Shares
   (c) Cost of Debentures
   (d) Cost of Retained Earnings.

8. Which is the most expensive source of funds?
   (a) New Equity Shares
   (b) New Preference Shares
   (c) New Debts
   (d) Retained Earnings.

9. Marginal cost of capital is the cost of:
   (a) Additional Sales
   (b) Additional Funds
   (c) Additional Interests
   (d) Additional Revenue.

10. In case the firm is all-equity financed, the WACC would be equal to:
    (a) Cost of Debt
    (b) Cost of Equity
    (c) Neither (a) nor (b)
    (d) Both (a) and (b).

11. In case of partially debt-financed firm, k0 is less
    (a) k_d
    (b) k_e
    (c) Both (a) and (b)
    (d) k_p.

12. In order to calculate Weighted Average Cost of capitals (WACC) weights may be based on:
    (a) Market Values
    (b) Target Values
    (c) Book Values
    (d) All of the above.

13. Firm's cost of capital is the average cost of:
    (a) All sources
    (b) All borrowings
    (c) Share capital
    (d) Share, Bonds and Debentures.

14. An implicit cost of increasing proportion of debt is:
    (a) Tax should would not be available on new debt
    (b) P/E Ratio would increase
    (c) Equity shareholders would demand higher return
    (d) Rate of Return of the company would decrease.

15. Cost of redeemable preference share capital is:
    (a) Rate of Dividend
    (b) After Tax Rate of Dividend
    (c) Discount Rate that equates PV of inflows and out-flows relating to capital
    (d) None of the above.

16. Which of the following is true?
    (a) Retained earnings are cost free
    (b) External Equity is cheaper than Internal Equity
    (c) Retained Earnings are cheaper than External Equity
    (d) Retained Earnings are costlier than External Equity.

17. Cost of capital may be defined as:
    (a) Weighted average cost of all debts
    (b) Rate of return expected by equity shareholders

(c) Average IRR of the Projects of the firm

(d) Minimum rate of return that the firm should earn.

18. Minimum rate of return that a firm must earn in order to satisfy its investors, is also known as:

(a) Average Return on Investment

(b) Weighted Average Cost of Capital

(c) Net Profit Ratio

(d) Average Cost of borrowing.

19. Cost of capital for equity share capital does not imply that:

(a) Market price is equal to book value of share

(b) Shareholders are ready to subscribe to right issue

(c) Market price is more than issue price

(d) All of the three above.

20. In order to calculate the proportion of equity financing used by the company, the following should be used:

(a) Authorised Share Capital

(b) Equity Share Capital plus Reserves and Surplus

(c) Equity Share Capital plus Preference Share Capital

(d) Equity Share Capital plus Long-term Debt.

21. The term capital structure denotes:

(a) Total of Liability side of Balance Sheet

(b) Equity Funds, Preference Capital and Long-term Debt

(c) Total Shareholders Equity

(d) Types of Capital Issued by a Company.

22. Debt financing is a cheaper source of finance because of:

(a) Time Value of Money

(b) Rate of Interest

(c) Tax-deductibility of Interest

(d) Dividends not Payable to lenders.

23. In order to find out cost of equity capital under CAPM, which of the following is not required:
    (a) Beta Factor
    (b) Market Rate of Return
    (c) Market Price of Equity Share
    (d) Risk-free Rate of Interest.

24. Tax-rate is relevant and important for calculation of specific cost of capital of:
    (a) Equity Share Capital
    (b) Preference Share Capital
    (c) Debentures
    (d) (a) and (b) both.

25. Advantage of debt financing is:
    (a) Interest is tax-deductible
    (b) It reduces WACC
    (c) It does not dilute owners control
    (d) All of the above.

26. Cost of issuing new shares to the public is known as:
    (a) Cost of Equity
    (b) Cost of Capital
    (c) Flotation Cost
    (d) Marginal Cost of Capital.

27. Cost of equity share capital is more than cost of debt because:
    (a) Face value of debentures is more than face value of shares
    (b) Equity shares have higher risk than debt
    (c) Equity shares are easily saleable
    (d) All of the above.

28. Which of the following is not a generally accepted approach for calculation of cost of equity?
    (a) CAPM
    (b) Dividend Discount Model
    (c) Rate of Preference Dividend Plus Risk Model
    (d) Price-Earnings Ratio.

29. _____ is the basic debt instrument which may be issued by a borrowing company for a price which may be less than, equal to or more than the face value.

    (a) A bond

    (b) A debenture

    (c) A bond or a debenture

    (d) A bond and a debenture

30. Every debt instrument has _____.

    (a) A face value

    (b) A maturity value

    (c) A face value as well as a maturity value

    (d) Liquidity value

31. A firm is said to be financially unlevered if the firm has …….

    (a) only external equity in its capital structure.

    (b) (b) only owner's equity in its capital structure.

    (c) both external equity and owner's equity in its capital structure

    (d) only equity share capital in its capital structure.

32. The term "optimal capital structure" implies that combination of external equity and internal equity at which ……..

    (a) the overall cost of capital is minimised.

    (b) the overall cost of capital is maximised.

    (c) the market value of the firm is minimised.

    (d) the market value of firm is greater than the overall cost of capital.

33. Net Income Approach to capital structure decision was proposed by …….

    (a) J. E. Walter

    (b) D. Durand

    (c) E. Solomon

    (d) M.H. Miller and D. Orr

34. There is a reciprocal relationship between …….

    (a) DOL and DFL

    (b) DOL and margin of safety ratio.

    (c) DFL and margin of safety ratio.

    (d) DOL and break-even-point.

35. The genesis of financial risk lies in …….
    (a) capital budgeting decision.
    (b) capital structure decision.
    (c) dividend decision.
    (d) liquidity decision.

36. Financial break-even point is that level of EBIT at which …….
    (a) EPS > 0
    (b) EPS < 0
    (c) EPS = 0
    (d) EPS > 1

37. Company X issues 11% bonds of ₹ 100 for an amount aggregating ₹ 200,000 at 10% premium, redeemable at par after 5 years. Corporate tax rate is 35%. The cost of bonds would be:
    (a) 4.9%
    (b) 5.0%
    (c) 5.2%
    (d) 6.0%

38. Which of the following is not a generally accepted approach for Calculation of Cost of Equity?
    (a) CAPM
    (b) Dividend Discount Model
    (c) Rate of Pref. Dividend Plus Risk
    (d) Price-Earnings Ratio

39. A firm has EBIT of ₹ 50,000. Market value of debt is ₹ 80,000 and overall capitalization rate is 20%. Market value of firm under NOI Approach is:
    (a) ₹ 2,50,000
    (b) ₹ 1,70,000
    (c) ₹ 3,00,0000
    (d) ₹ 1,30,000

40. Which of the following cost of capital require tax adjustment?
    (a) Cost of Equity Shares
    (b) Cost of Preference Shares
    (c) Cost of Debentures
    (d) Cost of Retained Earnings.

41. A project has an equity beta of 1.2 and is going to be financed by 30% debt and 70% equity. Assume debt beta = 0, Rf = 10% and Rm = 18%. What is the required rate of return?

    (a) 8.4%

    (b) 18%

    (c) 16.72%

    (d) 10%

42. Pritam Technologies Limited issued 1,00,000, 14% debentures of ₹100 each, redeemable after 5 years at ₹ 110 each. The commission payable to under writers and brokers is 10%. The after-tax cost of debt, assuming a tax rate of 45%, will be

    (a) 15.1%

    (b) 12.54%

    (c) 10%

    (d) 11.7%

43. A project had an equity beta of 1.2 and was going to be financed by a combination of 30% debt and 70% equity (assume debt beta = 0). Hence, the required rate of return of the project is (assume Rf = 10% and Rm =18%)

    (a) 16.27%

    (b) 17.26%

    (c) 16.72%

    (d) 12.76%

44. A company has expected Net Operating Income – ₹2,40,000; 10% Debt – ₹7,20,000 and Equity Capitalisation rate - 20% what is the weighted average cost of capital for the company?

    (a) 0.15385

    (b) 0.13585

    (c) 0.18351

    (d) 0.15531

45. The required rate of return on equity is 24% and cost of debt is 12%. The company has a capital structure mix of 80% of equity and 20% debt. What is the overall rate of return, the company should earn? Assume no tax.

    (a) 21.6%

    (b) 14.4%

    (c) 18.6%

    (d) 17.22%

46. MA Ltd. has EBIT of ₹36 crores. The company has 7% debentures of ₹72 crores. Cost of equity is 12.5%. Ignore taxes. What is the overall cost of Capital? *(Ignore taxes)*

    (a) 11.26%

    (b) 11.20%

    (c) 11.50%

    (d) 11.28%

47. A project had an equity beta of 1.4 and was going to be financed by a conbination of 25% Debt and 75% Equity (Assume Debt Beta as zero). Hence, the required rate of return of the project is *(Assume Rf, = 12% and Rm = 18%)*

    (a) 16.72%

    (b) 18.30%

    (c) 17.45

    (d) 12.00

48. Which of the following is not a source of fund?

    (a) Issue of Capital

    (b) Issue of Debenture

    (c) Decrease in Working Capital

    (d) Increase in Working Capital

49. Cost of capital may be defined as:

    (a) Weighted Average cost of all debts

    (b) Rate of Return expected by Equity Shareholders

    (c) Average IRR of the Projects of the firm

    (d) Minimum Rate of Return that the firm should earn

50. Cost of Capital refers to

    (a) Floatation Cost

    (b) Dividend

    (c) Required Rate of Return

    (d) None of the above

51. Debt Financing is a cheaper source of finance because of

    (a) Time Value of Money.

    (b) Rate of Interest.

    (c) Tax-deductibility of Interest.

    (d) Dividends not Payable to lenders.

52. SG Ltd has paid dividend of ₹3 per share of ₹10 each last year and it is expected to grow @ 10% next year. If the market price of share is ₹60 what will be the Cost of equity ?

    (a) 12.00%

    (b) 12.50%

    (c) 16.50%

    (d) 15.50

53. Surya Ltd. has issued 30,000 irredeemable 14% debentures of ₹ 150 each. The cost of floatation of debentures is 5% of the total issued amount. The company's taxation rate is 40%. The cost of debentures is :

    (a) 8.95%

    (b) 7.64%

    (c) 9.86%

    (d) 8.84%

54. Anand Ltd. announced a rights issue of four shares of ₹ 100 each at a premium of 160% for every five shares held by the existing shareholders. The market value of the shares at the time of rights issue is ₹ 395. The value of right is :

    (a) ₹ 90

    (b) ₹ 80

    (c) ₹ 60

    (d) ₹ 55

55. The value of a share of MN Ltd. after right issue was found to be ₹75/-. The theoretical value of the right is ₹5. The number of existing shares required for a rights share is 2. The subscription price at which the shares were issued were :

    (a) ₹22.50

    (b) ₹40.00

    (c) ₹65.00

    (d) ₹82.00

56. A share of Sun Ltd. is currently quoted at ₹55. The retained earning per share being 40% is ₹4 per share. If the investors expect annual growth rate of 10%, what would be the cost of equity of Sun Ltd.?

    (a) 20.5%

    (b) 21.0%

    (c) 22.0%

    (d) 23.5%

57. In using debt-equity ratio in capital structure decisions, there is an optimal capital structure where :

    (a) The WACC is minimum

    (b) The cost of debt is lowest

    (c) The cost savings are highest

    (d) The marginal tax benefit is equal to marginal cost of financial distress

58. Where the firm has sufficient profits from its existing operations, the loss on the new project will :

    (a) Cause overall loss

    (b) Reduce the overall taxation liability

    (c) Increase WACC

    (d) Increase cost of debt

59. Mohammad Steels Ltd. Has issued 30,000 irredeemable 14% debentures of ₹150 each. The cost of floatation of debentures is 5% of the total issued amount. The company's taxation rate is 40%. The cost of debentures is :

    (a) 8.95%

    (b) 7.64%

    (c) 9.86%

    (d) 8.84%

60. The current price of a share of VOLTAS LTD. is ₹130. The company is planning to go for rights issue. The subscription price for one rights share is proposed to be ₹114. If the company targets that exrights value of a share shall not fall below ₹126, the number of existing shares required for one rights share will be

    (a) 1

    (b) 2

    (c) 3

    (d) None of the above

61. A company has expected Net Operating Income – ₹4,80,000; 10% Debt – ₹14,40,000 and Equity Capitalisation rate - 20% what is the weighted average cost of capital for the company?

    (a) 0.15385

    (b) 0.13585

    (c) 0.18351

    (d) 0.15531

62. Ramya Ltd.'s share beta factor is 1.40. The risk free rate of interest of government securities is 9%. The expected rate of return on the company equity shares is 16%. The cost of equity capital based on CAPM is:

    (a) 9%

    (b) 16%

    (c) 18.8%

    (d) 15.8%

63. If EBIT is less than financial break-even point then:

    (a) EPS will be positive

    (b) EPS will be negative

    (c) there will be no impact on EPS

    (d) Cost of debt raises

64. From the following select one factor which is sources of fund.

    (a) Payment of dividend

    (b) Increase in working capital

    (c) Non trading Income

    (d) None of the above

65. The weighted average cost of capital for a firm is the:

    (a) Discount rate which the firm should apply to all of the projects it undertakes.

    (b) Rate of return a firm must earn on its existing assets to maintain the current value of its stock.

    (c) Coupon rate the firm should expect to pay on its next bond issue.

    (d) Maximum rate which the firm should require on any projects it undertakes.

66. If the CAPM is used to estimate the cost of equity capital, the expected excess market return is equal to the:

    (a) Return on the stock minus the risk-free rate.

    (b) Difference between the return on the market and the risk-free rate.

    (c) Beta times the market risk premium.

    (d) Beta times the risk-free rate.

67. Computation of cost capital of a firm involveswhich of the following steps:

    (a) Computation of cost of specific sources of a capital, viz., debt, preference capital, equity and retained earnings;

    (b) Computation of weighted average cost of capital

    (c) Both (a) and (b)

    (d) None of the above

Answers:

1	c	2	d	3	a	4	a	5	b	6	c	7	c	8	a
9	b	10	b	11	b	12	d	13	a	14	c	15	c	16	c
17	d	18	b	19	d	20	b	21	b	22	c	23	c	24	c
25	d	26	c	27	b	28	c	29	c	30	c	31	b	32	a
33	d	34	b	35	b	36	c	37	a	38	c	39	b	40	c
41	c	42	d	43	c	44	a	45	a	46	a	47	b	48	d
49	d	50	c	51	c	52	d	53	d	54	c	55	c	56	c
57	d	58	b	59	d	60	c	61	a	62	c	63	b	64	c
65	d	66	b	67	c										

⊙ State True or False

1. Cost of capital is cost of borrowing funds.
2. Equity capital does not carry any cost as a company is under no legal obligation to pay dividends.
3. Like equity capital, retained earnings also do not cause any cost to the company.
4. Weighted average cost of capital takes into consideration cost of long-term sources of finance.
5. Retained earnings do not have explicit cost. It carries implicit cost.
6. Overall cost of capital decreases on payment of entire long-term debt.
7. Cost of retained earnings is less then cost of equity.
8. Beta is a measure of unsystematic risk.
9. Cost of additional equity share capital is the same as that of existing equity share capital.

10. The higher is the corporate tax rate, the higher is the cost of debt.
11. Beta is a measure of systematic risk.
12. Cost of debt is higher than cost of equity.
13. Cost of preference share capital is higher than cost of debt.
14. Cost of preference share capital is higher than cost of equity share capital.
15. Among all long-term sources of finance, equity capital carries maximum cost.
16. The cost of capital is the required rate of return to certain the value of the firm.
17. Different sources of funds have a specific cost of capital related to that source only.
18. Cost of capital does not comprise any risk premium.
19. Cost of capital is basic data for NPV technique.
20. Risk free interest rate and cost of capital are same things.
21. Different sources have same cost of capital.
22. Tax liability of the firm is relevant for cost of capital of all the sources of funds.
23. Cost of debt and Cost of Preference share capital, both, require tax adjustment.
24. Every source of fund has an explicit cost of capital.
25. WACC is the overall cost of capital of the firm.
26. Cost of debt is the same as the rate of interest.
27. Cost of Preference share capital is determined by the rate of fixed dividend.
28. Cost of Equity share capital depends upon the market price of the share.
29. Cost of existing share capital and fresh issue of capital are same.
30. Retained earnings have implicit cost only.
31. WACC is always calculated with reference to book value of different sources of funds.
32. Book value and Market Value weights are always different.
33. Retained earnings have no market value, so these are not included in WACC (based on market value).
34. Long-term sources of finance are used for a period of 5 to 10 years.
35. Medium term sources of finance are needed for a period of 1 to 5 years.
36. The preference shares carry limited voting right though they are a part of the capital.
37. Lease is a contract between the owner of asset and the user of the asset.
38. As compared to operating lease, a financial lease is for a shorter period of time.
39. Short-term financing means financing for a period of less than 1 year.
40. Factoring and discounting are same.
41. ADR means any instrument in the form of a depository receipt or certificate created by the RBI.
42. Crowdfunding is a great alternative way to fund a venture.

43. Crowdfunding is a collaborative funding model that lets you collect small contributions from many individuals.

44. The cost of capital is an integral part of investment decisions as it is used to measure the worth of investment proposal.

Answers:

1	**F**
4	**T**
7	**T**
10	**F**
13	**T**
16	**T**
19	**T**
22	**F**
25	**T**
28	**T**
31	**F**
34	**T**
37	**T**
40	**F**
43	**T**

2	**F**
5	**T**
8	**F**
11	**T**
14	**F**
17	**T**
20	**F**
23	**F**
26	**F**
29	**F**
32	**F**
35	**T**
38	**F**
41	**F**
44	**T**

3	**F**
6	**F**
9	**F**
12	**F**
15	**T**
18	**F**
21	**F**
24	**F**
27	**T**
30	**T**
33	**F**
36	**T**
39	**T**
42	**T**

⊙ Fill in the Blanks

1. The cost of preference shares is _____than that of equity shares.
2. A GDR is a _____.
3. The ADRs _____ have voting rights.
4. DPIIT stands for _____.
5. SISFS stands for _____.
6. _____ is a collaborative funding model that lets you collect small contributions from many individuals (the crowd).
7. _____ is needed to start a business and ramp it up to profitability
8. _____ is an unsecured promissory note issued by a firm to raise funds for a short period, generally, varying from a few days to a few months.
9. The portion of profits not distributed among the shareholders but retained and used in the business is called_____.

Answer:

1	**less**	**2**	**negotiable instrument**	**3**	**may or may not**
4	**Department for Promotion of Industry and Internal Trade**	**5**	**Start-up India Seed Fund Scheme**	**6**	**Crowdfunding**
7	**Financing**	**8**	**Commercial Paper (CP)**	**9**	**Retained Earnings**

⊙ Short Essay Type Questions

1. Identify the long-term, medium-term and short-term sources of finance.
2. Write the advantages of equity share financing.
3. Discuss the important international sources of finance.
4. Describe how to finance to startup business in modern days.
5. Identify alternative investment funds for startups.
6. Explain the concept of crowdfunding.
7. Discuss the advantages and disadvantages of start-up financing.
8. State the concept and relevance cost of capital with appropriate examples.
9. Discuss the different types of cost of capital involved in financing.
10. Determine the specific cost of long-term debt, preference share capital, equity share capital and retained earnings.
11. Write a short note on Weighted Average Cost of Capital (WACC..
12. Write a short note on Marginal Cost of Capital (MCC).

⊙ Essay Type Questions

1. Discuss the different sources of finance available to management, both internal and external.
2. State the advantages and disadvantages of the different sources of funds.
3. Discuss how the cost of capital enters into the process of evaluating capital budgeting proposals? Particularly, how is it related to the various discounted cash flow techniques for determining a project's acceptability?
4. What is financial risk? Is it necessary to assume that firm's financial structure remains unchanged when evaluating the firm's cost of capital? Why is this assumption impractical?
5. Explain why:
   (a) Debt is usually considered the cheapest source of financing available to the firm.
   (b) The cost of preference shares is less than the cost of equity.
   (c) The cost of retained earnings is less than the cost of new equity.

(d) The cost of equity and retained earnings is not zero.

(e) The cost of capital is dependent only on the cost of long-term funds.

(f) The cost of capital is a hurdle for new investment projects.

(g) The cost of capital is most appropriately measured on an after-tax basis.

6. Explain the problems faced in determining the cost of capital. How is the cost of capital relevant in capital budgeting decisions?

7. Examine critically the different approaches to the calculation of cost of equity capital.

8. Explain the CAPM approach for computing the cost of equity. Discuss the merits and demerits of the approach.

9. The determination of any explicit cost of capital requires two things: (i) the net proceeds the firm will receive from the particular capital source and (ii) the expected future payments the firm will make to the investors. In spite of the similarity of estimation problems, it is recognised that the cost of equity (both internal and external) is the most difficult cost to estimate. Briefly explain why this is so.

10. State briefly the assumptions on which the Gordon (valuation) Model for the cost of equity is based. What does each component of the equation represent?

11. Discuss the approach to determine the cost of retained earnings. Also explain the rationale behind treating retained earnings as a fully subscribed issue of equity shares.

12. Other things being equal, explain how the following events would affect the company's weighted average cost of capital:

(a) The corporate income tax rate is increased/ decreased.

(b) The company has started making substantial new investments in assets that are considerably riskier than the company's presently owned assets.

(c) The company begins to make use of substantial amounts of debt to finance its new projects.

(d) The company has repaid its long-term debts.

(e) Flotation costs of issuing new securities increase/ decrease.

13. What is the weighted average cost of capital? Examine the rationale behind the use of weighted average cost of capital.

14. The weighted average cost of capital (k_0) may be determined using 'book' or 'market' weights. Compare the pros and cons of using market value weights rather than book value weights in calculating the value of k_0.

15. Compare the advantages and disadvantages of using marginal as opposed to historical weights for calculating the weighted average cost of capital (k_0). Which of the weights are more consistent with the company's goal of wealth maximization?

B. Numerical Questions:

⊙ Comprehensive Numericals Problems

1. ABC company sold ₹ 1,000, 6 % debentures carrying no maturity date to the public a decade earlier. Interest rates since have risen, so that debentures of the quality represented by this company are now selling at 9 % yield basis.

   (a) Determine the current indicated market price of the debentures. Would you buy the debentures for ₹ 700? Explain your answer.

   (b) Assuming that debentures of the company are selling at ₹ 850, and if the debentures have 8 years to run to maturity, compute the approximate effective yield an investor would earn on his investment?

2. The shares of a textile company are selling at ₹ 20 per share. The firm had paid ₹ 2 per share dividend last year. The estimated growth of the company is approximately 5 % per year.

   (a) Determine the cost of equity capital of the company.

   (b) Determine the estimated market price of the equity shares if the anticipated growth rate of the firm (i) rises to 8 % (ii) falls to 3 %.

   (c) Determine the market price of the company assuming a growth rate of 20 %. Are you satisfied with your calculations?

3. Assuming a corporate tax rate of 35 %, compute the after-tax cost of the capital in the following situations:

   (a) A perpetual 15 % debentures of ₹ 1,000, sold at the premium of 10 % with no flotation costs.

   (b) A ten year 14 % debenture of ₹ 2,000, redeemable at par, with 5 % flotation costs.

   (c) A ten year 14 % preference share of ₹ 100, redeemable at premium of 5 %, with 5 % flotation costs.

   (d) An equity share selling at ₹ 50 and paying a dividend of ₹ 6 per share, which is expected to be continued indefinitely.

   (e) The same equity share (that is, described in situation (d), if dividends are expected to grow at the rate of 5 %.

   (f) An equity share, selling at ₹ 120 per share, of a company that engages only in equity financing. The earning per share is ₹ 20 of which 50 % is paid in dividends. The shareholders expect the company to earn a constant after-tax rate of 10 % on its investment of retained earnings.

4. From the following information supplied to you, determine the appropriate weighted average cost of capital, relevant for evaluating long-term investment projects of the company:

   Cost of equity 12 %

   After-tax cost of long-term debt 7 %

   After-tax cost of short-term loans 4 %

Source of Capital	Book value (₹)	Market value (₹)
Equity	5,00,000	7,50,000
Long-term debt	4,00,000	3,75,000
Short-term debt	1,00,000	1,00,000
TOTAL	10,00,000	12,25,000

Answers:

1	(a) ₹666.67. No. Its current worth is only ₹666.67; (b) 8.69%.
2	(a) Cost of equity, 15.5%, (b) (i) ₹28.8, (ii) ₹15.43, (c) (₹53.33) (ridiculous). The reason is $k_e > g$.
3	(a) 8.86%, (b) 9.85%, (c) 15%, (d) 12%, (e) 17%, (f) 13.33%
4	10.33%.

Unsolved Case(s)

1. R. Ltd. manufactures blankets of high quality. Company's history has been satisfactory, but for the past sometime its cash flow position was not good. That is why the company has not been able to pay sufficient dividend to its equity shareholders. The finance manager tried to find out the causes of poor financial situation of the company and observed that the control of the company was in the hands of several persons who are unable to take any concrete decision.

   To come out of this financial crisis, the finance manager has been deliberating on the source of finance that needs to be tapped to arrange funds. He wants to make use of such a source as does not prove to be a fixed burden on the company. He has also kept in mind that company has got its premises on rent and the rent in exorbitant. Similarly, it has to bear the burden of fixed salaries. He is also worried about the fact that in future control of the company should not be in the hands of too many persons.

   (a) Identify the two sources of finance discussed in the above case.

   (b) Identify and explain the advantages of both source by quoting lines from the above case.

2. Shyam Steel Ltd. is a large and creditworthy company that manufacture steel for the Indian market. It now wants to cater the Asian market and decides to invest in new Hi-tech machines. Since the investment is large, it requires Long-term finance. It decides to raise funds by issuing equity shares. The issue of equality shares involves huge floatation cost. To meet the expenses of floatation cost, the company decides to tap the money market.

   (a) Name and explain the money market instrument that company can use for the above purpose.

   (b) What is the duration for which the company can get funds through this investment?

   (c) State any other purpose for which this instrument can be used.

3. From the given data, calculate the cost of equity shares of X Ltd.

   Current market price of the share is ₹ 120.

   Floatation cost per share is ₹ 5.

   Dividend paid on outstanding shares for the past three years is as shown in following Table:

Year	Dividend Paid (₹)
2021	10.5
2022	12.5
2023	14.5

   The expected dividend on the new shares at the end of the current year is ₹ 15 per share.

4. B Ltd. has equity stock with a listed beta of 1.35. The estimated market return is 12% and the risk-free rate based on government bonds is 6.5%. Calculate the cost of its equity based upon the CAPM.

5. Assume that R_f is 9% and R_m is 18%. If a security has a beta factor of: (a)1.4; (b)1.0 and (c) 2.3, determine the expected return of the security.

6. From the following information, calculate weighted average cost of capital of the company considering (i) Book value as weights and (ii) Market value as weights.

Cost of equity	0.18
After tax cost of long-term debt	0.08
After tax cost of short-term debt	0.09
Cost of Reserve	0.15

Element	BV (₹)	MV (₹)
Capital	3,00,000	4,50,000
Reserve	2,00,000	3,00,000
L/T debt	4,00,000	3,75,000

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Capital Budgeting 5

This Module Includes

5.1 Introduction to Capital Budgeting

5.2 Identification of Cash Flows and Forecasting

5.3 Cash Flow vs Profit of the Firm

5.4 Evaluation Techniques – Non-discounted and Discounted Cash Flow Methods

5.5 Hurdle Rate in a Conglomerate Environment

Capital Budgeting

SLOB Mapped against the Module:

To develop critical thinking and problem-solving competencies so that students can assist the management in ensuring optimum management of working capital and capital expenditure in existing as well as new projects.

Module Learning Objectives:

After studying this module, the students will be able to –

- Know the basic concept of capital budgeting;
- Explain the nature of capital budgeting;
- Explain the need of capital budgeting decision;
- Discuss the significance of capital budgeting;
- Understand the process of capital budgeting;
- Compute, interpret and evaluate the traditional capital budgeting techniques (non-discounted);
- Compute, interpret and evaluate the modern capital budgeting techniques (discounted);
- Understand the difference between NPV and IRR method.

Introduction to Capital Budgeting

5.1

Success of finance mainly depends on proper decision making in respect of investment of funds. In general decision-making means selecting the best alternatives among all available alternatives based on analysing the positive sides and negative sides of each alternative. In financial management, capital budgeting is decision making technique. Capital budgeting decision may be defined as firm's decisions to invest its current funds most efficiently in long term activities in anticipation of an expected flow of future benefits over a series of year.

On behalf of financial management, an effective decision should be taken on how and where the available fund be invested. Successful operation of any business depends upon the investment of resources in such a way as to bring in benefits or best possible returns from any investment. An investment can be simply defined as an expenditure in cash or its equivalent during one or more time periods in anticipation of enjoying a net inflow of cash or its equivalent in some future time period or periods. An appraisal of investment proposals is necessary to ensure that the investment of resources will bring in desired benefits in future. If the financial resources were in abundance, it would be possible to accept several investment proposals which satisfy the norms of approval or acceptability. Since resources are limited, a choice has to be made among the various investment proposals by evaluating their comparative merit. It is apparent that some techniques should be followed for making appraisal of investment proposals. Capital Budgeting is one of the appraising techniques of investment decisions. Capital budgeting is defined as the firm's decision to invest its current funds most efficiently in long term activities in anticipation of an expected flow of future benefits over a series of years. It should be remembered that the investment proposal is common both for fixed assets and current assets. Mainly, the firm's capital budgeting decisions will include addition, disposition, modification and replacement of fixed assets.

Some important definitions of capital budgeting are:

Charles. T. Horngren defined capital budgeting as 'long-term planning for making and financing proposed capital out lay.'

According to **Keller and Ferrara**, 'capital Budgeting represents the plans for the appropriation and expenditure for fixed asset during the budget period.'

Robert N. Anthony defined as 'capital budget is essentially a list of what management believes to be worthwhile projects for the acquisition of new capital assets together with the estimated cost of each product.'

5.1.1 Nature of Capital Budgeting Decisions

The term capital budgeting is used interchangeably with capital expenditure decision, capital expenditure management, long-term investment decision, management of fixed assets and so on. Mainly, capital budgeting decisions related to fixed assets or long-term assets which by definition refer to assets which are in operation, and yield a return, over a period of time, usually, exceeding one year. They, therefore, involve a current outlay or series of outlays of cash resources in return for an anticipated flow of future benefits. In other words, the system

of capital budgeting is employed to evaluate expenditure decisions which involve current outlays but are likely to produce benefits over a period of time longer than one year. These benefits may be either in the form of increased revenues or reduced costs. Capital expenditure management, therefore, includes addition, disposition, modification and replacement of fixed assets. From the preceding discussion may be deduced the following basic features of capital budgeting: (i) potentially large anticipated benefits; (ii) a relatively high degree of risk; and (iii) a relatively long time period between the initial outlay and the anticipated returns.

5.1.2 Importance or Need of Capital Budgeting Decisions

An organisation has huge of fund to invest. As a finance manager, what you will do? You have to select the fund where you will invest your fund. Here, the capital budgeting decisions plays an important role. Capital budgeting is important because it creates accountability and measurability. Any organisation that seeks to invest its resources in a project without understanding the risks and returns involved would be held as irresponsible by its owners or shareholders. If this decision proves wrong, it may result huge loss forthe organisation. The selection of the most profitable project of capital investment is the key function of financial manager or finance team of any organisation.

The decisions taken by the management in this area affect the operations of the firm for many years. Capital budgeting decisions may be generally needed for the following purposes:

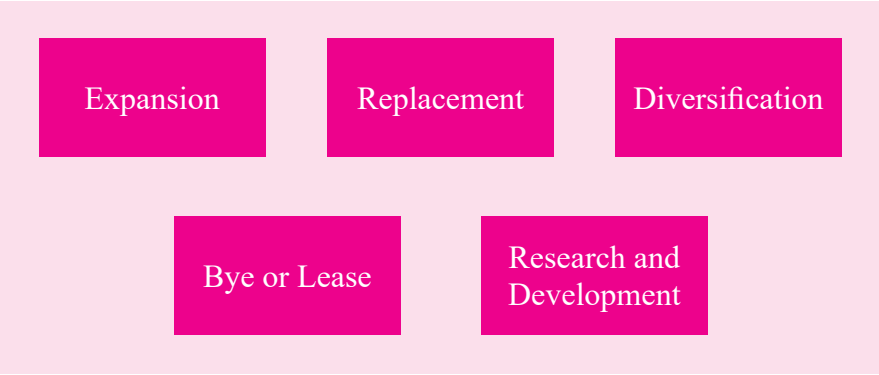

figure 5.1: Need of Capital Budgeting Decisions

(a) Expansion: The firm requires additional funds to invest in fixed assets when it intends to expand the production facilities in view of the increase in demand for their product in near future. Accordingly, the current assets will increase. In case of expansion the existing infrastructure – like plant, machinery and other fixed assets is inadequate, to carry out the increased production volume. Thus, the firm needs funds for such project.

This will include not only expenditure on fixed assets (infrastructure) but also an increase in working capital (current assets).

(b) Replacement: The machines and equipment used in production may either wear out or may be rendered obsolete due to new technology. The productive capacity and competitive ability of the firm may be adversely affected. The firm needs funds or modernization of a certain machines or for renovation of the entire plant etc., to make them more efficient and productive. Modernization and renovation will be a substitute for total replacement, where renovation or modernization is not desirable or feasible, funds will be needed for replacement.

(c) Diversification: If the management of the firm decided to diversify its production into other lines by adding a new line to its original line, the process of diversification would require large funds for long-term investment. For example, ITC and Philips company for their diversification.

(d) Buy or Lease: This is a most important decision area in financial management whether the firm acquire the desired equipment and building on lease or buy it. If the asset is acquired on lease, there have to be made a series of annual or monthly rental payments. If the asset is purchased, there will be a large initial commitment of funds, but not further payments. The decision–making area is which course of action will be better to follow? The costs and benefits of the two alternative methods should be matched and compared to arrive at a conclusion.

(e) Research and Development: The existing production and operations can be improved by the application of new and more sophisticated production and operations management techniques. New technology can be borrowed or developed in the laboratories. There is a greater need of funds for continuous research and development of new technology for future benefits or returns from such investments.

5.1.3 Significance of Capital Budgeting Decisions

The key function of the financial management is the selection of the most profitable portfolio of capital investment. It is the most important area of decision-making of the financial manager because any action taken by the manger in this area affects the working and the profitability of the firm for many years to come. Capital budgeting decisions are considered important for many reasons. Some of them are discussed below:

(a) Crucial Decisions: Capital budgeting decisions are crucial, affecting all the departments of the firm. So, the capital budgeting decisions should be taken very carefully.

(b) Long-run Decisions: The implications of capital budgeting decisions extend to a longer period in the future. The consequences of a wrong decision will be disastrous for the survival of the firm.

(c) Large Amount of Funds: Capital budgeting decisions involve spending large amount of funds. As such proper care should be exercised to see that these funds are invested in productive purchases.

(d) Rigid: Capital budgeting decision cannot be altered easily to suit the purpose. Because of this reason, when once funds are committed in a project, they are to be continued till the end, loss or profit no matter.

(e) Cash Forecast: Capital investment requires substantial funds which can only be arranged by making determined efforts to ensure their availability at the right time. Thus, it facilitates cash forecast.

(f) Wealth-Maximization of Shareholders: The impact of long-term capital investment decisions is far reaching. It protects the interests of the shareholders and of the enterprise because it avoids over-investment and under-investment in fixed assets. By selecting the most profitable projects, the management facilitates the wealth maximization of equity share-holders.

(g) Helps in Policy Making: It facilitates the management in making of the long-term plans to assist in the formulation of general policy.

5.1.4 Process of Capital Budgeting

Capital budgeting process refers to the total process of generating, evaluating, selecting and following up on capital expenditure alternatives. The firm allocates or budgets financial resources to new investment proposals. Basically, the firm may be confronted with three types of capital budgeting decisions: (i) the accept-reject decision; (ii) the mutually exclusive choice decision; and (iii) the capital rationing decision.

The major steps in the capital budgeting process are given below. These are (a) Generation of project; (b) Evaluation of the project; (c) Selection of the project and (d) Execution of the project. The capital budgeting process may include a few more steps. As each step is significant, they are usually taken by the top management.

The Steps are discussed below:

(a) Generation of Project: Depending upon the nature of the firm, investment proposals can emanate from a variety of sources. Projects may be classified into five categories.

(i) New products or expansion of existing products.

(ii) Replacement of equipment or buildings.

(iii) Research and development.

(iv) Exploration.

(v) Others like acquisition of a pollution control device etc.

Investment proposals should be generated for the productive employment of firm's funds. However, a systematic procedure must be evolved for generating profitable proposals to keep the firm healthy.

(b) Evaluation of the Project: The evaluation of the project may be done in two steps. First the costs and benefits of the project are estimated in terms of cash flows and secondly the desirability of the project is judged by an appropriate criterion. It is important that the project must be evaluated without any prejudice on the part of the individual. While selecting a criterion to judge the desirability of the project, due consideration must be given to the market value of the firm.

(c) Selection of the Project: After evaluation of the project, the project with highest return should be selected. There is no hard and fast rule set for the purpose of selecting a project from many alternative projects. Normally the projects are screened at various levels. However, the final selection of the project vests with the top-level management.

(d) Execution of Project: After selection of a project, the next step in capital budgeting process is to implement the project. Thus, the funds are appropriated for capital expenditures. The funds are spent in accordance with appropriations made in the capital budget funds for the purpose of project execution should be spent only after seeking format permission for the controller. The follow–up comparison of actual performance with original estimates ensures better control.

Thus, the top management should follow the above procedure before taking anycapital expenditure decision.

5.1.5 Capital Budgeting Decisions (Situation Decisions)

On the basis of situation decision, firm may be confronted with three types of capital budgeting decisions: (a) Accept-reject Decision; (b) Mutually Exclusive Project Decisions and (iii) Capital Rationing Decision. These are discussed below:

(a) Accept-reject Decision

Business firm is confronted with alternative investment proposals. That means you have to take decision whether the project is accepted or rejected. So, accept-reject decision is a fundamental decision in capital budgeting. If the project is accepted, the firm would invest in it, if the proposal is rejected, the firm does not invest in it. In general, all those proposals which yield a rate of return greater than a certain required rate of return or cost of capital are accepted and the rest are rejected. By applying this criterion, all independent projects are accepted. Under this decision criterion, all independent projects that satisfy the minimum investment criterion should be implemented.

(b) Mutually Exclusive Project Decision

'Mutually exclusive projects' is used generally in the capital budgeting process where the firms choose a single project on the basis of certain parameters out of the set of the projects where acceptance of one project will lead to rejection of the other projects. In case of mutually exclusive projects, the project with highest net present value or the highest IRR or the lowest payback period is preferred and a decision to invest in that select project excluded all other projects from consideration even if they individually have positive NPV or higher IRR than hurdle rate or shorter payback period than the reference period.

(c) Capital Rationing Decision

Capital rationing refers to the choice of investment proposals under financial constraints in terms of a given size of capital expenditure budget. The objective of capital rationing is to select the combination of projects would be the maximisation of the total NPV. It is concerned with the selection of a group of investment proposals out of many investment proposals acceptable under the accept-reject decision. Capital rationing employs ranking of the acceptable investment projects. The projects can be ranked on the basis of a predetermined criterion such as the rate of return. The projects are ranked in the descending order of the rate of return.

Identification of Cash Flows and Forecasting

5.2

Capital budgeting is concerned with investment decisions which yield return over a period of time in future. As we know, capital budgeting decision mainly focuses on cash flows rather than profits. Capital budgeting involves identifying the cash in flows and cash out flows rather than accounting revenues and expenses flowing from the investment. So, capital budgeting involves in determination of cash flows.

Cash flows are the most important factor in a capital investment decision. Investment decision has to take place at present, not in future and therefore capital expenditure is a cash-flow concept, rather than a profit-based concept. That's why computation of cash flow decides the success or failure of any investment decision.

The cash flows associated with a proposal may be classified into: (i) Initial Cash Flow, (ii) Subsequent Cash Flow and (iii) Terminal Cash Flow. These are discussed below:

(i) Initial Cash Flow:

Any long-term investment decision will involve large amount of initial cash outlay. It reflects the cash spent for acquiring the asset, known as initial cash outflow. For estimating the initial cash outflow, the following aspects are taken into consideration.

(a) The cost of the asset, installation cost, transportation cost and any other incidental cost, i.e., all the costs to be incurred for the asset in order to bring it to workable condition, are to be taken into consideration.

(b) Sunk cost which has already been incurred or committed to be incurred, hence, which has no effect on the present or future decision, will be ignored as it is irrelevant cost for the decision.

c) For investment decisions relating to replacement of an existing asset usually involve salvage value which is considered as cash inflow and subtracted from the cash outflow relating to the installation of the new asset. If the existing asset is the only asset in the concerned block of asset, the incidence of income tax on gain or loss on sale of the existing asset is also to be considered, as the block of asset will cease to exist due to sale of the asset. The tax impact on gain on sale of asset represent burden of tax, hence cash outflow and tax impact on loss on sale represent savings of tax, hence, cash inflow. Therefore, tax on gain on sale of asset has to be added and tax on loss on sale has to be subtracted in order to determine initial cash outflow. However, if there are other assets in the same block, the question of gain or loss on sale of asset will not arise, only the sale proceed from sale of old asset will be deducted from the total initial cash outflow.

(d) Change in working capital requirement due to the new investment decision requires to be considered. If additional working capital is required, it will increase the initial cash outflow. On the other hand, in a replacement situation, if requirement of working capital is decreased, such decrease in working capital requirement will reduce the total initial cash outflow.

Initial Cash Outflow:

Cost of the new asset including installation, transportation and other incidental costs related to the asset

(±) Change in working capital requirement (Addition for increase, Subtraction for decrease)

(–) Salvage value of the old asset (in case of replacement of old asset)

(–) Tax savings for loss on sale of asset (if the block ceases to exist due to sale of old asset), or

(+) Tax payable for profit on sale of asset (if the block ceases to exist due to sale of old asset)

(ii) Subsequent Cash Flow:

In conventional cash flow, cash outflow occurs at the initial period and a series of cash inflows occur in the subsequent periods. On the other hand, non-conventional cash flow involves intermittent cash outflows in the subsequent periods also for major repairing, additional working capital requirement, etc. Therefore, apart from estimating initial cash flow, subsequent cash flows are also required to be estimated. For estimating future cash inflows, i.e., cash inflows of the subsequent periods, the following aspects need to be considered.

Cash inflows are to be estimated on an after-tax basis.

Depreciation being a non-cash item is to be added back to the amount of profit after taxes.

Interest being financial charge will be excluded for estimating cash inflow for investment decisions (Interest Exclusion Principal). However, interest (on debt capital) is taken into consideration for determining weighted average cost of capital which is used for discounting the cash inflows to arrive at its present value.

Calculation of Net Cash Inflow after Taxes (CFAT)

Particulars	Amount (₹)	Amount (₹)
Net Sales Revenue		xxx
Less: Cost of Goods Sold	xxx	
Less: General Expenses (other than Interest)	xxx	
Less: Depreciation	xxx	xxx
Profit before Interest and Taxes (PBIT or EBIT)		xxx
Less: Taxes		xxx
Profit after Taxes (excluding Interest) [PAT]		xxx
Add: Depreciation		xxx
Net Cash Inflow after Taxes [CFAT = EBIT (1 – t) + Depreciation [where, t is income tax rate] If PAT is taken from accounting records, which is arrived at after charging Interest, 'Interest Net of Taxes' is to be added back along with the amount of Depreciation, i.e., PAT after charging Interest		xxx
Add: Depreciation		xxx
Add: Interest Net of Taxes (i.e., Total Interest – Tax on Interest)		xxx
Net Cash Inflow after Taxes		xxx

Illustration 1

From the following information calculate Net Cash Inflow after Taxes.

Particulars	Amount (₹)	Amount (₹)
Net Sales Revenue		10,00,000
Less:		
Cost of Goods Sold	5,00,000	
Operating Expenses	2,00,000	
Depreciation	1,00,000	8,00,000
PBIT or EBIT		2,00,000
Less: Interest		50,000
PBT or EBT		1,50,000
Less: Tax (30%)		45,000
PAT		1,05,000

Solution:

Calculation of Net Cash Inflow after Taxes

Particulars	Amount (₹)
EBIT	2,00,000
Less: Tax (30%)	60,000
	1,40,000
Depreciation	1,00,000
Net Cash Inflow after Taxes	2,40,000

Alternatively,

Particulars	Amount (₹)	Amount (₹)
PAT		1,05,000
Add: Depreciation		1,00,000
		2,05,000
Add: Interest Net of Taxes		
Total Interest	50,000	
Less: Tax on Interest (30%)	15,000	35,000
Net Cash Inflow after Taxes		2,40,000

(iii) Terminal Cash Flow:

In the last year, i.e., at the end of the economic life of the asset or at the time of termination of the project, usually some additional cash inflows occur in addition to the operating cash inflows, viz., salvage value of the asset, release of working capital (the working capital that is introduced at the beginning will no longer be required at the end of the life of the asset or at the termination of the project). Moreover, tax impact on gain or loss on sale of the asset if the block of asset ceases to exist.

Terminal Cash Inflow:	
Salvage or Scrap Value	xxx
Add: Tax Savings on Loss on Sale of Asset	xxx
Or	
Less: Tax Burden on Gain on Sale of Asset	xxx
Add: Release of Working Capital	xxx

Cash Flow vs Profit of the Firm

5.3

The foremost requirement for evaluation of any capital investment proposal is to estimate the future benefits accruing from the investment proposal. Theoretically, two alternative criteria are available to quantify the benefits: (i) accounting profit, and (ii) cash flows. Cash flow and profit are both important financial measures in any business organisation, but cash flow and profit are not the same things. It is critical to understand the difference between them to make key decisions regarding a business's performance and financial health.

Cash flow refers to the net balance of cash moving into and out of a business at a specific point in time. Cash flow can be positive or negative. Positive cash flow indicates that a company has more money moving into it than out of it. Negative cash flow indicates that a company has more money moving out of it than into it. On the other hand, profit is typically defined as the balance that remains when all of a business's operating expenses are subtracted from its revenues. Accounting profit is to be adjusted for non-cash expenditures to determine the actual cash inflow. The cash flow approach of measuring future benefits of a project is superior to the accounting approach as cash flows are theoretically better measures of the net economic benefits of costs associated with a proposed project.

However, changes in profits do not necessarily mean changes in cash flows. It is not difficult to find examples of firms in practice that experience cash shortages in spite of increasing profits. Cash flow and profit are not same in many reasons. The important reasons are:

(i) Profit, as measured is based on accrual concept— revenue (sales) is recognized when it is earned, rather than when cash is received, and expense is recognized when it is incurred rather than when cash is paid. In other words, profit includes cash revenues as well as receivables and excludes cash expenses as well as payable.

(ii) For computing profit, expenditures are arbitrarily divided into revenue and capital expenditures. Revenue expenditures are entirely charged to profits while capital expenditures are not. Capital expenditures are capitalized as assets (investments), and depreciated over their economic life. Only annual depreciation is charged to profit. Further, depreciation (DEP) is an accounting entry and does not involve any cash flow. Thus, the measurement of profit excludes some cash flows such as capital expenditures and includes some non-cash items such as depreciation.

We can explain differences between profit and cash flow.

Assume that a firm is entirely equity-financed, and it receives its revenues (REV) in cash and pays its expenses (EXP) and capital expenditures (CAPEX) also in cash. Further, assume that taxes do not exist. Under these circumstances, profit can be expressed in the following equation:

Profit = Revenues − Expenses – Depreciation

Profit = REV − EXP − DEP ..... (1)

Cash flow can be shown in the following equation:

Cash flow = Revenues – Expenses – Capital Expenditure

Cash flow (CF) = REV – EXP – CAPEX ..... (2)

It may be noticed from Equations (1) and (2) that profit does not deduct capital expenditures as investment outlays are made. Instead, depreciation is charged on the capitalized value of investments. Cash flow, on the other hand, ignores depreciation since it is a non-cash item and includes cash paid for capital expenditures. In the accountant's book, the net book value of capital expenditures will be equal to their capitalized value minus depreciation.

We can obtain the following definition of cash flows if we adjust Equation (2) for relationships given in Equation (1):

CF = (REV − EXP − DEP) + DEP − CAPEX

CF = Profit + DEP − CAPEX ..... (3)

From Equation (3), it makes clear that even if revenues and expenses are expressed in terms of cash flow, still profit will not be equal to cash flows. It overstates cash inflows by excluding capital expenditures and understates them by including depreciation. Thus, profits do not focus on cash flows.

The objective of a firm is not to maximize profits or earnings per share, rather it is to maximize the shareholders' wealth, which depends on the present value of cash flows available to them.

Evaluation Techniques – Non-Discounted and Discounted Cash Flow Methods

5.4

The capital budgeting appraisal methods or techniques for evaluation of investment proposals will help the company to decide the desirability of an investment proposal, depending upon their relative income generating capacity and rank them in order if their desirability. These methods provide the company a set of normal method should enable to measure the real worth of the investment proposal. Appraisal of investment proposals are based on objective, quantified and economic costs and benefits.

Characteristics of an Appraisal Method

The appraisal methods should possess several good characteristics, which are mentioned as under.

(a) It should help the company to rank the investment proposals in order of their desirability.

(b) It should provide a technique for distinguishing between an acceptable and non-acceptable project.

(c) It should provide criteria to solve the problem of choosing among alternative projects.

(d) It should recognize the importance of time value of money i.e. bigger benefits are preferable to smaller ones and early benefits are preferable to later benefits.

(e) It should provide the criteria for the selection of investment proposals.

(f) It should take into account the pattern of cash flows.

The methods of appraising capital expenditure proposals can be classified into two broad categories:

(a) Traditional or Non-Discounted Cash Flow (Non-DCF) Techniques

1. Payback Period
2. Payback Reciprocal
3. Payback Profitability
4. Average or Accounting Rate of Return (ARR)

(b) Discounted Cash Flow (DCF) or Time-Adjusted Techniques

1. Net Present Value (NPV)
2. Profitability Index
3. Internal Rate of Return (IRR)
4. Discounted Payback Period
5. Modified NPV
6. Modified IRR
7. Adjusted Present Value

5.4.1 Non-discounted or Traditional Techniques

These methods are based on the principles to determine the desirability of an investment project on the basis of its useful life and expected returns. These methods depend upon the accounting information available from the books of accounts. These will not take into account the concept of 'time value of money' which is a signification factors to desirability of a project in terms of present value.

1. Payback Period (PBP) Method

The PBP method is the simplest way to budget for a new project. It measures the amount of time it will take to earn enough cash inflows from your project to recover what you invested. It is the most popular and widely recognized traditional methods of evaluating the investment proposals. It can be defined as the number of years to recover the original capital invested in a project. According to Weston and Brigham, the PBP is the number of years it takes for the firm to recover its original investment by net returns before depreciation, but after taxes:

(a) **When cash flows are uniform:** If the proposed project's cash inflows are uniform the following formula can be used to calculate the payback period.

$$\text{Payback Period} = \frac{\text{Annual Cash Inflows}}{\text{Initial Investment}}$$

(b) **When cash flows are not uniform:** When the project's cash inflows are not uniform, but vary from year to year payback period is calculated by the process of cumulating cash inflows till the time when cumulative cash flows become equal to the original investment outlay.

Advantages: The following are the advantages of the payback period method:

(i) **(Easy to calculate:** It is one of the easiest methods of evaluating the investment projects. It is simple to understand and easy to compute.

(ii) **Knowledge:** The knowledge of payback period is useful in decision-making, the shorter the period better the project.

(iii) **Protection from loss due to obsolescence:** This method is very suitable to such industries where mechanical and technical changes are routine practice and hence, shorter payback period practice avoids such losses.

(iv) **Easily availability of information:** It can be computed on the basis of accounting information, what is available from the books.

Disadvantages: However, the payback period method has certain disadvantages and limitations:

(i) **Failure in taking cash flows after payback period:** This method is not taking into account the cash flows received by the company after the payback period.

(ii) **Not considering the time value of money:** It does not take into account the time value of money.

(iii) **Non-considering of interest factor:** It does not take into account the interest factor involved in the capital outlay.

(iv) **Maximisation of market value not possible:** It is not consistent with the objective of maximizing the market value of share.

(v) **Failure in taking magnitude and timing of cash inflows:** It fails to consider the pattern of cash inflows i.e., the magnitude and timing of cash inflows.

Accept-Reject Decision:

The payback period can be used as an accept or reject criterion as well as a method of ranking projects. The payback period is the number of years to recover the investment made in a project. If the payback period calculated for a project is less than the maximum payback period set-up by the company, it can be accepted. As a ranking method it gives the highest rank to a project which has the lowest payback period, and the lowest rank to a project with the highest payback period. Whenever a company faces the problem of choosing among two or more mutually exclusive projects, it can select a project on the basis of payback period, which has shorter period than the other projects.

With equal and unequal cash flows

Illustration 2

Pioneer Ltd. is considering two mutually-exclusive projects. Both require an initial cash outlay of ₹ 10,000 each for machinery and have a life of 5 years. The company's required rate of return is 10% and it pays tax at 50%. The projects will be depreciated on a straight-line basis. The net cash flows (before taxes) expected to be generated by the projects and the present value (PV) factor (at 10%) are as follows:

(₹ in '000)

	2020 (Year 1)	2021 (Year 2)	2022 (Year 3)	2023 (Year 4)	2024 (Year 5)
Project 1 (₹)	4,000	4,000	4,000	4,000	4,000
Project 2 (₹)	6,000	3,000	3,000	5,000	5,000
PV factor (at 10%)	0.909	0.826	0.751	0.683	0.621

You are required to calculate the Payback Period of each project.

Solution:

(₹ in '000)

Payback Period of Project - 1					
Year	2020 (Year 1)	2021 (Year 2)	2022 (Year 3)	2023 (Year 4)	2024 (Year 5)
Cash Flows (₹)	4,000	4,000	4,000	4,000	4,000
Less: Depreciation (₹)	2,000	2,000	2,000	2,000	2,000
Earnings before Tax (EBT) (₹)	2,000	2,000	2,000	2,000	2,000
Less: Tax at 50% (₹)	1,000	1,000	1,000	1,000	1,000
Net Income (₹)	1,000	1,000	1,000	1,000	1,000
Cash flows after tax (₹)	3,000	3,000	3,000	3,000	3,000
Cumulative cash flows (₹)	3,000	6,000	9,000	12,000	15,000

Payback period would be the time when initial investment is recovered in cash. The investment is ₹ 10,000.

Payback period would be between 3 and 4 years.

$$\text{Payback Period} = 3 + \frac{₹\ 10,000 - ₹\ 9,000}{₹\ 9,000}$$

$$= 3.11 \text{ years}$$

(₹)

Payback Periods of Project - 2					
Year	2020 (Year 1)	2021 (Year 2)	2022 (Year 3)	2023 (Year 4)	2024 (Year 5)
Cash Flows	6,000	3,000	2,000	5,000	5,000
Less: Depreciation	2,000	2,000	2,000	2,000	2,000
Earnings before Tax (EBT)	4,000	1,000	0	3,000	3,000
Less: Tax at (50%)	2,000	500	0	1,500	1,500
Net Income	2,000	500	0	1,500	1,500
Cash flows after tax	4,000	2,500	2,000	3,500	3,500
Cumulative cash flows	4,000	6,500	8,500	12,000	15,500

A project with an initial investment of ₹ 50 Lakh and life of 10 years, generates CFAT of ₹ 10 Lakh per annum. Calculate Payback Reciprocal of the project.

Solution:

$$\text{Payback Reciprocal} = \frac{₹\ 10\ \text{lakh}}{₹\ 50\ \text{lakh}} = 20\%$$

3. Payback Profitability

As the profitability beyond the Payback Period is not taken into consideration in Payback Period method, the projects with higher Payback period are rejected though such projects with longer life may generate higher benefits after recovering its initial investment. In Payback Profitability method, the profitability beyond the payback period is considered and projects generating higher benefits after the recovery of initial investment are considered for selection.

Payback Profitability = Net Cash Inflow after Taxes after recovering the Initial Investment, i.e., Total Net Cash Inflow after Taxes – Initial Investment

4. Accounting or Average Rate of Return (ARR) Method

This technique uses the accounting information revealed by the financial statements to measure the profitability of an investment proposal. It can be determined by dividing the average income after taxes by the average investment. According to Solomon, Accounting Rate of Return can be calculated as the ratio of average net income to the initial investment.

On the basis of this method, the company can select all those projects whose ARR is higher than the minimum rate established by the company. It can reject the projects with an ARR lower than the expected rate of return.

This method also helps the management to rank the proposal on the basis of ARR.

Accounting Rate of Return (ARR) = Average Net Income / Original Investment

Or,

Accounting Rate of Return (ARR) = Average Net Income / Average Investment

Advantages: The following are the advantages of ARR method:

(i) It is very simple to understand and calculate;

(ii) It can be readily computed with the help of the available accounting data;

(iii) It uses the entire stream of earnings to calculate the ARR.

Disadvantages: This method has the following limitations:

(i) It is not based on cash flows generated by a project;

(ii) This method does not consider the objective of wealth maximization;

(iii) It ignores the length of the project's useful life;

(iv) If does not take into account the fact that the profile can be re-invested; and

(v) It ignores the time value of money.

Accept-Reject Decision

With the help of the ARR, the financial decision maker can decide whether to accept or reject the investment proposal. As an accept-reject criterion, the actual ARR would be compared with a pre-determined or a minimum required rate of return or cut-off rate. A project would qualify to be accepted if the actual ARR is higher than the minimum desired ARR. Otherwise, it is liable to be rejected. Alternatively, the ranking method can be used to select or reject proposals. Thus, the alternative proposals under consideration may be arranged in the descending order of magnitude, starting with the proposal with the highest ARR and ending with the proposal having the lowest ARR. Obviously, projects having higher ARR would be preferred to projects with lower ARR.

Illustration 4

Determine the average rate of return from the following data of two machines, A and B.

(₹ in "000)

Particulars	Machine - A (₹)	Machine - B (₹)
Cost	56,125	56,125
Annual estimated income after depreciation and income tax:		
Year 1	3,375	11,375
Year 2	5,375	9,375
Year 3	7,375	7,375
Year 4	9,375	5,375
Year 5	11,375	3,375
Total	**36,875**	**36,875**
Estimated life (years)	5	5
Estimated salvage value	3,000	3,000

Depreciation has been charged on straight line basis.

Solution:

ARR	=	(Average income/Average investment) x 100
Average income of Machines A and B	=	(₹ 36,875/5)
	=	₹7,375
Average investment	=	Salvage value + [1/2 (Cost of machine – Salvage value)]
	=	₹ 3,000 + [1/2 (₹ 56,125 – ₹3,000)]
	=	₹ 29,562.50
ARR (for machines A and B)	=	(₹ 7,375/₹ 29563.50) × 100
	=	24.9 %

5.4.2 Discounted Cash Flow Techniques

The discounted cash flow methods provide a more objective basis for evaluating and selecting an investment project. These methods consider the magnitude and timing of cash flows in each period of a project's life. Discounted cash flow methods enable us to isolate the differences in the timing of cash flows of the project by discounting them to know the present value. The present value can be analyses to determine the desirability of the project. These techniques adjust the cash flows over the life of a project for the time value of money.

The distinguishing characteristics of the discounted cash flow capital budgeting techniques is that they take into consideration the time value of money while evaluating the costs and benefits of a project. In one form or another, all these methods require cash flows to be discounted at a certain rate, that is, the cost of capital. The cost of capital (k) is the minimum discount rate earned on a project that leaves the market value unchanged. The second commendable feature of these techniques is that they take into account all benefits and costs occurring during the entire life of the project.

However, the popular discounted cash flows techniques are:

1. Net Present Value (NPV)
2. Internal Rate of Return (IRR)
3. Profitability Index (PI)
4. Discounted Payback Period (DPBP)
5. Modified NPV
6. Modified Internal Rate of Return (MIRR)
7. Adjusted Present Value

Present Value:

It is very important to have idea about present value for applying discounted cash flows techniques. The concept of present value has already been discussed in Time Value of Money chapter in detail. Present value states that an amount of money today is worth more than the same amount in the future. In other words, present value shows that money received in the future is not worth as much as an equal amount received today. The present value or the discounted cash flow procedure recognizes that cashflow streams at different time periods differ in value and can be compared only when they are expressed in terms of a common denominator, that is, present values. It, thus, takes into account the time value of money.

The value of a firm depends upon the net cash inflows generated by the firm assets and also on future returns. The amount of cash inflows and risk associated with the uncertainty of future returns forms the basis of valuation. To get the present value, cash inflows are to be discounted at the required rate of return i.e., minimum rate expected by the investor to account for their timing and risk. The cash inflows and outflows of an investment decision are to be compared at zero time period or at the same value by discounting them at required rate of return. The following formula can be used to discount the future inflows of a project to compare with its cash outflows.

The present value (PV) formula is **$PV=FV/(1+i)^n$**, where you divide the future value (FV) by a factor of 1 + i for each period between present and future dates. Here, i = PVIF/Rate of Discount and n = No. of Periods.

1. Net Present Value (NPV) Method

Net present value (NPV) is the difference between the present value of cash inflows and the present value of cash outflows over a period of time. NPV is used in capital budgeting and investment planning to analyze the profitability of a projected investment or project. In other words, it is a method of calculating the present value of cash flows (inflows and outflows) of an investment proposal using the cost of capital as an appropriate discounting rate. According to Ezra Solomon, 'it is a present value of the cast of the investment.'

This method correctly postulates that cash flows arising at time periods differ in value and are comparable only with their equivalents i.e., present values.

Steps of computation of Net Present Value (NPV):

(i) Estimation of future cash inflows.

(ii) An appropriate rate of interest should be selected to discount the cash flows. Generally, this will be the "cost of capital" of the company, or required rate of return.

(iii) The present value of inflows and outflows of an investment proposal has to be computed by discounting them with an appropriate cost of capital.

(iv) The net value is the difference between the present value of cash inflows and the present value of cash outflows.

The formula for the net present value can be written as:

Net Present Value (NPV)

$$NPV = \frac{C_1}{(1+k)^1} + \frac{C_2}{(1+k)^2} + \frac{C_3}{(1+k)^3} \ldots\ldots\ldots\ldots + \frac{C_n}{(1+k)^n} - I$$

Where,

C = Annual Cash inflows

Cn = Cash inflow in the year n

k = Cost of Capital

I = Initial Investment

Or

$$NPV = \sum_{t=1}^{n} \frac{C_t}{(1+i)^t} - I$$

Where,

C_t = Net cash inflow – outflows during a single period t.

i = Discount rate or return that could be earned in alternative investments.

t = Number of periods.

I = Initial Investment

Accept-Reject Decision:

If the NPV is positive or at least equal to zero, the project can be accepted. If it is negative, the proposal can be rejected. Among the various alternatives, the project which gives the highest positive NPV should be selected.

NPV is positive = A positive NPV indicates that the projected earnings generated by a project or investment.

Cash inflows are generated at a rate higher than the minimum required by the firm.

NPV is zero = Cash inflows are generated at a rate equal to the minimum required.

NPV is negative = An investment with a negative NPV will result in a net loss. Cash inflows are generated at a rate lower than the minimum required by the firm.

The market value per share will increase if the project with positive NPV is selected.

The accept/reject criterion under the NPV method is as follows:

If, NPV>Zero then, Accept

If, NPV<Zero then, Reject

If, NPV=0 then, May accept or reject

Advantages: The following are the advantages of the net present value (NPV) methods:

(i) Consideration to total Cash Inflows: The NPV methods considers the total cash inflows of investment opportunities over the entire life-time of the projects unlike the payback period methods.

(ii) Recognition to the Time Value of Money: This method explicitly recognizes the time value of money, which is investable for making meaningful financial decisions.

(iii) Changing Discount Rate: Due to change in the risk pattern of the investor different discount rates can be used.

(iv) Best decision criteria for Mutually Exclusive Projects: This Method is particularly useful for the selection of mutually exclusive projects. It serves as the best decision criteria for mutually exclusive choice proposals.

(v) Maximisation of the Shareholders Wealth: Finally, the NPV method is instrumental in achieving the objective of the maximization of the shareholders' wealth. This method is logically consistent with the company's objective of maximizing shareholders' wealth in terms of maximizing market value of shares, and theoretically correct for the selections of investment proposals.

Disadvantages: The following are the disadvantages of the net present value method:

(i) It is difficult to understand and use.

(ii) The NPV is calculated by using the cost of capital as a discount rate. But the concept of cost of capital itself is difficult to understand and determine.

(iii) It does not give solutions when the comparable projects are involved in different amounts of investment.

(iv) It does not give correct answer to a question when alternative projects of limited funds are available, with unequal lives.

Illustration 5

A project requires an initial investment of ₹ 2,25,000 and is expected to generate the following net cash inflows:

Year 1: ₹ 95,000; Year 2: ₹ 80,000; Year 3: ₹ 60,000; Year 4: ₹ 55,000. Compute net present value of the project if the minimum desired rate of return is 12%.

Solution:

Computation of PVECF **(₹)**

Period	Cash Inflows Amount (₹)	PVIF @ 12%	Present Value (₹)
Year 1	95,000	0.893	84,835
Year 2	80,000	0.797	63,760
Year 3	60,000	0.712	42,720
Year 4	55,000	0.636	34,980
PVECF (Total)			**2,26,295**

Here, Initial investment = ₹ 2,25,000.

Now, **NPV = PVECF – Initial Investment**

Where,

= ₹ (2,26,295 – 2,25,000)

= ₹ 1,295

The project seems attractive because its net present value is positive.

Illustration 6

Parrot Ltd. is the manufacturer of a low-end consumer durable N. In order to modernize the manufacturing facility, Parrot Ltd. wants to buy a new machinery costing ₹ 10,00,000 at cash price. The annual cash flow before tax over the entire life span of the company is ₹ 3,00,000 p.a. The marginal rate of tax is 30% and cost of capital is 10% p.a. The scrap value at the end of the useful life of the machinery is negligible. The company is currently following a straight-line method of charging depreciation on machineries. Do you think the project is financially viable?

The company has an alternative to charge accelerated depreciation @ 30% of the depreciable amount each for the first three years and @ 10% for the fourth year. Does it change your suggestion?

Solution:

Computation of NPV (Under Straight Line Method of Depreciation) **(₹)**

Year	CFBT (₹)	Depreciation (₹)	Taxable Profit (₹)	Tax (₹)	CFAT (₹)	PVIF @10%	PV (₹)
(1)	(2)	(3)	(4)=(2) – (3)	(5)= (4)×30%	(6)=(4)-(5)+(3)	(7)	(8)=(6)×(7)
1	3,00,000	2,00,000 (10,00,000/5)	1,00,000	40,000	2,60,000	0.909	2,36,340
2	3,00,000	2,00,000	1,00,000	40,000	2,60,000	0.826	2,14,760
3	3,00,000	2,00,000	1,00,000	40,000	2,60,000	0.751	1,95,260
4	3,00,000	2,00,000	1,00,000	40,000	2,60,000	0.683	1,77,580
5	3,00,000	2,00,000	1,00,000	40,000	2,60,000	0.621	1,61,460
Total PV*							9,85,400
Less. Initial investment							10,00,000
NPV							**(14,600)**

Note: * Alternatively, Total PV = CFAT p.a.× PVIFA (10%, 5 Years) = ₹2,60,000 × 3.79 = ₹ 9,85,400.

Since the NPV is negative, the decision of buying the machine is not viable.

Computation of NPV (Under Straight Line Method of Depreciation) **(₹)**

Year	CFBT (₹)	Depreciation (₹)	Taxable Profit (₹)	Tax (₹)	CFAT (₹)	PVIF @10%	PV (₹)
(1)	(2)	(3)	(4)=(2) – (3)	(5)= (4)×30%	(6)=(4)-(5)+(3)	(7)	(8)=(6)×(7)
1	3,00,000	3,00,000 (10,00,000 × 30%)	0	0	3,00,000	0.909	2,72,700
2	3,00,000	3,00,000	0	0	3,00,000	0.826	2,47,800
3	3,00,000	3,00,000	0	0	3,00,000	0.751	2,25,300
4	3,00,000	1,00,000 (10,00,000 × 10%)	2,00,000	80,000	2,20,000	0.683	1,50,260
5	3,00,000	0	3,00,000	1,20,000	1,80,000	0.621	1,11,780
Total PV							10,07,840
Less. Initial Investment							10,00,000
NPV							**7,840**

Since the NPV is positive, the decision of buying the machine is viable.

2. Profitability Index (PI) Method

Profitability index method measures the present value of benefits for every rupee investment. In other words, it involves the ratio that is created by comparing the ratio of the present value of future cash flows from a project to the initial investment in the project. This method is also known as 'Benefit Cost Ratio'. According to Van Horne, the Profitability Index of a project is the ratio of the present value of future net cash inflows to the present value of cash outflows.

Actually, the profitability index is just a fraction. The profitability index is equal to the present value of future cash flows divided by the cost of the investment. Present value of future cash flows simply means the money that you expect to make from the investment. Initial investment refers to the money that the firm have to put down to make that money.

The formula for the net present value can be written as:

$$\text{Profitability Index} = \frac{\text{Present value of the expected cash inflow}}{\text{Present value of cash outflow or Initial Investment}}$$

Accept-Reject Decision:

If the Profitability Index (PI) is greater than or equal to one, the project should be accepted otherwise rejected. Specifically, if the PI is greater than 1, the project generates value and the company may want to proceed with the project. If the PI is less than 1, the project destroys value and the company should not proceed with the project. If the PI is equal to 1, the project breaks even and the company is indifferent between proceeding or not proceeding with the project.

So, the higher the profitability index, the more attractive the investment.

The accept/reject criterion under the PI method is as follows:

If, PI > 1	then, Accept
If, PI < 1	then, Reject
If, PI = 0	then, May accept or reject

Advantages: The advantages of this method are:

(i) It takes into account the time value of money

(ii) It helps to accept / reject investment proposal on the basis of value of the index.

(iii) It is useful to rank the proposals on the basis of the highest /lowest value of the index.

(iv) It takes into consideration the entire stream of cash flows generated during the life of the asset.

Disadvantages: However, this technique suffers from the following disadvantages:

(i) It is somewhat difficult to compute.

(ii) It is difficult to understand the analytical of the decision on the basis of profitability index.

Illustration 7

A project requires an initial investment of ₹ 225,000 and is expected to generate the following net cash inflows:

Year 1: ₹ 95,000; Year 2: ₹ 80,000; Year 3: ₹ 60,000; Year 4: ₹ 55,000. Compute profitability index of the project if the appropriate discount rate for this project is 12%.

Solution:

Computation of PV of expected Cash Flows (PVECF)

Period	Cash Inflows Amount (₹)	PVIF @ 12%	Present Value (₹)
Year 1	95,000	0.893	84,835
Year 2	80,000	0.797	63,760
Year 3	60,000	0.712	42,720
Year 4	55,000	0.636	34,980
(PVECF)			**2,26,295**

Here, Initial investment i.e. PVICF = ₹ 2,25,000.

Now, **PI** **= PVECF ÷ PVICF**

Where,

PVECF = Present value of the expected cash inflows

PVICF = Present value of invested cash outflows

or, = (₹2,26,295 ÷ ₹2,25,000)

= 1.00058

The project seems attractive because its profitability index is greater than 1.

3. Internal Rate of Return (IRR) Method

Internal Rate of Return (IRR) is one such technique of capital budgeting. It is the rate of return at which the net present value of a project becomes zero. We call it 'internal' because it does not take any external factor (like inflation etc.) into consideration. IRR method follows discounted cash flow technique which takes into account the time value of money. The internal rate of return is the interest rate which equates the present value of expected future cash inflows with the initial capital outlay. In other words, it is the rate at which NPV is equal zero.

Whenever a project report is prepared, IRR is to be worked out in order to ascertain the viability of the project. This is also an important guiding factor to financial institutions and investors.

For the computation of the internal rate of return, we use the same formula as NPV. To derive the IRR, we apply trial and error method to make the difference between the present value of expected future cash inflows with the initial investment zero.

IRR refers to that discount rate (i) such that

Present value of cash inflows = Present value of cash outflows

Or, Present value of cash inflows – present value of cash outflows = 0

Or, NPV = 0

Therefore, at IRR, NPV = 0 and PI = 1.

The formula for computation of IRR using NPV is written as under:

$$C = \frac{A_1}{(1+r)^1} + \frac{A_2}{(1+r)^2} + \frac{A_3}{(1+r)^3} \ldots\ldots\ldots\ldots\ldots + \frac{A_n}{(1+r)^n}$$

Where,

C = Initial Capital outlay

A_1 , A_2 , A_3 etc. = Expected future cash inflows at the end of year 1, 2, 3 and so on.

r = Internal Rate of Return

n = Number of years of project

$$\text{IRR} = \frac{\text{Present value of the expected cash inflows}}{(1+i)^n} + \text{Initial Investment}$$

Where,

i = Discount rate

n = No. of periods

In the above equation 'r' is to be solved in order to find out IRR.

Computation of IRR

The IRR is to be determined by trial-and-error method. The following steps can be used for its computation.

(i) Compute the present value of the cash flows from an investment, by using arbitrary by selected interest rate.

(ii) Then compare the present value so obtained with capital outlay.

(iii) If the present value is higher than the cost, then the present value of inflows is to be determined by using higher rate.

(iv) This procedure is to be continued until the present value of the inflows from the investment are approximately equal to its outflow.

(v) The interest rate that brings about equality is the internal rate of return.

The rate at which the cost of investment and the present value of future cash flows match will be considered as the ideal rate of return. A project that can achieve this is a profitable project. In other words, at this rate the cash outflows and the present value of inflows are equal, making the project attractive.

Remember, the internal rate of return is using the interpolation technique to calculate it and it is very important to understand this concept so that you can get a better understanding of how IRR works. In order to find out the exact IRR between two near rates, the following formula is to be used.

$$\text{IRR} = L + \frac{P_1 - C_0}{P_1 - P_2} \times D$$

Where, L = Lower rate of interest

P_1 = Present value at lower rate of interest

P_2 = Present value at higher rate of interest

C_0 = Cash outlay

D = Difference in rate of interest

Illustration 8

Calculate IRR by using interpolation technique when initial investment is ₹ 56,000.

10%	₹60,000
11%	₹50,000

Solution:

10%	₹60,000
IRR = ?	₹56,000
11%	₹50,000

$$IRR = L + \frac{P_1 - C_0}{P_1 - P_2} \times D$$

Where, L = Lower rate of interest = 10%

P_1 = Present value at lower rate of interest = ₹ 60,000

P_2 = Present value at higher rate of interest = ₹ 50,000

C_0 = Cash outlay or initial investment = ₹ 56,000

D = Difference in rate of interest = 11% - 10% = 1%

$$= 10 + \frac{60000 - 56000}{60000 - 50000} \times 1$$

$$= 10.4\%$$

Accept-Reject Decision:

If the internal rate of return exceeds the required rate of return, then the project will be accepted. If the project's IRR is less than the required rate of return, it should be rejected. In case of ranking the proposals the technique of IRR is significantly used. The projects with highest rate of return will be ranked as first compared to the lowest rate of return projects.

Thus, the IRR acceptance rules are -

Accept if	**IRR > k**
Reject if	**IRR < k**
May accept or reject if	**IRR = k**

Where, 'k' is the cost of capital.

Advantages: The following are the advantages of the IRR method:

(i) **Consideration of time of money:** It considers the time value of money.

(ii) **Consideration of total Cash Flows:** It taken into account the cash flows over the entire useful life of the asset.

(iii) **(Maximising of shareholders' wealth:** It is in conformity with the firm's objective of maximizing owner welfare.

(iv) **Provision for risk and uncertainty:** This method automatically gives weight to money values which are nearer to the present period than those which are distant from it. Conversely, in case of other methods like

'Payback Period' and 'Accounting Rate of Return', all money units are given the same weight which is unrealistic. Thus, the IRR is more realistic method of project valuation. This method improves the quality of estimates reducing the uncertainty to minimum.

(v) **Elimination of pre-determined discount rate:** Unlike the NPV method, the IRR method eliminates the use of the required rate of return which is usually a pre-determined rate of cost of capital for discounting the cash flow consistent with the cost of capital. Therefore, the IRR is more reliable measure of the profitability of the investment proposals.

Limitation: The following are the limitations of the IRR:

(i) It is very difficult to understand and use

(ii) It involves a very complicated computational work

(iii) It may not give unique answer in all situations.

(iv) The assumption of re-investment of cash flows may not be possible in practice.

(v) In evaluating the mutually exclusive proposals, this method fails to select the most profitable project which is consistent with the objective of maximization of shareholders wealthy.

Both NPV and IRR are sound analytical tools of capital budgeting.Net present value (NPV) is the difference between the present value of cash inflows and the present value of cash outflows over a period of time. By contrast, the internal rate of return (IRR) is a calculation used to estimate the profitability of potential investments.

Similarities:

(i) NPV and IRR both are two discounted cash flow methods used for evaluating investments or capital projects.

(ii) Both recognize the time value of money.

(iii) Both take into account the cash flows over the entire life of the project.

(iv) Both are consistent with the objective of maximizing the wealth of shareholders.

(v) Both are difficult to calculate.

(vi) Both techniques may often give contradictory result in the case of alternative proposals which are mutually exclusive.

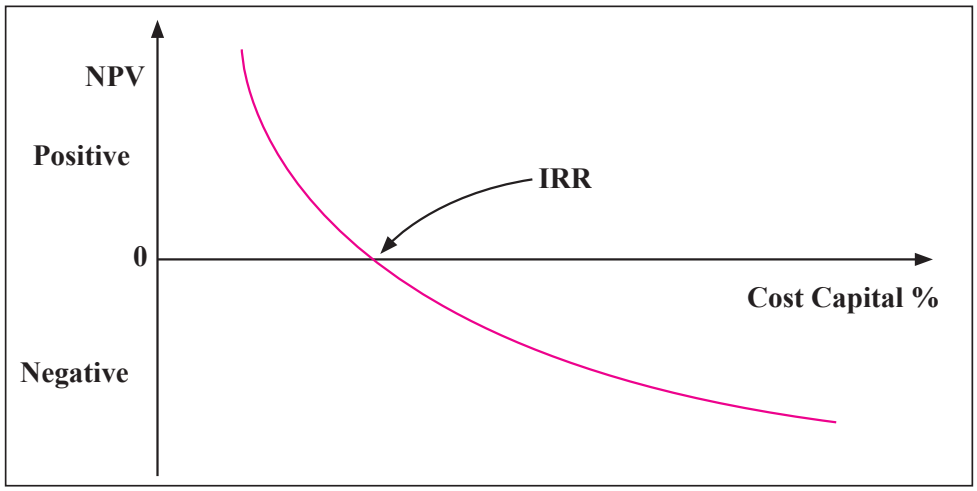

Figure 5.2: Accept Reject – Decisions

Contrast, i.e., Points of Difference –

(i) NPV uses the firm's cost of capital as interest rate. Unless the cost of capital is known, NPV method cannot be used. Calculating cost of capital is not required for computing IRR.

(ii) NPV may mislead when dealing with alternative projects or limited funds under the conditions of unequal lives. IRR allows a sound comparison of the project having different lives and different timings of cash inflows.

(iii) NPV may give different ranking in case of complicated projects as compared to IRR method.

(iv) NPV assumes that intermediate cash flows are re-invested at firm's cost of capital whereas IRR assumes that intermediate cash inflows are reinvested at the internal rate of the project.

(v) The results of IRR method may be inconsistent compared to NPV method, if the projects differ in their (a) expected lives or (b) investment or (c) timing of cash inflow.

(vi) IRR method favours short-lived project so long as it promises return in excess of cut-off rate whereas NPV method favours long-lived projects.

(vii) Sometimes IRR may give negative rate or multiple rates. NPV does not suffer from the limitation of multiple rates.

Recommendations -

The NPV method is generally considered to be superior theoretically because:

(i) It is simple to calculate as compared to IRR.

(ii) It does not suffer from the limitation of multiple rates.

(iii) NPV assumes that intermediate cash flows are reinvested at firm's cost of capital. The reinvestment assumption of NPV is more realistic than IRR method.

But IRR method is favoured by some analysts because:

(i) It is easier to visualize and to interpret as compared to NPV.

(ii) Even in the absence of cost of capital, IRR gives an idea of project's profitability. **Note -** Unless the cost of capital is known, NPV cannot be used.

(iii) IRR method is preferable to NPV in the evaluation of risky projects.

4. Discounted Payback Period (DPBP) Method:

The discounted payback period is a capital budgeting procedure used to determine the profitability of a project. A discounted payback period gives the number of years it takes to break even from undertaking the initial expenditure, by discounting future cash flows and recognizing the time value of money. Under this method the discounted cash inflows are calculated and where the discounted cash flows are equal to original investment then the period which is required is called discounting Payback period. While calculating discounting cash inflows the firm's cost of capital has been used.

The period of time that a project or investment takes for the present value of future cash flows to equal the initial cost provides an indication of when the project or investment will break even. The point after that is when cash flows will be above the initial cost.

Procedure for computation of Discounted Payback Period

Step 1: Determine the Total Cash Outflow of the project. (Initial Investment)

Step 2: Determine the Cash Inflow after Taxes (CFAT) for each year.

Step 3: Determine the present value of net cash inflow after taxes (CFAT)

= CFAT of each year x PV Factor for that year.

Step 4: Determine the cumulative present value of CFAT of every year.

Step 5:

- Find out the Discounted Payback Period as the time at which cumulative DCFAT equals Initial Investment.
- This is calculated on "time proportion basis" (usually following simple interpolation method).

The formula for the DPBP can be written as:

$$\textbf{DPBP} = \frac{\text{Total Investment}}{\text{Discounted annual cash inflows}}$$

[When cash flows are uniform]

When the project's cash inflows are not uniform, that means vary from year to year, payback period is calculated by the process of cumulating cash inflows till the time when cumulative cash flows become equal to the original investment outlay. If necessary, we have to use interpolation technique to find out the fraction of payback period.

$$\text{DPBP} = \text{Year before the discounted pay back period occurs} + \frac{\text{Cumulative cash flow in year before recovery}}{\text{Discounted cash flow in year after recovery}}$$

[When cash flows are not uniform]

Accept-Reject Decision:

The shorter a discounted payback period is means the sooner a project or investment will generate cash flows to cover the initial cost. A general rule to consider when using the discounted payback period is to accept projects that have a payback period that is shorter than the target timeframe. So, out of two projects, selection should be based on the period of discounting payback period (lesser payback period should be preferred.)

The shorter the discounted payback period, the quicker the project generates cash inflows and breaks even. While comparing two mutually exclusive projects, the one with the shorter discounted payback period should be accepted.

Advantages: Following are the advantages of discounted payback period:

(i) The discounted payback period is used as part of capital budgeting to determine which projects to take on.

(ii) More accurate than the standard payback period calculation, the discounted payback period factors in the time value of money.

(iii) The discounted payback period formula shows how long it will take to recoup an investment based on observing the present value of the project's projected cash flows.

(iv) The shorter a discounted payback period is, means the sooner a project or investment will generate cash flows to cover the initial cost.

Disadvantages: Following are the disadvantages of discounted payback period:

(i) One of the disadvantages of discounted payback period analysis is that it ignores the cash flows after the payback period.

(ii) Both payback and discounted payback method do not take into account the full life of the project. The overall benefit and profitability of a project cannot be measured under these methods because any cash flows beyond the payback period is ignored.

(iii) It may become a relative measure. In some situations, the discounted payback period of the project may be longer than the maximum desired payback period of the management but other measures like accounting rate of return (ARR) and internal rate of return (IRR) etc. may favor the project.

(iv) The accuracy of the output only depends upon the accuracy of the input provided, like the accuracy of figures of cash flows, the estimation of the timing of cash flows which affects their present values, and the accuracy of the discount rate to be used etc.

Illustration 9

Assume a business that is considering a given project. Below are some selected data from the discounted cash flow model created by the company's financial analysts:

A project requires an initial investment of ₹1,91,315 and is expected to generate the following net cash inflows:

Year 1: ₹95,000; Year 2: ₹80,000; Year 3: ₹60,000; Year 4: ₹55,000. Compute discounted payback period of the project if the appropriate discount rate for this project is 12%.

Solution:

We can calculate the discounted payback period as follows:

Computation of DPBP

Period	Cash Inflows Amount (₹)	PVIF @ 12%	Present Value (₹)	Cumulative Present Value (₹)
Year 1	95,000	0.893	84,835	84,835
Year 2	80,000	0.797	63,760	1,48,595
Year 3	**60,000**	**0.712**	**42,720**	**1,91,315**
Year 4	55,000	0.636	34,980	2,26,295

In this case, we see that the project's payback period is 3 years.

Payback Period Vs. Discounted Payback Period

The payback period is the amount of time for a project to break even in cash collections in financial value of money. Alternatively, the discounted payback period reflects the amount of time necessary to break even in a project, based not only on what cash flows occur but when they occur and the prevailing rate of return in the market. The discounted payback period follows time value of money whereas payback period does not.

These two calculations, although similar, may not return the same result due to the discounting of cash flows. For example, projects with higher cash flows toward the end of a project's life will experience greater discounting due to compound interest. For this reason, the payback period may return a positive figure, while the discounted payback period returns a negative figure.

5. Modified Net Present Value (MNPV)

One of the limitations of NPV method is that reinvestment rate in case of NPV is Cost of Capital (k). However, in case of MNPV, different reinvestment rates for the cash inflows over the life of the project may be used. Under this modified approach, terminal value of the cash inflows is calculated using such expected reinvestment rate (s). Thereafter, MNPV is determined with present value of such terminal value of the cash inflows and present value of the cash outflows using cost of capital (k) as the discounting factor.

Terminal value is the sum of the compounded value of cash inflows of different years at the end of the life of the project. If the life of the project is 'n' years, cash inflow of period 't' is CF_t and reinvestment rate is 'r', the terminal value will be $\sum(CF_t)^{n-t}$.

6. Modified Internal Rate of Returns (MIRR)

The modified internal rate of return (MIRR) is a financial measure of an investment's attractiveness. It is used in capital budgeting to rank alternative investments of equal size. As the name implies, MIRR is a modification of the internal rate of return (IRR) and as such aims to resolve some problems with the IRR.

IRR assumes that interim positives cash flows are reinvested at the rate of returns as that of the project that generated them. This is usually an unrealistic scenario. To overcome this draw back a new technique emerges. Under MIRR the earlier cash flows are reinvested at firm's rate of return and finding out the terminal value. MIRR is the rate at which present value of terminal values equal to outflow (Investment).

The procedure for calculating MIRR is as follows:

$$\textbf{MIRR} = \textbf{(Future value of positive cash flows / present value of negative cash flows)} \left(\frac{1}{n}\right) - \textbf{1.}$$

Advantages:

(i) The standard internal rate of return calculation may overstate the potential future value of a project.

(ii) MIRR can distort the cost of reinvested growth from stage to stage in a project.

(iii) MIRR allows for adjusting the assumed rate of reinvested growth for different stages of a project.

Disadvantages:

The disadvantage of MIRR is that it asks for two additional decisions, i.e., determination of financing rate and cost of capital.

Illustration 10

M Ltd. for a construction company and asked you to calculate the MIRR for two mutually exclusive projects to determine which project should be selected.

Project X has a total life of 3 years with a cost of capital 12% and a financing cost 14%.

Project Y has a total life of 3 years with a cost of capital 15% and a financing cost 18%.

The expected cash flows of the projects are in the table below: (₹)

Year	Project X	Project Y
0	-1,000	-800
1	-2,000	-700
2	4,000	3,000
3	5,000	1,500

Solution:

M Ltd. calculates the future value of the positive cash flows discounted at the cost of capital.

Project X: ₹4,000 × (1 + 12%)1 + ₹5,000 = ₹9,480

Project Y: ₹3,000 × (1 + 15%)1 + ₹1,500 = ₹4,950

Then, it calculates the present value of the negative cash flows discounted at the financing cost.

Project X: ₹ –1,000 + ₹(–2,000) / (1 + 14%)1 = ₹–3,000

Project Y: ₹ – 800 + ₹(–700 / 1 + 18%)1 = ₹–1,500

To calculate the MIRR for each project M Ltd. uses the formula:

MIRR = (Future value of positive cash flows / present value of negative cash flows) (1/n) – 1.

Therefore,

Project X: ₹9,480 / (₹3,000)1/3 -1 = 5.3%

Project Y: ₹ 4,950 / (₹1,500)1/3 -1 = 10.0%

Given that these are mutually exclusive projects and project Y should be undertaken because it has a higher MIRR than project X.

7. Adjusted Net Present Value

For determining NPV, weighted average cost of capital is used as the discounting factor, based on the assumption that every project is financed by the same proportions of debt and equity as found in the capital structure of the firm. However, that may not be true. Moreover, tax advantages (savings in tax) due to use of borrowed fund is not usually considered in financial appraisal of investment proposals discussed so far. But impact of debt financing can be incorporated using Adjusted Present Value Method with an adjustment of tax aspects of debt financing with the Base Case NPV.

Base Case NPV is the NPV under the assumption that the project is all-equity financed.

Adjusted NPV = Base case NPV + NPV of Tax Shields arising out of financing decisions associated with the project.

Illustration 11

A firm is considering a project requiring ₹50 lakh of investment. Expected cash flow is ₹10 lakh per annum for 8 years. The rate of return required by the equity investors from the project is 15%. The firm is able to raise ₹ 24 lakh of debt finance carrying 14% interest for the project. The debt is repayable in equal annual installments over the eight-year period – the first to be paid at the end of the first year. The tax rate is 40%. You are required to calculate adjusted NPV. Assume equity cost is 5%.

Solution:

Base case NPV = ₹ (–) 50,00,000 + ∑ ₹ 10,00,000 / 1.158 = ₹ (–) 5,12,700

Equity Finance ₹ 26 lakh, Debt Finance ₹ 24 lakh.

Equity Issue Cost is assumed to be 5%.

Therefore, to get ₹ 26 lakh, total equity issue = ₹ 26 / 0.95 = ₹ 27.37 lakh

Difference of ₹ (27.37 – 26) lakh = ₹ 01.37 lakh is the cost of underwriting, brokerage, etc. for the issue.

(₹ in lakh)

Year	1	2	3	4	5	6	7	8
Outstanding Debt at the beginning	24	21	18	15	12	09	06	03
Interest	3.36	2.94	2.52	2.10	1.68	1.26	0.84	0.42
Tax Shield	1.344	1.176	1.008	0.840	0.672	0.504	0.336	0.168
PV of Tax Shield	1.179	0.9049	0.6804	0. 497	0.349	0.230	0.134	0.059

(Discounting at 14%, cost of debt) Total PV of Tax Shield: 4.0333

Adjusted NPV = Base case NPV – Issue Cost + Present Value of Tax Shield

= ₹ (– 5,12,700 – 1,37,000 + 4,03,333) = ₹ (–) 2,46,367

Hurdle Rate in a Conglomerate Environment

5.5

Conglomerates are companies that either partially or fully own a number of other companies. Here, conglomerate means large company. In case of investment in or by the large company environment, hurdle rate is an important criterion. Hurdle rate will guide us to make effective investment decision. A hurdle rate, which is also known as benchmark or cut-off rate or the minimum required rate of return or target rate that investors are expecting to receive on an investment. The rate is determined by assessing the cost of capital, risks involved, current opportunities in business expansion, rates of return for similar investments, and other factors that could directly affect an investment.

In other words, before accepting and implementing a certain investment project, its internal rate of return (IRR) should be equal to or greater than the hurdle rate. Any potential investments must possess a return rate that is higher than the hurdle rate in order for it to be acceptable in the long run.

As we find in practical, most companies use their Weighted Average Cost of Capital (WACC) as a hurdle rate for investments. Generally, it is utilized to analyze a potential investment, taking the risks involved and the opportunity cost of foregoing other projects into consideration. One of the main advantages of a hurdle rate is its objectivity, which prevents management from accepting a project based on non-financial factors. Some projects get more attention due to popularity, while others involve the use of new and exciting technology. Another way of looking at the hurdle rate is that it's the required rate of return investors demand from a company. Therefore, any project the company invests in must be equal to or ideally greater than its cost of capital.

In conglomerate environment, at present, the most common way to use the hurdle rate to evaluate an investment is using a discounted cash flow (DCF) technique. The DCF technique uses the concept of the time value of money (opportunity cost) to forecast all future cash flows and then discount them back to today's value to provide the net present value.

NPV Vs. IRR

In case of mutually exclusive projects, financial appraisal using NPV & IRR methods may provide conflicting results. The reasons for such conflicts may be attributed to

(i) Difference in timing / pattern of cash inflows of the alternative proposals (Time Disparity),

(ii) Difference in their amount of investment (Size Disparity) and

(iii) Difference in the life of the alternative proposals (Life Disparity).

Capital Rationing

There may be situations where a firm has a number of independent projects that yield a positive NPV or having IRR more than it's cut off rate, PI more than 1, i.e., the projects are financially viable, hence, acceptable. However, the most important resource in investment decisions, i.e., funds, are not sufficient enough to undertake all the projects. In such a case, the projects are selected in such a way so that NPV becomes maximum in order to maximize wealth of shareholders. Investment planning in such situation is Capital Rationing.

There are two possible situations of Capital Rationing

(i) Generally, firms fix up maximum amount that can be invested in capital projects, during a given period of time, say a year. This budget ceiling imposed internally is called as Soft Capital Rationing or Internal Capital Rationing.

(ii) There may be a market constraint on the amount of funds available for investment during a period. This inability to obtain funds from the market, due to external factors is called Hard Capital Rationing or External Capital Rationing.

Different proposals may be classified into **two categories**:

Divisible and Indivisible

In case of divisible projects, part acceptance of the project is possible. Indivisible projects are either to be accepted in its entirety or to be rejected, i.e., part acceptance is not possible. For divisible projects, **PI** approach help in selecting the proposals providing the **highest NPV**. For indivisible projects, through trial-and-error methods, best combination of the projects with the **highest NPV** may be ascertained.

For Divisible Projects

Rank the projects following PI and arrange them in descending order. Go on selecting the projects till the fund is available.

For Indivisible Projects

Determine all the feasible combinations of the projects and rank them according to total NPV of the combinations. Select the combination with the highest NPV.

Illustration 12

X Ltd. has a capital budget of ₹ 1.5 crore for the year. From the following information relating to six independent proposals, select the projects if (i) the projects are divisible and (ii) the projects are indivisible.

Proposal	Investments (₹)	NPV (₹)
A	70,00,000	30,00,000
B	25,00,000	16,00,000
C	50,00,000	20,00,000
D	20,00,000	10,00,000
E	55,00,000	45,00,000
F	75,00,000	-25,00,000

If the projects are divisible

Projects are ranked according to PI and arranged in descending order.

Proposal Rank NPV (₹)	Investments (₹)	PV of Inflows (NPV+I)	PI	Rank	NPV (₹)
A	70,00,000	1,00,00,000	100/70 = 1.43	(4)	30,00,000
B	25,00,000	41,00,000	41/25 = 1.64	(2)	16,00,000
C	50,00,000	70,00,000	70/50 = 1.4	(5)	20,00,000
D	20,00,000	30,00,000	30/20 = 1.5	(3)	10,00,000
E	55,00,000	1,00,00,000	100/55 = 1.8	(1)	45,00,000
F	75,00,000	50,00,000	50/75 = 0.67		-25,00,000

Proposal	Investments (₹)	Cum. Inv. (₹)	NPV (₹)	Cum. NPV
E	55,00,000	55,00,000	45,00,000	45,00,000
B	25,00,000	80,00,000	16,00,000	61,00,000
D	20,00,000	100,00,000	10,00,000	71,00,000
A*	70,00,000	170,00,000	30,00,000	92,42,857*
C	50,00,000	220,00,000	20,00,000	

*Only ₹50,00,000 can be invested in Project A, i.e., $5/7^{th}$ of the total investment can be made. Proportionate NPV is 5/7 × ₹30,00,000 = ₹21,42,857

- So selected projects are E, B, D and 5/7th part of A

If the projects are indivisible

Feasible Sets	Investments (₹)	NPV (₹)
EBDC	1,50,00,000	91,00,000
EBA	1,50,00,000	91,00,000
BAC	1,45,00,000	66,00,000
DAC	1,40,00,000	60,00,000
EBC	1,30,00,000	81,00,000

Either EBDC or EBA, which provides the maximum NPV, may be undertaken.

Illustration 13

A limited company is considering investing a project requiring a capital outlay of ₹ 2,00,000. Forecast for annual income after depreciation but before tax is as follows:

Year	(₹)
1	1,00,000
2	1,00,000
3	80,000
4	80,000
5	40,000

Depreciation may be taken as 20% on original cost and taxation at 50% of net income.

You are required to evaluate the project according to each of the following methods:

(a) Payback period method

(b) Rate of return on original investment method

(c) Rate of return on average investment method

(d) Discounted cash flow method taking cost of capital as 10%

(e) Net present value index method

(f) Internal rate of return method.

(g) Modified internal rate of return method.

Solution:

Working Notes:

Year	Profit before tax (₹)	Profit after tax @ 50% (₹)	Cash inflows after tax [PAT + Dep] (₹)	Cumulative cash inflows (₹)	Discounting factor @ 10%	Present Value (₹)	Discounting factor @ 20%	Present value @20% (₹)	Discounting factor @ 30%	Present Value @30% (₹)	Discounting factor @ 32%	Present value @32% (₹)
1	1,00,000	50,000	90,000	90,000	0.9091	81,819	0.8333	74,997	0.7692	69,228	0.7576	68,184
2	1,00,000	50,000	90,000	1,80,000	0.8264	74,376	0.6944	62,496	0.5917	53,253	0.5739	51,651
3	80,000	40,000	80,000	2,60,000	0.7513	60,104	0.5787	46,296	0.4552	36,416	0.4348	34,784
4	80,000	40,000	80,000	3,40,000	0.6830	54,640	0.4823	38,584	0.3501	28,008	0.3294	26,352
5	40,000	20,000	60,000	4,00,000	0.6209	37,254	0.4019	24,114	0.2693	16,158	0.2495	14,970
						308193		**246487**		**203063**		**195941**

(a) Payback Period Method

Payback period = 2 + ₹ 20,000/₹ 80,000

= 2.25 years (or) 2 years 3 months

(b) Rate of Return on Original Investment Method

ARR = (Average Profit after Tax / Investment) × 100

= (₹ 40,000 / ₹ 2,00,000) × 100

= 20%

(c) Rate of Return on Average Investment Method

ARR = (Average Profit after Tax / Average Investment) × 100

= ₹ 40,000 / (₹ 2,00,000 + 0/2) × 100

= 40%

(d) Discounted Cash Flow Method taking Cost of Capital as 10%

Present value of cash inflows after tax (₹)	3,08,193
Less: Outflow (₹)	2,00,000
Net Present Value (₹)	1,08,193

(e) Profitability Index

Profitability Index = P.V of Cash Inflows / Cash Outflow

= ₹ 3,08,193 / ₹ 2,00,000

= 1.54

Since PI is more than 1 the company can accept the project.

(f) Internal Rate of Return Method

IRR = L + [P1 – I / P1 – P2] × d

= 30 + (2,03,063 – 2,00,000) / (2,03,063 – 1,95,941) × 2

= 30 + 0.8602

= 30.8602%

(g) Modified Internal Rate of Return (MIRR)

	1	2	3	4	5	Total
Cash inflow after tax (₹)	90,000	90,000	80,000	80,000	60,000	--
Re-investment period	4	3	2	1	0	
Re-investment at	10%	10%	10%	10%	10%	
Future value factor	(1.1)4	(1.1)3	(1.1)2	(1.1)	1	
Future value (₹)	1,31,769	1,19,790	96,800	88,000	60,000	4,96,359

At MIRR = 2,00,000 [1 + MIRR]5 = ₹ 4,96,359

= [1 + MIRR]5 = ₹ 4,96,359 /₹ 2,00,000 = 2.48

MIRR = 20% (Please see Annuity Tables)

Illustration 14

A company has just installed a machine Model A for the manufacture of a new product at capital cost of ₹ 1,00,000. The annual operating costs are estimated at ₹ 50,000 (excluding depreciation) and these costs are estimated on the basis of an annual volume of 1,00,000 units of production. The fixed costs at this volume of 1,00,000 units of output will amount to ₹ 4,00,000 p.a. The selling price is ₹ 5 per unit of output. The machine has a five-year life with no residual value.

The company has now come across another machine called Super Model which is capable of giving, the same volume of production at an estimated annual operating cost of ₹ 30,000 exclusives of depreciation. The fixed costs will however, remain the same in value. This machine also will have a five-year life with no residual value. The capital cost of this machine is ₹ 1,50,000.

The company has an offer for the sale of the machine Model A (which has just been installed) at ₹ 50,000 and the cost of removal thereof will amount to ₹ 10,000. Ignore tax.

In view of the lower operating cost, the company is desirous of dismantling of the machine Model A and installing the Super Model Machine. Assume that Model A has not yet started commercial production and that the time lag in the removal thereof and the installation of the Super Model machine is not material.

The cost of capital is 14% and the P.V. Factors for each of the five years respectively are 0.877, 0.769, 0.675, 0.592 and 0.519.

State whether the company should replace Model A machine by installing the Super Model machine. Will there be any change in your decision if the Model A machine has not been installed and the company is in the process of consideration of selection of either of the two models of the machine? Present suitable statement to illustrate your answer.

Solution:

(A) Appraisal of Replacement Decision under NPV method

Step 1:

Calculation of Present value of net cash outflow or net investment required.	(₹)	
Cost of super model		1,50,000
Less: Sale proceeds of Model A	50,000	
(-) Cost of removal	10,000	40,000
Net investment required		1,10,000

Step 2:

Calculation of present value of incremental operating cash flows:

Particulars	Model A	Super Model	Incremental
Sales p.a. (units)	1,00,000	1,00,000	
Sales p.a. [₹] [1,00,000 × 5] [a]	5,00,000	5,00,000	
Less: Expenses (₹)			
Operating cost (₹)	50,000	30,000	
Fixed cost (₹)	4,00,000	4,00,000	
Total Cost (₹) [b]	**4,50,000**	**4,30,000**	
Cash Inflows(₹) [a – b]	**50,000**	**70,000**	**20,000**

Step 3:

Present value of terminal cash inflow [Salvage value] - NIL

Step 4:

Calculation of NPV		(₹)
Present value of total cash inflows	=	68,660
(Recurring + Salvage)		
Less: Outflow	=	1,10,000
Net Present Value	=	(41,340)

Comment:

As net present value is negative, the replacement decision is not financially feasible.

Working Notes:

* 1. Total incremental cash inflows = ₹ 20,000

Present value of incremental recurring cash inflows for 5 years

= ₹ 20,000 × PVAF 5 years 14%

= ₹ 20,000 × 3.433

P.V of cash flows = ₹ 68,660

(B) Appraisal of Mutually Exclusive Decision under NPV method

Alternative I – Model A

Calculation of NPV under Alternative I

Step 1:

Calculation of Present value of cash outflow

Cost of machine = ₹ 1,00,000

Step 2:

Calculation of present value of recurring cash inflows or operating cash inflows

Cash inflows after tax (as above) – ₹ 50,000

PV of operating cash inflows for 5 years = ₹ 50,000 × PVAF 5 years 14%

= ₹ 50,000 × 3.433

= ₹ 1,71,650

Step 3:

Calculation of PV of terminal cash inflows = Nil

Step 4:

Calculation of NPV		(₹)
PV of total cash inflows	=	1,71,650
Less: Outflow	=	1,00,000
Net Present Value (under alternative I)	=	**71,650**

Alternative II : Super Model

Calculation of NPV under Alternative II

Step 1:

Calculation of Present value of cash outflow

Cost of Machine = ₹ 1,50,000

Step 2:

Calculation of operating cash inflows or PV of recurring cash inflows

PV of operating cash inflows for 5 years = ₹ 70,000 × PVAF 5 years 14% = ₹ 70,000 × 3.433 = ₹ 2,40,310

Step 3:

Calculation of PV of terminal cash inflow – NIL

Step 4:

Calculation of NPV	(₹)
PV of total cash inflow [₹ 2,40,310 + 0]	= 2,40,310
Less: Cash Outflow	= 1,50,000
Net Present Value (under alternative II)	= **90,310**

Comment: As NPV of Super Model is more [₹ 90,310] than that of Model A [₹ 71,650], it is advised to select Super Model.

Illustration 15

A chemical company is considering replacing an existing machine with one costing ₹ 65,000. The existing machine was originally purchased two years ago for ₹ 28,000 and is being depreciated by the straight-line method over its seven-year life period. It can currently be sold for ₹ 30,000 with no removal costs. The new machine would cost ₹ 10,000 to install and would be depreciate over five years. The management believes that the new machine would have a salvage value of ₹ 5,000 at the end of year 5. The management also estimates an increase in net working capital requirement of ₹ 10,000 as a result of expanded operations with the new machine. The firm is taxed at a rate of 55% on normal income and 30% on capital gains. The company's expected after-tax profits for next 5 years with existing machine and with new machine are given as follows:

Expected after-tax profits (₹)		
Year	**With existing machine**	**With new machine**
1	2,00,000	2,16,000
2	1,50,000	1,50,000
3	1,80,000	2,00,000
4	2,10,000	2,40,000
5	2,20,000	2,30,000

(a) Calculate the net investment required by the new machine.

(b) If the company's cost of capital is 15%, determine whether the new machine should be purchased.

Solution:

Appraisal of Replacement Decision under NPV method

Step 1:

Calculation of present value of net investment required:	(₹)	(₹)
Cost of new asset		65,000
Add: Installation cost		10,000
		75,000
Add: Additional WC		10,000
		85,000
Less: Sale proceeds of old machine	30,000	
Less: Tax	5,000	
[8,000 × 55/100 + 2000 × 30/100]		25,000
Net Investment required		60,000

Step 2:

Calculation of Present Value of Incremental Operating cash inflows for 5 years.

Year	CIAT (PAT + Dep) (₹)	New (₹)	Incremental (₹)	PV factor at 15%	Present Value (₹)
1	2,04,000	2,30,000	26,000	0.8696	22,609
2	1,54,000	1,64,000	10,000	0.7561	7,561
3	1,84,000	2,14,000	30,000	0.6575	19,725
4	2,14,000	2,54,000	40,000	0.5718	22,872
5	2,24,000	2,44,000	20,000	0.4972	9,944
PV of cash inflows for 5 years					**82,711**

Step 3:

Calculation of PV of terminal cash inflow		(₹)
Salvage value of asset		5,000
[No tax because book value and salvage value are equal]		
Working capital recovered [100% recovered]		10,000
Terminal cash inflows		15,000
Its PV at the end of 5th year	= ₹15,000 × 0.4972	= 7,458

Step 4:

Calculation of NPV		(₹)
PV of total cash inflows [₹82,711 + ₹7,458]	=	90,169
(–) Outflow	=	60,000
NPV	=	**30,169**

Comment:

As NPV is positive, it is advised to replace.

Note 1: Depreciation for old Machine = ₹28,000 / 7 = ₹ 4,000

$$\text{Depreciation for new Machine} = \frac{65000+10000-5000}{5} = ₹14,000$$

Illustration 16

A project costing ₹ 5,60,000 is expected to produce annual net cash benefits (CFAT) of ₹ 80,000 over a period of 15 year. Estimate the internal rate of return (IRR). Also, find the payback period and obtain the IRR from it. How do you compare this IRR with the one directly estimated?

Solution:

$$\text{Payback value} = \frac{₹\ 5,60,000}{₹\ 80,000} = ₹\ 7.000$$

The factors closet to ₹ 7,000 are 7.191 at 11% rate of discount and 6.811 at 12% rate of discount against 15 years The actual IRR would be between 11 and 12%.

Using interpolation, the IRR would be 0.11 + 0.005 (0.19 ÷0.38 = 11.5%.

IRR determination through PB period:

The reciprocal of the Payback period is a good approximation of the IRR if,

(i) the life of the project is at least twice the PB period, and

(ii) the project generates annuity cash inflows. Accordingly, IRR would be the reciprocal of the PB period, i.e. 1/7 = 0.1428 = 14.28%.

Comparison: The two IRRs are different. But the IRR which is directly estimated is correct as at this rate of discount, NPV of cash flow stream of the project would be zero. The NPV cannot be zero at 14.28%. The IRR through the Payback period is only an approximate measure.

Illustration 17

A plastic manufacturer has under consideration the proposal of production of high-quality plastic glasses. The necessary equipment to manufacture the glasses would cost ₹ 1 lakh and would last 5 year The tax relevant rate of depreciation is 20% on written down value. There is no other asset in this block. The expected salvage value is ₹ 10,000. The glasses can be sold at ₹ 4 each. Regardless of the level of production, the manufacturer will incur cash cost of ₹ 25,000 each year if the project is undertaken. The overhead costs allocated to this new line would be ₹ 5,000. The variable costs are estimated at ₹ 2 per glass. The manufacturer estimates it will sell about 75,000 glasses per year; the tax rate is 35%. Should the proposed equipment be purchased? Assume 20% cost of capital and additional working requirement, ₹ 50,000.

Solution:

Cash outflows	
Cost of production equipment (₹)	1,00,000
Additional working capital requirement (₹)	50,000
Cash outflows (₹)	1,50,000

Determination of CFAT and NPV					
Particulars	**Years**				
	1 (₹)	**2 (₹)**	**3 (₹)**	**4 (₹)**	**5 (₹)**
Sales revenue (75,000 × ₹4)	3,00,000	3,00,000	3,00,000	3,00,000	3,00,000
Less: Costs					
Variable costs (75,000 × 2)	1,50,000	1,50,000	1,50,000	1,50,000	1,50,000
Additional fixed costs	25,000	25,000	25,000	25,000	25,000
Depreciation (D)	20,000	16,000	12,800	10,240	Nil *
Earnings before taxes	1,05,000	1,09,000	1,12,200	1,14,760	1,25,000
Less: Taxes	36,750	38,150	39,270	40,166	43,750
Earnings after taxes (EAT)	68,250	70,850	72,930	74,594	81,250
CFAT (EAT + D)	88,250	86,850	85,730	84,834	81,250
Add: Recovery of Working Capital					50,000
Add: Salvage value (SV)					10,000
Add: Tax benefit on short term capital loss **					10,836
					1,52,086
Multiplied by PV factor @ 0.20	0.833	0.694	0.579	0.482	0.402
PV (CFAT × PV factor)	73,512	60,274	49,638	40,890	61,139
Total PV (t = 1 – 5)					2,85,453
Less: Cash outflows					1,50,000
NPV					1,35,453

* As the block consists of single asset, no depreciation is to be charged in the terminating year as the asset has been sold in the year.

** (₹ 1,00,000 – ₹ 59,040 accumulated depreciation – ₹ 10,000, SV) × 0.35 = ₹ 10,836.

Recommendation: The company is advised to buy the proposed equipment

Illustration 18

Modern Enterprises Ltd. is considering the purchase of a new computer system for its research and development division, which would cost ₹ 35 lakh. The operation and maintenance costs (excluding depreciation) are expected to be ₹ 7 lakh per annum. It is estimated that the useful life of the system would be 6 years, at the end of which the disposal value is expected to be ₹ 1 lakh.

The tangible benefits expected from the system in the form of reduction in design and draftsmanship costs would be ₹ 12 lakh per annum. The disposal of used drawing office equipment and furniture initially is anticipated to net ₹ 9 lakh.

As capital expenditure in research and development, the proposal would attract a 100% write-off for tax purposes. The gains arising from disposal of used assets may be considered tax free. The effective tax rate is 35%. The average cost of capital of the company is 12%.

After appropriate analysis of cash flows, advise the company of the financial viability of the proposal. Ignore tax on salvage value.

Solution:

Assessment of Financial Viability of proposal	(₹ in lakh)
Incremental cash outflows	
Cost of new computer system	35
Less: Sale proceeds from drawing office equipment and furniture	9
	26
Incremental CFAT and NPV:	
(a) Cost savings (years 1–6)	
Reduction in design and draftsmanship costs	12
Less: Operation and maintenance costs	7
Cost savings (earnings) before taxes	5
Less: Taxes (0.35)	**1.75**
Earnings after taxes (CFAT)	3.25
(×) PV factor of annuity for 6 years (0.12)	× 4.111
Total PV of cost savings	13.36
(b) Tax savings on account of depreciation	
Cost of new computer system (₹ 35 lakhs × 0.35)	12.25
(×) PV factor for year 1	× 0.892
Total PV	9.93
(c) Terminal salvage value at the end of year 6 (₹ 1 lakh × 0.507)	**0.507**
(d) Gross PV of CFAT [(a) + (b) + (c)]	**24.797**
Less: Cash outflows	**26.000**
NPV	**(1.203)**

Illustration 19

A textile company is considering two mutually exclusive investment proposals. Their expected cashflow streams (CFAT) are given as follows:

Year	Proposal X (₹in thousand)	Proposal Y (₹ in thousand)
0	(500)	(700)
1	145	100
2	145	110

Year	Proposal X (₹in thousand)	Proposal Y (₹ in thousand)
3	145	130
4	145	150
5	145	160
6	145	150
7		120
8		120
9		110
10		100

The company employs the risk-adjusted method of evaluating risky projects and selects the appropriate required rate of return as follows:

Project payback	Required rate of return (percentage)
Less than 1 year	8
1 to 5 years	10
5 to 10 years	12
Over 10 years	15

Which proposal should be acceptable to the company?

Solution:

i. **Payback period (PB) for Proposal X** = ₹ 5,00,000/₹ 1,45,000 = 3.448 year

The appropriate risk adjusted rate of return for payback period of 3.448 years is 0.10.

ii. **Payback period for proposal Y**

Year	Cash flows (₹ in thousand)	Cumulative cash flows (₹ in thousand)
1	100	100
2	110	210
3	130	340
4	150	490
5	160	650
6	150	800

The payback period for Proposal Y is 5 years and 4 months and the appropriate risk adjusted rate of return is 0.12.

iii. **Net present value of proposal X**

Years	CFAT		Total PV
1-6	₹ 1,45,000	4.355	₹ 6,31,475
Less: Cash utflows			5,00,000
NPV			1,31,475

iv. **Net present value of proposal Y**

Year	CFAT (₹ thousand)	PV factor (at 0.12)	Total PV (₹)
1	100	0.893	89,300
2	110	0.797	87,670
3	130	0.712	92,560
4	150	0.636	95,400
5	160	0.567	90,720
6	150	0.507	76,050
7	120	0.452	54,240
8	120	0.404	48,480
9	110	0.361	39,710
10	100	0.322	32,200
Total PV			7,06,330
Less: Cash outflows			7,00,000
NPV			6,330

Proposal X should be acceptable to the company as its NPV is higher than that of Proposal Y.

Illustration 20

A machine costing ₹ 110 lakh has a life of 10 years, at the end of which its scrap value is likely to be ₹ 10 lakh. The firm's cut-off rate is 12 %. The machine is expected to yield an annual profit after tax of ₹ 10 lakh, depreciation being reckoned on straight line basis for tax purposes. At 12%, the PV of the rupee received annually for 10 years is 5.650, and the value of one rupee received at the end of the tenth year is 0.322. Ascertain the NPV of the project.

Solution:

Net Present Value (NPV)

Particulars	Amount (₹)
1. Profit after Tax (PAT)	10,00,000
2. Add: Depreciation (₹1,00,00,000 ÷ 10 years)	10,00,000
3. CFAT (1 + 2) for years 1-10	20,00,000
4. PV factor (annuity) for 10 years (at 0.12) = 5.650	
5. Total PV (3 × 4)	1,13,00,000
6. (a) CFAT in year 10 = ₹ 10,00,000 (b) Relevant PV factor = 0.322 (c) Additional PV in year 10 (a × b)	3,22,000
7. Total PV (5 + 6)	1,16,22,000
8. Project cost (t = 0)	1,10,00,000
9. NPV (7 – 8)	6,22,000

Illustration 21

A company has to replace one of its machines, which has become unserviceable. Two options are available to the company:

(i) A more expensive machine (EM) with 12 years life.

(ii) A less expensive machine (LM) with 6 years life.

If machine LM is chosen, it will be replaced at the end of 6 years by another LM machine.

The pattern of maintenance, running costs and prices as under:

Particulars	EM (₹)	LM (₹)
Purchase price	20,00,000	14,00,000
Scarp value at end of life	3,00,000	3,00,000
Overhauling is due at the end of	8th Year	4th Year
Overhauling cost	4,00,000	2,00,000
Annual repairing expenses	2,00,000	2,80,000

Cost of capital is 14%.

You are required to recommend which of the machines should be purchased.

Given, Present Value Interest Factor, PVIF (14%)

Year	4	6	8	12
PV Factor	0.5921	0.4556	0.3506	0.2076

Present Value Interest Factor for an Annuity, PVIFA (14%)

Year	1 to 6 Years	1 to 12 Years
PV Factor	3.8899	5.6600

Solution:

Machine EM -12 Year's Life

Particulars	Year	Cost (₹)	Discount Factor	Present Value (₹)
Purchase price	0	20,00,000	1.000	20,00,000
Overhauling cost	8	4,00,000	0.3506	1,40,240
Annual repairing expenses	1-12	2,00,000	5.6600	11,32,000
Scrap value	12	3,00,000	0.2076	(62,280)
Total NPV outflow				32,09,960

Machine LM -6 Year's Life

Particulars	Year	Cost (₹)	Discount Factor	Present Value (₹)
Purchase price	0	14,00,000	1.000	14,00,000
Overhauling cost	4	2,00,000	0.5921	1,18,420
Annual repairing expenses	6	2,80,000	3.8890	10,88,920
Scrap value	12	3,00,000	0.4556	(1,36,680)
Total NPV outflow				24,70,660

Equated annual values: EM = ₹ 32,09,960/5.6600 = ₹ 5,67,130

LM = ₹ 24,70,660/3.889 = ₹ 6,35,647

Decision: Since, annualized value of EM is less, it is suggested to replace existing machine with Machine EM.

Illustration 22

Electronics Pvt. Ltd. is considering a proposal to replace one of its machines. In this connection, the following information is available.

The existing machine was purchased 3 years ago for ₹ 20 Lakh. It was depreciated 20% per annum on reducing balance basis. It has remaining useful life of 5 years, but its annual maintenance cost is expected to increase by ₹ 1 Lakh form the sixth year of its installation. Its present realizable value is ₹ 12 Lakh. The company has several machines, having 20% depreciation.

The new machine costs ₹ 30 Lakh and is subject to the same rate of depreciation. On sale after 5 years, it is expected to realize ₹ 18 Lakh. With the new machine, the annual operating costs (excluding depreciation) are expected to decrease by ₹ 2 Lakh. In addition, the machine would increase productivity on account of which net revenues would increase by ₹ 3 Lakh annually. The tax rate applicable to the company is 40% and the cost of capital is 10%.

Is the proposal financially viable? Advise the company on the basis of NPV of the proposal.

PV Factors (10%)

Year	1	2	3	4	5
PV Factor	0.909	0.826	0.751	0.683	0.620

Solution:

A. Calculation of Incremental Cash outflows

Cost of new machine	₹ 30,00,000
Less: Sale value of existing machine	₹ 12,00,000
	₹ 18,00,000

B. Determination of Cash Flows after Taxes (CFAT) (Operating) (₹)

Year (1)	Incremental cash profits before taxes (2)	Incremental depreciation (3)	Taxable income (4) = [2-3]	Taxes @ 40% (5)	Earnings after Tax (EAT) (6) = [4-5]	Cash Flows After Taxes (CFAT) (7) = [6+3]
1	5,00,000	3,60,000	1,40,000	56,000	84,000	4,44,000
2	5,00,000	2,88,000	2,12,000	84,800	1,27,200	4,15,200

3	6,00,000	2,30,400	3,69,600	1,47,840	2,21,760	4,52,160
4	6,00,000	1,84,320	4,15,680	1,66,272	2,49,408	4,33,728
5	6,00,000	1,47,456	4,52,544	1,81,018	2,71,526	4,18,982

C. Determination of Net Present Value (NPV)

Year	Cash Flows After Taxes (₹)	PV Factor (0.10)	Total PV (₹)
1	4,44,000	0.909	4,03,596
2	4,15,200	0.826	3,42,955
3	4,52,160	0.751	3,39,572
4	4,33,728	0.683	2,96,236
5	4,18,982	0.620	2,59,769
6	9,00,000 (Net Salvage Value)	0.620	5,58,000
Total Present Value			**2,200,129**
Less: Incremental Cash Outflows			1,800,000
NPV			4,00,129

Working Notes

(i) WDV of existing machine in the beginning of year 5

	(₹)
Initial cost of machine	20,00,000
Less: Depreciation @ 20% in year 1	4,00,000
WDV at beginning of year 2	16,00,000
Less: Depreciation @20% in year 2	320,000
WDV at beginning of year 3	1,280,000
Less: Depreciation @20% in year 3	256,000
WDV at beginning of year 4	1,024,000

(ii) Depreciation base of new machine	**(₹)**
WDV of existing machine	1,024,000
Add: Cost of new machine	3,000,000
	4,024,000
Less: Sale proceeds of existing machine	1,200,000
	2,824,000

(iii) Base of incremental depreciation	**(₹)**
Depreciation base of new machine	2,824,000
Less: Depreciation base of existing machine	1,024,000
	1,800,000

(iv) Incremental Depreciation

Year	Incremental asset cost base (₹)	Depreciation @20% (₹)
1	1,800,000	360,000
2	1,440,000	288,000
3	1,152,000	230,400
4	921,600	184,320
5	737,280	147,456

(v) Incremental cash profit before taxes (in terms of decrease in operating costs and increase in revenues) owing to the new machine

Year	Saving in Operating cost (₹)	Increase in Revenue (₹)	Incremental cash profit before taxes (₹)
1	200,000	300,000	500,000
2	200,000	300,000	500,000
3	300,000*	300,000	600,000
4	300,000	300,000	600,000
5	300,000	300,000	600,000

*Maintenance expenses of existing machine are expected to increase by ₹ 1,00,000 from sixth year of installation.

Illustration 23

A manufacturing company has an old machine having no book value which can be sold for ₹ 100,000. The company is thinking to choose one of the following two alternatives:

(i) To incur additional cost of ₹ 20,00,000 to upgrade the existing old machine.

(ii) To replace old machine with a new machine costing of ₹ 40,00,000 along with installation cost of ₹ 100,000.

The above two alternatives envisage useful life to be 5 years. The expected after-tax profits for three alternatives are as under:

Year	Old Existing Machine (₹)	Upgraded Machine (₹)	New Machine (₹)
1	10,00,000	11,00,000	12,00,000
2	10,80,000	11,80,000	12,80,000
3	11,60,000	12,20,000	13,80,000
4	12,40,000	13,00,000	14,80,000
5	13,20,000	14,00,000	16,00,000

The tax rate is 40%. The company follows straight line depreciation and the cost of capital is to be taken 15%.

You are required to advice the company as to which alternative is to be adopted.

Present value of One Rupee

Year/Rate	1	2	3	4	5
15%	0.870	0.756	0.658	0.572	0.497

Solution:

There are three possibilities, coming out from the analysis:

(i) Retain the existing machine

(ii) Upgrade the existing machine

(iii) Replace the old with machine

The incremental approach would be adopted for 2nd and 3rd options. In case the NPV of this incremental approach of both options turn negative, then reject both options and accept the 1st option, else choose a better option.

Cash outflows

(i) In case of machine is upgraded:

Upgradation cost: ₹ 20,00,000

(ii) In case of new machine installed

	(₹)
Cost	40,00,000
Add: Installation Cost	1,00,000
Total Cost	41,00,000
Less: Disposal of old machine (100,000 – 40% Tax)	60,000
Total cash outflow	**40,40,000**

Depreciation

Depreciation in case of machine is upgraded: ₹ 20,00,000/5 = ₹ 400,000

Depreciation in case of new machine is installed: ₹ 41,00,000/5 = ₹ 820,000

Old existing machine – Book Value is zero hence no depreciation

Incremental Cash Inflows after Taxes (CFAT) of Upgraded Old Machine

	Old Machine	Upgraded Machine			
Year	PAT/CFAT (₹)	PAT (₹)	Depreciation (₹)	CFAT (₹)	Incremental CFAT=5-2 (₹)
(1)	(2)	(3)	(4)	(5)	(6)
1	10,00,000	11,00,000	4,00,000	15,00,000	5,00,000
2	10,80,000	11,80,000	4,00,000	15,80,000	5,00,000
3	11,60,000	12,20,000	4,00,000	16,20,000	4,60,000
4	12,40,000	13,00,000	4,00,000	17,00.000	4,60,000
5	13,20,000	14,00,000	4,00,000	18,00,000	4,80,000
Total	**58,00,000**				

Incremental Cash Inflows after Taxes (CFAT) of New over Old Machine

	Old Machine	Upgraded Machine			
Year	PAT/CFAT (₹)	PAT (₹)	Depreciation (₹)	CFAT (₹)	Incremental CFAT=5-2 (₹)
(1)	(2)	(3)	(4)	(5)	(6)
1	10,00,000	12,00,000	8,20,000	20,20,000	10,20,000
2	10,80,000	12,80,000	8,20,000	21,00,000	10,20,000
3	11,60,000	13,80,000	8,20,000	22,00,000	10,40,000
4	12,40,000	14,80,000	8,20,000	23,00,000	10,60,000
5	13,20,000	16,00,000	8,20,000	24,20,000	11,00,000
Total	58,00,000				

Calculation of NPV of both options

Year	Upgraded Machine			New Machine		
	Incremental CFAT (₹)	PVF	Total PV (₹)	Incremental CFAT (₹)	PVF	Total PV (₹)
1	5,00,000	0.870	4,35,000	10,20,000	0.870	8,87,400
2	5,00,000	0.756	3,78,000	10,20,000	0.756	7,71,120
3	4,60,000	0.658	3,02,680	10,40,000	0.658	6,84,320
4	4,60,000	0.572	2,63,120	10,60,000	0.572	6,06,320
5	4,80,000	0.497	2,38,560	11,00,000	0.497	5,46,700
			16,17,360			34,95,860
Less: Cash Outflows			20,00,000			40,40,000
NPV			-3,82,640			-5,54,140

Decision: As the NPV in both the alternatives are negative, the company should continue with the existing old machine.

Illustration 24

Vedika Ltd., with a limited investment funds of ₹ 6,00,000 is evaluating the desirability of 5 (five) investment proposals. Their profiles are summarized below:

	Project Investment (₹)	Annual Cash flow (after tax) (₹)	Life (in years)
M	1,00,000	36,000	10
N	2,00,000	1,00,000	4
O	2,40,000	60,000	8
P	3,00,000	80,000	16
Q	4,00,000	60,000	25

Project N and Q are mutually exclusive. The cost of funds is 10%.

Find out the feasible combination of projects and rank them on the basis of Net Present Value (NPV).

PVIFA

Year	10	4	8	16	25
PVIFA at 10%	6.145	3.170	5.335	7.824	9.077

Solution:

Calcualtion of NPV of the Projects

Project	Investment (₹)	Cash flow (₹)	Annuity	PV (Cash flow × annuity) (₹)	NPV (PV – invest.) (₹)
M	1,00,000	36,000	6.145	2,21,220	1,21,220
N	2,00,000	1,00,000	3.170	3,17,000	1,17,000
O	2,40,000	60,000	5.335	3,20,100	80,100
P	3,00,000	80,000	7.824	6,25,920	3,25,920
Q	4,00,000	60,000	9.077	5,44,620	1,44,620

Life of project is not relevant in determination of NPV.

Statement of feasible combination

Combination Rank		Investment (₹)	NPV
M, N & P	6,00,000	5,64,140	1
M, N & O	5,40,000	3,18,320	4
O & P	5,40,000	4,06,020	3
M & Q	5,00,000	2,65,840	5
N & P	5,00,000	4,42,920	2

Illustration 25

Vedavyas Ltd. is considering two manually exclusive projects M and project N. The Finance Director thinks that the project with the higher NPV should be chosen, whereas the Managing Director thinks 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 10% and the net after-tax cash flow of the projects are as follows:

Year	0	1	2	3	4	5
Cash Flows (₹)	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)
Project M	(4,00,000)	70,000	1,60,000	1,80,000	1,50,000	40,000
Project N	(4,00,000)	4,36,000	20,000	20,000	8,000	6,000

You are required to:

i. Calculate the NPV and IRR of each project.

ii. State with reasons, which project you would recommend.

iii. Explain the inconsistency in the ranking of the two projects.

Present value table is given:

Year	0	1	2	3	4	5
PVIF at 10%	1000	0.909	0.826	0.751	0.683	0.621
PVIF at 20%	1000	0.833	0.694	0.579	0.482	0.402

Solution:

(i) Calculation of NPV and IRR

NPV of Project M					
Year	**Cash Flows (₹)**	**Discount factor (10%)**	**Discount Values (₹)**	**Discount Factor (20%)**	**Discounted Value (₹)**
0	(4,00,000)	1.000	(4,00,000)	1000	(4,00,000)
1	70,000	0.909	63,630	0.833	58,310
2	1,60,000	0.826	1,32,160	0.694	1,11,040
3	1,80,000	0.751	1,35,180	0.579	1,04,220
4	1,50,000	0.683	1,02,450	0.482	72,300
5	40,000	0.621	24,840	0.402	16,080
NPV			58,260		(38,050)

IRR of Project M:

At 20% NPV is (-) ₹38050 and at 10% NPV is ₹58,260

$$\text{So, IRR} = 10 + \frac{58260}{58260 + 38050} \times 10$$

$$= 16.05\%$$

NPV of Project N					
Year	**Cash Flows (₹)**	**Discount factor (10%)**	**Discount Values (₹)**	**Discount Factor (20%)**	**Discounted Value (₹)**
0	(4,00,000)	1000	(4,00,000)	1000	(4,00,000)
1	4,36,000	0.909	3,96,324	0.833	3,63,188
2	20,000	0.826	16,520	0.694	13,880
3	20,000	0.751	15,020	0.579	11,580
4	8,000	0.683	5,464	0.482	3,856
5	6,000	0.621	3,726	0.402	2,412
NPV			37,054		(5,084)

IRR of Project M:

At 20% NPV is (-) ₹5084 and at 10% NPV is ₹37054

$$\text{So, IRR} = 10 + \frac{37054}{37054 + 5084} \times 10$$

$$= 18.79\%$$

(ii) Since, both the projects are generating the positive NPV at the company's cost of capital at 10% hence, they are acceptable. IF company follows NPV method, then the company will have to select Project M because it has higher NPV.

If the company follows IRR method, then Project N 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 M should be selected.

(iii) Because of the difference in the pattern of the cash flows the inconsistency in the ranking of the projects arises. Project M's major cash flow occur mainly in the middle three years whereas project N generated the major cash flow in the first year itself.

Illustration 26

Information of two projects is given below:

Project	A	B
Cash Inflows (₹ '000) Year-end		
1	50	282
2	300	250
3	360	180
4	208	NIL
Initial Investment – beginning of year 1	535	540

Evaluate which project is better under each of the following criteria taking discount rate as 10% p.a.

(i) NPV

(ii) Discounted Payback period

(iii) Profitability Index

Solution: **(₹ in '000)**

Year	PV factor @ 10%	Cash flows of Project A	Present Value of Project A	Cumulative PV of Project A	Cash flows of Project B	Present value of Project B	Cumulative PV of Project B
0	1.00	(535)	(535)	-	(540)	(540)	-
1	0.909	50	45.45	45.45	282	256.338	256.338
2	0.826	300	247.80	293.25	250	206.50	462.838
3	0.751	360	270.36	563.61	180	135.18	598.018
4	0.683	208	142.06	705.67	-	-	598.018

(i) Net Present Value of Project A = PV of inflows – PV of outflows
= 705.67 – 535
= 170.67 (₹ in '000)

Net Present Value of Project B = PV of inflows – PV of outflows
= 598.018 - 540
= 58.018 (₹ in '000)

Project A is better, since, it has higher NPV.

(ii) Discounted payback period

Project A = $2 + \frac{241.75}{270.36}$ = 2.89 Years

Project B (Payback period) = $2 + \frac{77.162}{135.18}$ = 2.57 Years

Project B is better. Since, it has lower payback period.

(iii) Profitability Index = $\frac{\text{Present value of inflow}}{\text{Present value of outflow}}$

Project A (Profitability Index) = $\frac{705.67}{535}$ = 1.32 (₹ in '000)

Project B (Profitability Index) = $\frac{598.018}{540}$ = 1.12 (₹ in '000)

Comment: Project A is better, since, it has lower Profitability Index.

Illustration 27

Lokesh Ltd. is considering buying a machine costing ₹ 15,00,000 which yields the following annual income:

End of year	1	2	3	4	5
Annual Income after Depreciation but before tax	3,50,000	3,72,000	3,10,000	1,75,000	1,10,000
PV Factor at 12% of ₹ 1	0.893	0.797	0.712	0.636	0.567

Corporate tax rate applicable is 30%. Depreciation is on straight line basis for 5 year There is no scrap value.

Normal rate of return is 12%. Round off calculations to the nearest rupee and calculate:

(a) Payback Period

(b) Discounted Payback Period

(c) Net Present Value

(d) Profitability Index

Solution:

Calculation of Present Value **(₹)**

Year	Profit before tax	Profit after tax	Cash Inflows (PAT + Dep)	Cumulative Cash Inflows	Discounting factors @ 12%	Present Value	Cumulative Present value
1	3,50,000	2,45,000	5,45,000	5,45,000	0.893	4,86,685	4,86,685
2	3,72,000	2,60,000	5,60,400	11,05,400	0.797	4,46,639	9,33,324
3	3,10,000	2,17,000	5,17,000	16,22,400	0.712	3,68,104	13,01,428
4	1,75,000	1,22,500	42,2,500	20,44,900	0.636	2,68,710	15,70,138
5	1,10,000	77,000	3,77,000	24,21,900	0.567	2,13,759	17,83,897

(a) Payback Period = 2 + 3,94,600/5,17,000 = 2.76 Years

(b) Discounted Payback Period = 3 + 1,98,572 / 2,68,710 = 3.74 Years

(c) Net Present Value = Present value of cash inflows – Present value of cash outflows

= ₹17,83,897 – ₹15,00,000 = ₹ 2,83,897

(d) Profitability Index = Present value of cash inflows / Present value of cash outflows

= ₹17,83,897 / ₹15,00,000 = 1.19

Note:

Depreciation $= \frac{\text{Cost - Scrap Value}}{\text{Life}} = \frac{₹\ 15,00,000 - 0}{5}$ = ₹ 3,00,000

Illustration 28

Robin Ltd. is examining two manually exclusive investment proposals. The management uses Net Present Value method to evaluate new investment proposals. Depreciation is charged using Straight line Method. Other details relating to these proposals are:

Particulars	Proposal X	Proposal Y
Annual Profit before tax (₹)	13,00,000	24,50,000
Cost of the Project (₹)	90,00,000	1,80,00,000
Salvage value (₹)	1,20,000	1,50,000
Working Life	4 Years	5 Years
Cost of Capital	10%	10%
Corporate Tax Rate	30%	30%

The present value of ₹ 1 at 10% discount rates at the end of first, second, third, fourth and fifth year are 0.9091; 0.8264; 0.7513; 0.683; and 0.6209 respectively.

You are required to advise the company on which proposal should be taken up by it.

Solution:

	Proposal X (₹)	Proposal Y (₹)
Earnings before Interest and Taxes	13,00,000	24,50,000
Less: Tax @ 30%	3,90,000	7,35,000
Earnings after Tax	9,10,000	17,15,000
Add: Depreciation	22,20,000	35,70,000
Cash inflow (a)	31,30,000	52,85,000
Present value annuity factor @ 10% (b)	3.1698	3.7907
Present Value of cash inflow (a) × (b)	99,21,474	2,00,33,850
Add: Present value of salvage value:		
Proposal X: ₹1,20,000 × 0.683	81,960	-
Proposal Y: ₹1,50,000 × 0.6209	-	93,135
Total Present Value	1,00,03,434	2,01,26,985
Less: Initial Outflow	90,00,000	1,80,00,000
Net Present Value	10,03,434	21,26,985

Working Note:

	X	Y
Depreciation		
Cost (₹)	90,00,000	1,80,00,000
Less: Salvage Value (₹)	1,20,000	1,50,000
	88,80,000	1,78,50,000
Working Life	4 Year	5 Year
Depreciation per annum (₹)	22,20,000	35,70,000

Advice – Annualized Net Present Value is more in case of Project Y hence, we should accept project Y.

Illustration 29

ABC Ltd. wishes to evaluate two mutually exclusive proposals to acquire a machine. Machines M and N are being considered, each costing ₹ 2,00,000 and having an estimated life of 5 years and 4 years respectively. Both have nil salvage value. The anticipated cash flows after adjustment of taxes for M and N are given below:

End of Year	Machine M (₹)	Machine N(₹)
1	70,000	1,00,000
2	60,000	90,000
3	60,000	80,000
4	50,000	40,000
5	90,000	NIL

Find the accounting rate of return and net present value for both the machines and advise ABC Ltd., which machine should be bought. The required rate of return is 10% p.a.

Present Value factor for 10%:

End of year	1	2	3	4	5
	0.909	0.826	0.751	0.683	0.621

Solution:

Ranking of Proposals:

Year	Cash Inflow (₹)		PV Factor	Total PV (₹)	
	M	N	(10% p.a.)	M	N
1	70,000	1,00,000	0.909	63,630	90,900
2	60,000	90,000	0.826	49,560	74,340
3	60,000	80,000	0.751	45,060	60,080
4	50,000	40,000	0.683	34,150	27,320
5	90,000	-	0.621	55,890	-
				2,48,290	2,52,640
Less: Cash Outflow				2,00,000	2,00,000
Net PV				48,290	52,640

$$\text{Average Rate of Return} = \frac{\text{Average Profit}}{\text{Average Investment}} \times 100$$

Note: [For evaluation of ARR the average investment has been taken at half of the initial cost for all the two machines]

M = ₹70,000 + ₹60,000 + ₹60,000 + ₹50,000 + ₹90,000 = ₹3,30,000 ÷ 5 = ₹ 66,000

N = ₹1,00,000 + ₹90,000 + ₹80,000 + ₹40,000 = ₹3,10,000 ÷ 4 = ₹ 77,500

$$\text{M} \quad \text{ARR} = \frac{\text{AV Profit}}{\text{AV Investment}} \times 100$$

$$= \frac{\text{Average Cash Inflow - Depreciation}}{\text{Average Investment}} \times 100$$

$$= \frac{66000 - 40000}{100000} \times 100 = 26\%$$

N $$= \frac{77500 - 50000}{100000} \times 100 = 27.5\%$$

Rank: Machine 'N' to be selected under both the methods as it generates higher NPV and average rate of return.

Illustration 30

FB Chemical Ltd. has three potential projects, all with an initial cost of ₹ 20,00,000 and estimated life of five year The capital budget for the year will only allow the company to accept one of the three projects.

Given the discount rates and the future cash flows of each project, which project should the company accept?

Project 1 has an annual cash flow of ₹ 5,00,000 and discount rate of 6%.

Project 2 has an annual cash flow of ₹ 6,00,000 and discount rate of 9%.

Project 3 has the following cash inflows and discount rate of 15%

Year	1	2	3	4	5
Cash Inflows ₹	10,00,000	8,00,000	6,00,000	2,00,000	1,00,000

Solution:

NPV = PV of Inflow – PV of Outflow

Project 1's NPV = ₹ [5,00,000 (0.943 + 0.889 + 0.839 + 0.792 + 0.747) – 20,00,000]

= ₹ 1,05,000

Project 2's NPV = ₹ [6,00,000 (0.917 + 0.841 + 0.772 + 0.708 + 0.649) – 20,00,000]

= ₹ 3,32,200

Project 3's NPV = ₹ 20,31,900 – 20,00,000 = ₹31,900.

Project 2 should be accepted as its NPV is maximum.

Illustration 31

P Ltd. has four potential projects all with an initial cost of ₹ 15,00,000. The capital budget for the year will only allow the company to take up only one of the three projects. Given the discount rates and the future cash flows of each project, which project should they accept?

Project	Annual Net Cash Flows per year for five years (₹)	Discount Rates
A	3,50,000	4%
B	4,00,000	8%
C	5,00,000	10%

Solution:

Cash outflow = ₹ 15,00,000

Life of the Project = 5 Years

1. Calculation of NPV of Project A

NPV = PV of Cash Inflow (CI) – PV of cash outflow

PV of CI = CI × PV of Annuity factor for 5 years @ 4%

= ₹ 3,50,000 × 4.452 = ₹ 15,58,200

NPV = ₹ 15,58,200 – ₹ 15,00,000

= ₹ 58,200

2. Calculation of NPV of Project B

PV of CI = CI × PV of Annuity factor for 5 years @ 8%

= ₹ 4,00,000 × 3.993 = ₹ 15,97,200

NPV = ₹ 15,97,200 – ₹ 15,00,000

= ₹ 97200

3. Calculation of NPV of Project C

PV of CI = CI × PV of Annuity factor for 5 years @ 10%

= ₹ 5,00,000 × 3.791 = ₹ 18,95,500

NPV = ₹ 18,95,500 – ₹ 15,00,000

= ₹ 3,95,500

Recommendation: The management of P Ltd. may be advised to select Project C as its NPV is more than NPV of Project A & B.

Solved Case 1

A company is considering an investment proposal to install new milling controls at a cost of ₹ 50,000. The facility has a life expectancy of 5 years and no salvage value. The tax rate is 35%. Assume the firm uses straight line depreciation and the same is allowed for tax purposes. The estimated cash flows before depreciation and tax (CFBT) from the investment proposal are as follows:

Year	CFBT (₹)
1	10,000
2	10,692
3	12,769
4	13,462
5	20,385

Compute the following:

(i) Payback period,

(ii) Average rate of return,

(iii) Internal rate of return,

(iv) Net present value at 10% discount rate,

(v) Profitability index at 10% discount rate.

Solution:

Determination of cash flows after taxes (CFAT)						
Year	CFBT ₹	Depreciation (₹ 50,000/5)	Profits before tax (Col.2 – Col.3)	Taxes (0.35)	EAT (Col.4 – Col.5)	CFAT (Col.6+Col.3)
1	2	3	4	5	6	7
1	10,000	10,000	Nil	Nil	Nil	₹10,000
2	10,692	10,000	₹692	₹242	₹450	10,450
3	12,769	10,000	2,769	969	1,800	11,800
4	13,462	10,000	3,462	1,212	2,250	12,250
5	20,385	10,000	10,385	3,635	6,750	16,750
					11,250	61,250

(i) Payback (PB) period

Year	CFAT (₹)	Cumulative CFAT (₹)
1	10,000	₹10000
2	10,450	20,450
3	11,800	32,250
4	12,250	44,500
5	16,750	61,250

The recovery of the investment falls between the fourth and fifth years. Therefore, the PB is 4 years plus a fraction of the fifth year. The fractional value = ₹ 5,500 ÷ ₹ 16,750 = 0.328. Thus, the PB is 4.328 years.

(ii) Average rate of return (ARR) $= \frac{\text{Average income}}{\text{AverageInvestment}} \times 100$

$= \frac{₹\ 2250\ (₹\ 11250 \div 5)}{₹\ 25000\ (₹\ 50000 \div 2)} \times 100 = 9\%$

(iii) Internal rate of return (IRR) $₹50000 = \frac{₹\ 10,000}{(1+r)^1} + \frac{₹\ 10,450}{(1+r)^2} + \frac{₹\ 11,800}{(1+r)^3} + \frac{₹\ 12,250}{(1+r)^4} + \frac{₹\ 16,750}{(1+r)^5}$

The fake payback period = 4.0816 (₹ 50,000 / ₹ 12,250). The value closest to the fake payback period of 4.0816 against 5 years is 4.100 against 7%. Since the actual cash flow stream is the initial years are slightly below the average cash flow stream, the IRR is likely to be lower than 7%. Let us try with 6%.

Year	CFAT	PV factor		Total PV	
		(0.06)	(0.07)	(0.06) (₹)	(0.07)
1	₹10,000	0.943	0.935	₹9,430	9350
2	10,450	0.890	0.873	9,300	9,123
3	11,800	0.840	0.816	9,912	9,629
4	12,250	0.792	0.763	9,702	9,347
5	16,750	0.747	0.713	12,512	11,942
Total PV				50,856	49,391
Less: Initial outlay				50,000	50,000
NPV				856	(609)

The IRR is between 6% and 7%. By interpolation, IRR = 6.6%.

(iv) Net present value (NPV)

Year	CFAT (₹)	PV factor (0.10)	Total PV (₹)
1	10,000	0.909	9,090
2	10,450	0.826	8,632
3	11,800	0.751	8,862
4	12,250	0.683	8,367
5	16,750	0.621	10,401
Total PV			45,352
Less: Initial outlay			50,000
NPV			(4,648)

(v) Profitability Index (PI) $= \frac{\text{PV of cash inflows}}{\text{PV of cash outflows}} = \frac{₹\ 45,352}{₹\ 50,000} = 0.907$

Solved Case 2

The H Ltd is considering investment in a new product. The information for one year is given as follows:

Particulars		(₹)
(a)	Sales	1,00,000
(b)	Manufacturing cost of sales (including ₹ 10,000 of depreciation)	40,000
(c)	Selling and administrative expenses (directly associated with the product)	20,000
(d)	Decrease in contribution of other products	2,000
(e)	Increase in accounts receivable	7,000
(f)	Increase in inventories	10,000
(g)	Increase in current liabilities	15,000
(h)	Income taxes associated with product income	6,000

You are required to compute the relevant cash flows of the year to be considered in evaluating this investment proposal.

Solution:

Relevant cash flows	(₹)	(₹)
a. Incremental cash inflows		
Sales		1,00,000
b. Incremental cash outflows		
Manufacturing cost of sales	30,000	
Selling and administrative expenses	20,000	
Decrease in contribution of other products	2,000	
Income taxes associated with product income	6,000	58,000
Net cash inflows (CFAT) for one year		42,000
b. Cash outflows due to additional working capital requirement in the beginning of the year		
Increase in accounts receivable	7,000	
Plus increase in inventories	10,000	
Less increase in current liabilities	15,000	2,000
Net increase in working capital		2,000

Exercise

A. Theoretical Questions:

⊙ **Multiple Choice Questions**

1. Capital Budgeting is a part of:
   (a) Investment Decision
   (b) Working Capital Management
   (c) Marketing Management
   (d) Capital Structure.
2. Capital Budgeting deals with:
   (a) Long-term Decisions
   (b) Short-term Decisions
   (c) Both (a) and (b)
   (d) Neither (a) nor (b).
3. Which of the following is not used in Capital Budgeting?
   (a) Time Value of Money
   (b) Sensitivity Analysis
   (c) Net Assets Method
   (d) Cash Flows.
4. Capital Budgeting Decisions are:
   (a) Reversible
   (b) Irreversible
   (c) Unimportant
   (d) All of the above.
5. Which of the following is not incorporated in Capital Budgeting?
   (a) Tax-Effect
   (b) Time Value of Money
   (c) Required Rate of Return
   (d) Rate of Cash Discount.
6. Which of the following is not a capital budgeting decision?
   (a) Expansion Programme
   (b) Merger
   (c) Replacement of an Asset
   (d) Inventory Level.

7. A sound Capital Budgeting technique is based on:
   (a) Cash Flows
   (b) Accounting Profit
   (c) Interest Rate on Borrowings
   (d) Last Dividend Paid.
8. Which of the following is not a relevant cost in Capital Budgeting?
   (a) Sunk Cost
   (b) Opportunity Cost
   (c) Allocated Overheads
   (d) Both (a) and (c) above.
9. Capital Budgeting Decisions are based on:
   (a) Incremental Profit
   (b) Incremental Cash Flows
   (c) Incremental Assets
   (d) Incremental Capital.
10. Which of the following does not effect cash flows proposal?
   (a) Salvage Value
   (b) Depreciation Amount
   (c) Tax Rate Change
   (d) Method of Project Financing.
11. Cash Inflows from a project include:
   (a) Tax Shield of Depreciation
   (b) After-tax Operating Profits
   (c) Raising of Funds
   (d) Both (a) and (b).
12. Which of the following is not true with reference capital budgeting?
   (a) Capital budgeting is related to asset replacement decisions
   (b) Cost of capital is equal to minimum required return
   (c) Existing investment in a project is not treated as sunk cost
   (d) Timing of cash flows is relevant.

13. Which of the following is not followed in capital budgeting?
    (a) Cash flows Principle
    (b) Interest Exclusion Principle
    (c) Accrual Principle
    (d) Post-tax Principle.
14. Depreciation is incorporated in cash flows because it:
    (a) Is unavoidable cost
    (b) Is a cash flow
    (c) Reduces Tax liability
    (d) Involves an outflow.
15. Which of the following is not true for capital budgeting?
    (a) Sunk costs are ignored
    (b) Opportunity costs are excluded
    (c) Incremental cash flows are considered
    (d) Relevant cash flows are considered.
16. Which of the following is not applied in capital budgeting?
    (a) Cash flows be calculated in incremental terms
    (b) All costs and benefits are measured on cash basis
    (c) All accrued costs and revenues be incorporated
    (d) All benefits are measured on after-tax basis.
17. Evaluation of Capital Budgeting proposals is based on Cash Flows because:
    (a) Cash Flows are easy to calculate
    (b) Cash Flows are suggested by SEBI
    (c) Cash is more important than profit
    (d) Cash Flows are suggested by RBI
18. Which of the following is not included in incremental A flows?
    (a) Opportunity Costs
    (b) Sunk Costs
    (c) Change in Working Capital
    (d) Inflation effect

19. A proposal is not a Capital Budgeting proposal if it:
    (a) is related to Fixed Assets
    (b) brings long-term benefits
    (c) brings short-term benefits only
    (d) has very large investment
20. In Capital Budgeting, Sunk cost is excluded because it is:
    (a) of small amount
    (b) not incremental
    (c) not reversible
    (d) All of the above
21. Savings in respect of a cost is treated in capital budgeting as:
    (a) An Inflow
    (b) An Outflow
    (c) Opening balance
    (d) Closing balance
22. _____ ignores the time value of money.
    (a) IRR
    (b) ARR
    (c) NPV
    (d) PI
23. The discounted cash flows techniques are:
    (a) Net Present Value (NPV)
    (b) Internal Rate of Return (IRR)
    (c) Profitability Index (PI)
    (d) All of the above
24. If the NPV is positive or at least equal to zero, the project can be _____.
    (a) break even situation
    (b) accepted or rejected
    (c) rejected
    (d) accepted

25. The following information is given for a project:

    Annual cash inflow ₹ 8,00,000

    Useful life 4 years

    Payback period 2.855 years

    The cost of the project would be -

    (a) ₹ 22,80,000

    (b) ₹ 22,84,000

    (c) ₹ 22,86,000

    (d) ₹ 22,87,800

26. Initial investment ₹ 20 Lakh. Expected annual cash flows ₹ 6 Lakh for 10 years. Cost of capital @15%. Profitability Index (PI) is - (Cumulative discounting factor @ 15% for 10 years = 5.019)

    (a) 1.51

    (b) 1.71

    (c) 2.51

    (d) 2.91

27. Annual Cost Saving ₹ 4,00,000; Useful life 4 years; Cost of the Project ₹ 11,42,000. The Payback period would be -

    (a) 2 years 8 months

    (b) 2 years 11 months

    (c) 3 years 2 months

    (d) 3 year 10 months

28. A project has a 10% discounted payback of 2 years with annual after-tax cash inflows commencing from year end 2 to 4 of ₹ 400 lakh. How much would have been the initial cash outlay which was fully made at the beginning of year 1?

    (a) ₹ 400 lakh

    (b) ₹ 422 lakh

    (c) ₹ 452 lakh

    (d) ₹ 497.20 lakh

29. In mutually exclusive projects, projects which are selected for comparison must have

    (a) positive net present value

    (b) negative net present value

    (c) zero net present value

    (d) none of the above

30. In a single projects situation, results of internal rate of return and net present value lead to

    (a) cash flow decision

    (b) cost decision

    (c) same decisions

    (d) different decisions

31. The discount rate which forces net present values to become zero is classified as

    (a) positive rate of return

    (b) negative rate of return

    (c) external rate of return

    (d) internal rate of return

32. A point where profile of net present value crosses horizontal axis at plotted graph indicates project

    (a) costs

    (b) cash flows

    (c) internal rate of return

    (d) external rate of return

33. Payback period in which an expected cash flows are discounted with help of project cost of capital is classified as

    (a) discounted payback period

    (b) discounted rate of return

    (c) discounted cash flows

    (d) discounted project cost

34. Number of years forecasted to recover an original investment is classified as

    (a) payback period

    (b) forecasted period

    (c) original period

    (d) investment period

35. In proper capital budgeting analysis we evaluate incremental

    (a) Accounting income

    (b) Cash flow

    (c) Earnings

    (d) Operating profit

36. The term mutually exclusive investments mean:

    (a) Choose only the best investments.

    (b) Selection of one investment precludes the selection of an alternative.

    (c) The elite investment opportunities will get chosen.

    (d) There are no investment options available.

37. While evaluating projects with different initial outlay, which of the following methods is more appropriate than NPV?

    (a) Payback Period

    (b) Accounting Rate of Return

    (c) Profitability Index

    (d) Discounted Payback Period

38. Which of the following features is not associated with capital budgeting decision?

    (a) Long term

    (b) Large Capital Outlay

    (c) Reversibility

    (d) High Risk

39. With respect to NPV, which of the following is incorrect?

    (a) When NPV is zero, PI will be 1

    (b) When NPV is zero, IRR = Cost of Capital

    (c) When NPV is zero, we get the PBP

    (d) When NPV is zero, we get Discounted PBP

40. Initial Investment ₹ 20 lakh. Expected annual cash flows ₹ 6 lakh for 10 years. Cost of capital @ 15%. What is the Profitability Index? The cumulative discounting factor @ 15% for 10 years = 5.019.

    (a) 1.51

    (b) 1.15

    (c) 5.15

    (d) 0.151

41. The following details relate to an investment proposal of XYZ Ltd.

    Investment outlay— ₹ 100 lakhs

    Lease Rentals are payable at ₹ 180 per ₹ 1,000

    Term of lease—8 years

    Cost of capital—12%

What is the present value of lease rentals, if lease rentals are payable at the end of the year? *[Given PV factors at 12% for years (1-8) is 4.9676.]*

(a) ₹ 98,14,680

(b) ₹ 89,41,680

(c) ₹ 94,18,860

(d) ₹ 96,84,190

42. Given for a project: Annual Cash inflow ₹80,000 Useful life 4 years Pay-Back period 2.855 years What is the cost of the project?

(a) ₹ 2,28,500

(b) ₹ 2,28,400

(c) ₹ 2,28,600

(d) ₹ 2,28,700

43. The following is not a Discounted Cash Flow Technique:

(a) NPV

(b) PI

(c) Accounting of Average Rate of Return

(d) IRR

44. Which of the following is not incorporated in Capital Building?

(a) Tax-Effect

(b) Time Value of Money

(c) Required Rate of Return

(d) Rate of Cash Discount

45. Which of the following variables is not known in Internal Rate of Return?

(a) Initial Cash Flows

(b) Discount Rate

(c) Terminal Inflows

(d) Life of the Project

46. Capital Budgeting techniques which considers the time value of money is based on

(a) Cash Flows of the organization

(b) Accounting Profit of the organization

(c) Interest Rate on Borrowings

(d) Last Dividend Paid

47. Internal Rate of return is the discounting factor which :

(a) Ensures that the present value of Net Cash Inflow is > the Net Cash Outflow

(b) Ensures that the present value of Net Cash Inflow is < the Net Cash Outflow

(c) Equates the present value of Net Cash Inflow to the Net Cash Outflow

(d) None of these

48. A company has obtained quotes from two different manufacturers for an equipment. The details are as follows :

PRODUCT	COST (₹Millions)	ESTIMATED LIFE [YEARS]
MAKE A	4.5	10
MAKE B	6	15

Ignoring operation and maintenance cost, which one would be cheaper ? The company's cost of capital is 10%. [Given : PVIFA (10%, 10 years) = 6.1446 and PVIFA (10%, 15 years) = 7.6061]

(a) Make A will be cheaper

(b) Make B will be cheaper

(c) Cost will be the same

(d) None of the above.

49. Investment in a project is ₹ 200 lakhs and Net Present Value is ₹ 50 lakhs. Then the amount of inflows is :

(a) ₹ 150 lakhs

(b) ₹ 200 lakhs

(c) ₹ 100 lakhs

(d) ₹ 250 lakhs

50. Present value of inflows ₹ 10 lakhs from a project and initial investment is ₹ 7.5 lakhs. The NPV is:

(a) ₹ 17.5 lakhs

(b) ₹ 7.5 lakhs

(c) ₹10 Lakhs

(d) ₹ 2.5 lakhs

51. In mutually exclusive projects, project which is selected for comparison with others must have

(a) higher net present value

(b) lower net present value

(c) zero net present value

(d) none of above

52. A project whose cash flows are more than capital invested for rate of return then net present value will be

    (a) positive

    (b) independent

    (c) negative

    (d) zero

53. NPV is positive indicates :

    (a) Cash inflows are generated at a rate higher than the minimum required by the firm.

    (b) Cash inflows are generated at a rate equal to the minimum required

    (c) Cash inflows are generated at a rate lower than the minimum required by the firm.

    (d) None of the above

Answers:

1	a
4	b
7	a
10	d
13	c
16	c
19	c
22	b
25	b
28	c
31	d
34	a
37	c
40	a
43	c
46	a
49	d
52	a

2	a
5	d
8	d
11	d
14	c
17	c
20	c
23	d
26	a
29	a
32	c
35	b
38	c
41	b
44	d
47	c
50	d
53	a

3	c
6	d
9	b
12	c
15	b
18	b
21	a
24	d
27	b
30	c
33	a
36	b
39	c
42	b
45	b
48	a
51	a

⊙ State True or False

1. Two mutually exclusive projects (A and B) have been evaluated. Project A has an NPV of ₹ 8 lakh and an IRR of 16%; Project B has NPV of ₹ 7 lakh but has IRR or 18%. Since Project B has higher IRR, it should be selected.

2. The cost of capital for new projects is 15%. Two competing projects (X and Y) respectively have IR₹ of 14% and 12% respectively; since IRR of project X is higher, it should be selected.

3. Two competing projects have the following NPVs: Project X, + ₹ 5 lakh (with initial outlay of ₹ 25 lakh) and Project Y, + ₹ 4,20,000 (with initial outlay of ₹ 20,00,000). The company should opt for project X as it has higher NPV.
4. A project requires an initial investment of ₹ 10,00,000. The estimated cash inflows from the project are as follows: ₹ 3 lakh (year 1),₹ 1 lakh (year 2), ₹ 3 lakh (year 3), ₹ 6 lakh (Year 4) and ₹ 4 lakh (year 5). The Payback of the project is 4 years.
5. A project requires an investment of ₹ 20 lakh. The estimated profit after tax for years 1-5 are: ₹ 3 lakh, ₹ 3 lakh, ₹ 3 lakh, ₹ 6 lakh and ₹ 8 lakh. The accounting rate of return is 21%
6. In the case of independent investment projects, if the NPV of the project is zero, IRR is equal to cost of capital.
7. A company has evaluated 3 investment proposals under IRR method, yielding different rates of return. Though the IRR values are varying, reinvestment rate of intermediate cash inflows is assumed to be the same for all these 3 proposals.
8. Since IRR is expressed in percentage figure, it is the best method for evaluating capital budgeting projects.
9. The more distant the CFAT, the higher is the present value of such cash flows.
10. NPV is the best method of evaluating long-term investment proposals.
11. Investment decisions and capital budgeting are same.
12. Capital budgeting decisions are long term decisions.
13. Capital budgeting decisions are reversible in nature.
14. Capital budgeting decisions do not affect the future Stability of the firm.
15. There is a time element involved in capital budgeting.
16. An expansion decision is not a capital budgeting decision
17. In mutually exclusive decision situation, the firm can accept all feasible proposals.
18. Capital budgeting and capital rationing are alternative to each other.
19. Correct capital budgeting decisions can be taken by comparing the cost with future benefits.
20. Future expected profits from investments are taken as returns from the investment for capital budgeting.
21. Cash flows are the appropriate measure of costs and benefits from an investment proposal.
22. Sunk cost is a relevant cost in capital budgeting.
23. The opportunity cost of an input is always considered, in capital budgeting.
24. Allocated overhead costs are not relevant for capital budgeting.
25. Cash flows and accounting profits are different.
26. Cash flows are same as profit before tax.
27. Net cash flow is on after-tax basis.
28. The term capital budgeting is used interchangeably with capital expenditure decision.
29. The key function of the financial management is the selection of the most profitable portfolio of capital investment.
30. Capital budgeting decisions are crucial, affecting all the departments of the firm.

Answer:

1	F
4	F
7	F
10	T
13	F
16	F
19	F
22	F
25	T
28	T

2	F
5	F
8	F
11	F
14	F
17	F
20	F
23	F
26	F
29	T

3	T
6	T
9	F
12	T
15	T
18	F
21	T
24	T
27	T
30	T

B. Fill in the Blanks

1. _____ _____ present value tables can be used only when cashflows are uniform to determine NPV.
2. In the case of mixed stream of cash flows, _____ present value tables are used to determine NPV.
3. _____ determines the number of years required to recover initial investment outlay.
4. In the case of _____ investment proposals, IRR and NPV method provides the same result.
5. In the case of conflict in ranking. _____ method provides better result than _____ method.
6. Capital budgeting is concerned with _____ decisions.
7. Cash flow can be _____.
8. The Internal rate of return is to be determined by _____method.
9. The shorter a discounted payback period is means the _____ (sooner/longer) a project or investment will generate cash flows to cover the initial cost.

Answers:

1	Annuity
4	Independent
7	positive or negative

2	Simple
5	NPV, IRR
8	trial and error

3	Payback method
6	investment
9	sooner

⊙ **Short Essay Type Questions**

1. Discuss the basic concept of capital budgeting.
2. Discuss the nature of capital budgeting.
3. State the need of capital budgeting decision.
4. Discuss the significance of capital budgeting.

5. Evaluate the process of capital budgeting.
6. Distinguish between Cash flow and Profit of the firm.
7. What is mutually exclusive project decision? Explain.
8. Write a note on the traditional capital budgeting techniques (non-discounted).
9. Write a note on the modern capital budgeting techniques (discounted).
10. Make differences between NPV and IRR method.

⊙ Essay Type Questions

1. Why is it important to evaluate capital budgeting projects on the basis of after-tax cash incremental flows? Why we not use accounting data instead of cash flow?
2. What are the components of net cash outlay in the capital budgeting decision? At what time is such an outlay incurred in the case of conventional cash flows?
3. How should working capital and sunk costs be treated in analysing investment opportunities? Explain with suitable examples.
4. Explain clearly the concept of block of assets vis-a-vis depreciation in the context of replacement situations of capital budgeting.
5. Suppose a firm is considering replacing an old machine with a new one. The firm does not anticipate that any new revenues will be created by the replacement since demand for the product generation by both the machines is the same. However, in the CFAT work sheet used in evaluating the proposal, the analyst shows positive CFBT in the operating cash flow section. What creates operating CFBT in this situation?
6. It is said that only cash costs are relevant for capital budgeting decision. However, depreciation which is a non-cash cost is a prominent part of cash flow analysis for such an investment decision. How do you explain this paradox?
7. What is payback period? Also, discuss the utility of the Payback period in determining the internal rate of return.
8. What are the critical factors to be observed while making replacement investment decision?
9. What does the profitability index signify? What is the criterion for judging the worth of investments in the capital budgeting technique based on the profitability index?
10. Do the profitability index and the NPV criterion of evaluating investment proposals lead to the same acceptance-rejection and ranking decisions?
11. Discuss the advantages and disadvantages of all the evaluation techniques of capital budgeting.

B. Numerical Questions :

⊙ Comprehensive Numerical Problems

1. One project of XYZ Ltd. is doing poorly and is being considered for replacement. Three mutually exclusive projects A, B and C have been proposed. The projects are expected to require ₹2,00,000 each, and have an estimated life of 5 years, 4 years and 3 years, respectively, and have no salvage value. The company's required rate of return is 10%. The anticipated cash inflows after taxes (CFAT) for the three projects are as follows:

Year	CFAT		
	A (₹)	B (₹)	C (₹)
1	50,000	80,000	1,00,000
2	50,000	80,000	1,00,000
3	50,000	80,000	10,000
4	50,000	30,000	--
5	1,90,000	--	--

(a) Rank each project applying the methods of PB, NPV, IRR and profitability index (PI).

(b) What would the profitability index be if the IRR equaled the required return on investment? What is the significance of a profitability index less than one?

(c) Recommend the project to be adopted and give reasons.

2. Royal Industries Ltd. is considering the replacement of one of its moulding machines. The existing machine is in good operating condition, but is smaller than required if the firm is to expand its operations. The old machine is 5 years old, has a current salvage value of ₹ 30,000 and a remaining depreciable life of 10 years.

   The machine was originally purchased for ₹ 75,000 and is being depreciated at ₹ 5,000 per year for tax purposes.

   The new machine will cost ₹ 1,50,000 and will be depreciated on a straight line basis over 10 years, with no salvage value. The management anticipates that, with the expanded operations, there will be need of an additional net working capital of ₹ 30,000. The new machine will allow the firm to expand current operations, and thereby increase annual revenues of ₹ 40,000, and variable operating costs from ₹ 2,00,000 to ₹ 2,10,000. The company's tax rate is 35% and its cost of capital is 10%. Should the company replace its existing machine? Assume that the loss on sale of existing machine can be claimed as short-term capital loss in the current year itself.

3. Arvind Mills Ltd. is considering two mutually exclusive investment proposals for its expansion programme. Proposal A requires an initial investment of ₹ 7,50,000 and yearly cash operating costs of ₹ 50,000. Proposal B requires an initial investment of ₹ 5,00,000 and yearly cash operating costs of ₹ 1,00,000. The life of the equipment used in both the investment proposals will be 12 years, with no salvage value; depreciation is on the straight-line basis for tax purposes. The anticipated increase in revenues is ₹ 1,50,000 per year in both the investment proposals. The firm's tax rate is 35% and its cost of capital is 15%. Which investment proposal should be undertaken by the company?

4. Initial investment is ₹ 100 lakh is same for both the projects A & B. The net cash inflows after taxes for project A is ₹ 25 lakh per annum for 5 years and those for project B over its life of 5 years are ₹ 20 lakh, ₹ 25 lakh, ₹ 30 lakh, ₹ 30 lakh and ₹ 20 lakh respectively. Find out payback period of both the projects.

5. Z Ltd. has two projects under consideration A & B, each costing ₹ 60 lakh. 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%.

Cash Inflows **(₹ in Lakh)**

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

Which project will be accepted by the company?

Answers:

1	(i) PB: C, B, A; NPV: A, B; IRR: A, B (ii) The profitability index would be 1. The significance of a PI less than 1 is that NPV is negative and the project should not be undertaken. (iii) Project A, because its NPV is the highest.
2	NPV ₹9,915. The company should replace the existing machine.
3	Proposal B should be accepted, since NPV is negative.
4	Project A: 4 Years and Project B: 3.75 Years
5	NPV of Project A: ₹ 117.18 lakh and NPV of Project B: ₹ 100.621; As Project "A" has a higher Net Present Value, it has to be taken up)

Unsolved Case(s)

1. The cost of a project is ₹ 50,000 and it generates cash inflows of ₹ 20,000, ₹ 15,000, ₹ 25,000, and ₹ 10,000 over four years.

   Required: Using the present value index method, appraise the profitability of the proposed investment, assuming a 10% rate of discount, charged semi-annually.

2. The cost of a plant is ₹ 50,000. It has an estimated life of 5 years after which it would be disposed of (scrap value is nil). Profit Before Depreciation, Interest and Taxes (PBIT) is estimated to be ₹ 17,500 p.a. Calculate the yearly cash flow from the plant when tax rate is 30%.

3. Oxford Ltd. has decided to diversify its production and wanted to invest its surplus funds on the most profitable project. It has only two projects under consideration – 'X' and 'Y'. The cost of project 'X' is ₹ 100 lacs and that of 'Y' is ₹ 10 lacs. Both projects are expected to have a life of 8 years only and at the end of this period 'X' will have a salvage value of ₹ 4 lacs and 'B' ₹ 14 lacs. The running expenses of 'X' will be ₹ 35 lacs per year and that of 'Y' ₹ 20 lacs per year. In either case, the company expects a rate of return of 10%. The company's tax rate is 50%. Depreciation is charged on straight line basis. Which project is profitable?

4. A firm is considering an introduction of a new product which will have a life of five years. Two alternatives of promoting the product have been identified:

   Option 1: This involves hiring many agents. An immediate investment of ₹ 5,00,000 is required to promote the product. This will result in a net cash inflow of ₹ 3,00,000 at the end of each year for the next five years.

However, agents need to pay ₹ 50,000 per year. After the contract is terminated, the agent has to pay a lump sum of ₹ 1,00,000 at the end of the fifth year.

Option 2: Under this alternative, the firm will not employ agents but will sell directly to the customers. The initial cost of advertising is ₹ 2,50,000. This earns cash at the end of each year ₹ 1,50,000. However, this alternative comes with a sales administration fee of ₹ 50,000. The firm also proposes to allocate fixed costs worth ₹ 20,000 per year to this product if this alternative is pursued.

Required:

(i) Advise the management, which method of promotion is to be adopted? You may assume that the firm's cost of capital is 20%.

(ii) Calculate the internal rate of return (IRR) for option 2.

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Working Capital Management 6

This Module Includes

6.1 Introduction to Working Capital Management

6.2 Receivable Management

6.3 Payable Management

6.4 Inventory Management

6.5 Management of Cash and Cash Equivalents

6.6 Financing Working Capital

Working Capital Management

SLOB Mapped against the Module:

To develop critical thinking and problem-solving competencies so that students can assist the management in ensuring optimum management of working capital and capital expenditure in existing as well as new projects.

Module Learning Objectives:

After studying this module, the students will be able to –

- Know different types of working capital;
- Explain working capital cycle and cash cycle;
- Analyse receivables and payables management;
- Explain inventory management techniques;
- Understand liquidity management;
- Explain investment, cash and cash equivalents;
- Equip themselves with detail understanding of different cash management models;
- Know different sources of working capital financing.

Introduction to Working Capital Management

6.1

Thhe financial management of business involves the management of long-term assets, long-term capital, and the management of short-term assets and liabilities. Management of working capital concerns with the management of assets such as cash, marketable securities, receivables, inventories and other current assets also liabilities include payables and accruals.

Working capital management is essentially the management of current assets and current liabilities in an organisation. It is concerned with the problems that has been arising in attempting to manage the current assets, the current liabilities and inter relationship that exists between them. The role of the working capital management is to manage the firm's current assets and liabilities in such a way that a satisfactory level of working capital is maintained.

6.1.1 Theoretical Underpinnings

Working capital typically means holdings of current assets or short-term assets such as cash, receivables inventories and marketable securities.

Working Capital - Meaning & Definition

The term working capital also called gross working capital refers to the firm's aggregate of current assets. Current assets are those assets which can be convertible into cash within an accounting period, generally a year. Therefore, they are cash or mere cash resources of a business concern. However, we can understand the meaning of working capital from the following:

(a) "Working capital means the funds available for day-to-day operations of an enterprise. It also represents the excess of current assets over current liabilities including short-term loans". — Accounting Standards Board, The Institute of Chartered Accountants of India.

(b) "Working capital is that portion of a firm's current assets which is financed by short-term funds."— Gitman, L.J.

From the above definitions, we can say that the working capital is the firm's current assets or the excess of current assets over current liabilities. However, the later meaning will be more useful in most of the times as in all cases we may not find excess of current assets over current liabilities.

Concept of Working Capital

Working capital has two concepts:

(i) Gross working capital and

(ii) Net working capital

Gross working capital refers to the total of the current assets.

Net working capital refers to the excess of the current assets over current liabilities. Net working capital (NWC) can alternatively define as the part of the current assets which are financed with the long-term funds. Since, current liabilities represent sources of short-term funds, as long as the current assets exceeds the current liabilities, the excess must be financed with the long-term funds.

Though both concepts are important for managing it. Gross working capital is more helpful to the management in managing each individual current assets for day-to-day operations. But, in the long run, it is the net working capital that is useful for the purpose.

When we want to know the sources from which funds are obtained, it is not working capital that is more important and should be given greater emphasis. The definition given by the Accountants, U.S.A., will give clear view of working capital which is given below:

"Working capital sometimes called net working capital, is represented by excess of current assets over current liabilities and identifies the relatively liquid portion of total enterprise capital which constitutes a margin of better for maturing obligations within the ordinary operation cycle of the business."

Each concern has its own limitations and constraints within which it has to decide whether it should give importance to gross or not working capital.

Concept of Zero Working Capital

The zero-working capital (ZWC) differs from the commonly used working capital i.e., current assets minus current liabilities.

ZWC = Inventories (+) Receivables (-) Payables.

The rationale is that inventories and receivables are the major constituents of current assets which affect sales. Further, suppliers finance inventories through account payable.

Current Assets

An asset is classified as current asset when:

(a) it is expected to be realised or intends to be sold or consumed in normal operating cycle of the organisation;

(b) the asset is held primarily for the purpose of trading;

(c) it is expected to be realised within twelve months after the reporting period;

(d) it is non- restricted cash or cash equivalent.

Generally current assets of an organisation, for the purpose of working capital management can be classified into the following main heads:

(i) Inventory (raw material, work-in-process and finished goods)

(ii) Receivables (trade receivables and bills receivables)

(iii) Cash or cash equivalents (short-term marketable securities)

(iv) Prepaid expenses

Current Liabilities

A liability is classified as current liability when:

(a) it is expected to be settled in normal operating cycle of the organisation

(b) the liability is held primarily for the purpose of trading;

(c) it is expected to be settled within twelve months after the reporting period.

Generally current liabilities of an organisation, for the purpose of working capital management can be classified into the following main heads:

(i) Payables (trade payables and bills payables)

(ii) Outstanding payments (wages and salary etc.)

6.1.2 Planning of Working Capital

Working capital of a business should be commensurate with its needs. Too high or too low working capital of a business or two extremes of working capital are equally dangerous to the existence of the business enterprise itself.

High amount of working capital, though increases its liquidity position but reduces its profitability and on the other hand too low working capital though increases its profitability reduces its liquidity. Both such extreme situations may cause business concerns to shut down.

Danger of too high amount of Working Capital

(a) It results in unnecessary accumulation of inventories and gives chance to inventory mishandling, wastage, pilferage, theft, etc., and losses increase.

(b) Excess working capital means idle funds which earns no profits for the business.

(c) It shows a defective credit policy of the company resulting in higher incidence of bad debts and adversely affects Profitability.

(d) It results in overall inefficiency.

Problems of inadequate or low amount of Working Capital

(a) It becomes difficult to implement operating plans and achieve the firm's profit target.

(b) It stagnates growth and it will become difficult to the firm to undertake profitable ventures for non-availability of working capital funds.

(c) It may not be in a position to meet its day-to-day current obligations and results in operational inefficiencies.

(d) The return on investment falls due to under utilisation of fixed assets and other capacities of the business concern.

(e) Credit facilities in the market will be lost due to faulty working capital.

(f) The reputation and goodwill of the firm will also be impaired considerably.

Determinants of Working Capital

The size or magnitude and amount of working capital will not be uniform for all organisations. It differs from one type of organisation to the other type of organisation. Depending upon various conditions and environmental factors of each and every organisation. There are many factors that determine the size of working capital. However, there are some factors, which are common to the most of the business concerns. Such factors are enumerated below:

1. **Nature and Size of the Business:** A company's working capital requirements depends on the activities it carried on and its size too. For instance, public utility organisation or service organisation where its activities are of mere service nature, does not require high amount of working capital, as it has no need of maintaining any stocks of inventories. In case of trading organisation, the magnitude of working capital is high as it

requires to maintain certain stocks of goods as also some credit to debtors. Further, if we go to manufacturing organisation the cycle period of working capital is high because the funds are to be invested in each and every type of inventory forms of raw-material, work-in-progress, finished goods as also debtors. Industrial units too require a large amount of working capital.

2. **Production Policies:** These policies will have a great significance in determining the size of the working capital. Where production policies are designed in such a way that uniform production is carried on throughout the accounting period, such concern requires a uniform and lesser amount of working capital. On the other hand, the concerns with production policies according to the needs of the customers will be peak at sometimes and require high amount of working capital. In seasonal industries too, where production policies are laid down tightly in the business season requires a high amount of working capital.

3. **Process of Manufacture:** If the manufacturing process of a particular industry is longer due to its complex nature, more working capital is required to finance that process, because, longer the period of manufacture, the larger the inventory tied up in the process and naturally requires a high amount of working capital.

4. **Growth and Expansion of Business:** A business concern at status requires a uniform amount of working capital as against the concerns which are growing and expanding. It is the tendency of any business organisation to grow further and further till its saturation point, if any. Such growth may be within the existing units by increased activities. Similarly, business concerns will expand their organisation by establishing new units. In both the cases, the need for working capital requirement increases as the organisation increases.

5. **Fluctuations in the Trade Cycle:** Business activities vary according to the general fluctuations in the world. There are four stages in a trade cycle which affects the activities of any business concern. Accordingly, the requirements of working capital are bound to change. When conditions of boom prevail, it is the policy of any prudent management to build or pile up large stock of inventories of various forms to take the advantage of the lower prices. Such fluctuations cause a business concern to demand for more amount of working capital. The other phase of trade cycle i.e., depression i.e., low or absence of business activities cause business concerns to demand for more working capital. In condition of depression, the products produced are not sold due to fall in demand, lack of purchasing power of the people. As a result of which entire production obtained was not sold in the market and high inventories are piled up. Therefore, there arises the need for heavy amount of working capital. Thus, the two extreme stages of trade cycles make the business concerns to demand for more working capital. In the former case due to acts and policies of management and in the later case due to natural phenomena of trade cycle.

6. **Terms and Conditions of Purchases and Sales:** A business concern which allows more credit to its customers and buys its supplies for cash requires more amount of working capital. On the other hand, business concerns which do not allow more credit period to its customers and seek better credit facilities for their supplies naturally require lesser amount of working capital.

7. **Dividend Policy:** A consistent dividend policy may affect the size of working capital. When some amount of working capital is financed out of the internal generation of funds such affect will be there. The relationship between dividend policy and working capital is well established and very few companies declare dividend without giving due consideration to its effects on cash and their needs for cash.

   If the dividend is to be declared in cash, such outflow reduces working capital and therefore, most of the business concerns declare dividend now-a-days in the form of bonus shares as such retain their cash. A shortage of working capital acts as powerful reason for reducing or skipping cash dividend.

8. **Price Level Changes:** The changes in prices make the functions of a finance manager difficult. The anticipations of future price level changes are necessary to avoid their affects on working capital of the firm. Generally, rising price level will require a company to demand for more amount of working capital, because the same level of current assets requires higher amount of working capital due to increased prices.

9. **Operating Efficiency:** The operating efficiency of a firm relates to its optimum utilisation of resources available whether in any form of factor of production, say, capital, labour, material, machines etc.; If a company is able to effectively operate its costs, its operating cycle is accelerated and requires relatively lessor amount of working capital. On the other hand, if a firm is not able to utilise its resources properly will have slow operating cycle and naturally requires higher amount of working capital.

10. **Percentage of Profits and Appropriation out of Profits:** The capacity of all the firms will not be same in generating their profits. It is natural that some firms enjoy a dominant and monopoly positions due to the quality of its products, reputations, goodwill etc. (for example Colgate Tooth Paste, Bata Chapels etc.,) and some companies will not have such position due to poor quality and other inherent hazards.

    The company policy of retaining or distribution of profits will also affect the working capital. More appropriation out of profits than distribution of profit necessarily reduces the requirements of working capital.

11. **Other Factors:** Apart from the above general considerations, there may be some factors responsible for determination of working capital which are inherent to the type of business. Some of such factors may be as follows:

    (a) General co-ordination and control of the activities in the organisation.

    (b) Absence of specialisation of products and their advantages.

    (c) Market facilities.

    (d) Means of transport and communication system.

    (e) Sector in which the firm works i.e., private or public sector etc.

    (f) Government policy as regard to: (i) Imports and Exports

    (g) Tax considerations.

    (h) Availability of labour and its organisation.

    (i) Area in which it is situated such as backward, rural sub-urban, etc.,

Types of Working Capital on the basis of Nature

There are two types of working capital, the distinction of which made keeping in view the nature of such funds in a business concern, which are as follows:

(a) Rigid, fixed, regular or permanent working capital; and

(b) Variable, seasonal, temporary or flexible working capital.

Every business concern has to maintain certain minimum amount of current assets at all times to carry on its activities efficiently and effectively. It is indispensable for any business concern to keep some material as stocks, some in the shape of work-in-progress and some in the form of finished goods.

Similarly, it has to maintain certain amount of cash to meet its day-to-day requirements. Without such minimum amount, it cannot sustain and carry on its activities. Therefore, some amount of working capital i.e., current assets is permanent in the business without any fluctuations like fixed assets and such amount is called working capital. To say precisely, permanent working capital is the irreducible minimum amount of working capital necessary to carry on its activities without any interruptions. It is that minimum amount necessary to outlays its fixed assets effectively.

On the other hand, temporary working capital is that amount of current assets which is not permanent and fluctuating from time to time depending upon the company's requirements and it is generally financed out of short-term funds. It may also high due to seasonal character of the industry as such it is also called seasonal working capital.

Temporary and permanent working capital are shown below in a diagram.

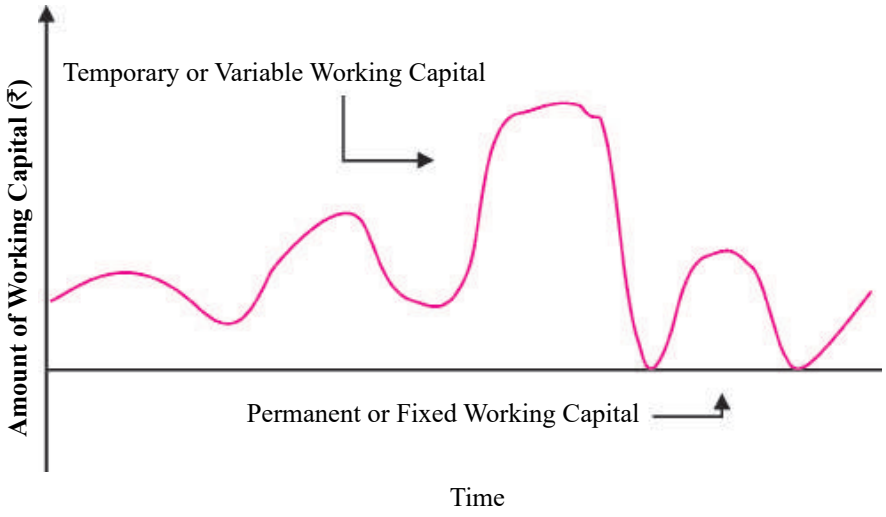

Figure 6.1: Types of working capital on the basis of Nature

6.1.3 Working Capital Cycle and Cash Cycle

Working Capital Cycle or Operating Cycle are synonymous terms in the context of management of working capital. Any business concern, whether it is of financial nature, trade organisation or a manufacturing organisation needs certain time to net fruits of the efforts. That is, by investment of cash, producing or doing something for some time will fetch profit. But soon after the investment of cash, it cannot get that profit by way of cash again immediately. It takes time to do so. The time required to take from investment of cash in some assets and conversion of it again into cash termed as operating or working capital cycle. Here the cycle refers to the time period.

The following figures has shown the working capital cycle and case cycle of different types of organisations.

In case of manufacturing concerns, the operating cycle will be Raw materials → WIP → Finished goods → Sales → Debtors & Bills Receivable → Cash

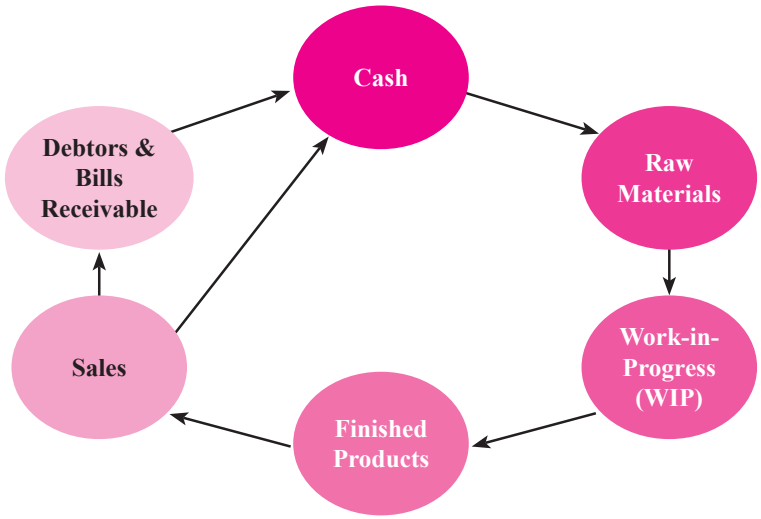

Figure 6.2: The operating cycle in manufacturing organisation

In case of trading concerns, the operating cycle will be: Cash → Stock → Debtors → Cash.

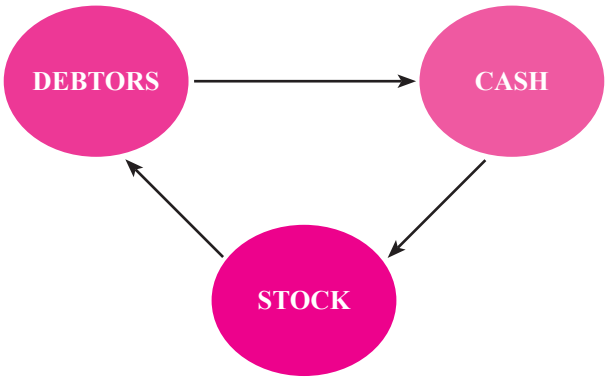

Figure 6.3: Operating cycle in trading organisation

In case of financial concerns, the operating cycle will be: Cash → Debtors → Cash only.

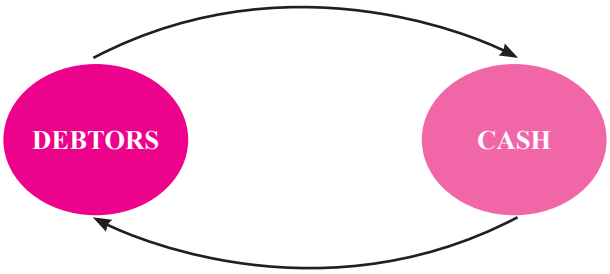

Figure 6.4: Operating cycle in financial organisation

The operating cycle of a manufacturing company involves three phases:

Phase 1: Acquisition of resources such as raw material, labour, power and fuel, etc.

Phase 2: Manufacture of the product which includes conversion of raw material into work-in-progress into finished goods.

Phase 3: Sale of the product either for cash or on credit. Credit sales create accounts receivable for collection

The length of the operating cycle of a manufacturing firm is the sum of: (i) inventory conversion period (ICP) and (ii) debtors (receivables) conversion period (DCP).

The inventory conversion period is the total time needed for producing and selling the product. Typically, it includes: (a) raw material conversion period (RMCP), (b) work-in-process conversion period (WIPCP), and (c) finished goods conversion period (FGCP). The debtors' conversion period is the time required to collect the outstanding amount from the customers. The total of inventory conversion period and debtors' conversion period is referred to as gross operating cycle (GOC).

Gross operating cycle = Inventory conversion period (ICP) + Debtors conversion period (DCP)

GOC = I CP + DCP

Net operating cycle (NOC) is the difference between gross operating cycle and payables deferral period. Net operating cycle = Gross operating cycle (GOC) – Creditors deferral period (CDP).

$$\text{NOC} = \text{GOC} - \text{CDP}$$

Net operating cycle is also referred to as cash conversion cycle.

Inventory Conversion Period

The inventory conversion (ICP) is the sum of raw material conversion period (RMCP), work-in-process conversion period (WIPCP) and finished goods conversion period (FGCP):

$$\text{ICP} = \text{RMCP} + \text{WIPCP} + \text{FGCP}$$

Raw Material Conversion Period (RMCP)

The raw material conversion period (RMCP) is the average time period taken to convert material in to work-in-process. RMCP depends on: (a) raw material consumption per day, and (b) raw material inventory.

$$\text{RMCP} = \frac{\text{Raw material invetory}}{\text{[Raw material consumption/360]}}$$

Work-in-process Conversion Period (WIPCP)

Work-in-process conversion period (WIPCP) is the average time taken to complete the semi-finished work or work-in-process.

$$\text{WIPCP} = \frac{\text{Work – in progress Inventory}}{\text{[Cost of Production / 360]}}$$

Finished Goods Conversion Period (FGCP)

Finished goods conversion period (FGCP) is the average time taken to sell the finished goods

$$\text{FGCP} = \frac{\text{Finished Goods inventory}}{\text{[Cost of Production / 360]}}$$

Debtors (Receivables) Conversion Period (DCP)

Debtors' conversion period (DCP) is the average time taken to convert debtors into cash. DCP represents the average collection period

$$\text{DCP} = \frac{\text{Receivables}}{\text{[Credit sales / 360]}} = \frac{\text{Debtors} \times 360}{\text{Credit sales}}$$

Creditors (Payables) Deferral Period (CDP)

Creditors (payables) deferral period (CDP) is the average time taken by the firm in paying its suppliers (creditors).

$$\text{DCP} = \frac{\text{Payables}}{\text{[Credit Purchase / 360]}} = \frac{\text{Creditors} \times 360}{\text{Credit Purchase}}$$

It is obvious from the above that the time gap between the sales and their actual realisation of cash is technically termed as Operating Cycle or Working Capital Cycle.

The period of working capital cycle may differ from one business enterprise to the other depending upon the nature of the enterprise and its activities. It means the pattern of working capital cycle do change according to its activities.

Students Note: Some authors consider 12 months = 360 days

6.1.4 Estimation of Working Capital Requirements

In order to calculate the working capital needs, holding period of various types of inventories, the credit collection period and the credit payment periods are required. Working capital also depends on the budgeted level of activity in terms of production/sales. The calculation of WC is based on the assumption that the production/sales is carried on evenly throughout the year and all costs accrue similarly.

The steps involved in estimating the different items of CA and CL are as follows:

Estimation of Current Assets

(i) Raw Materials Inventory

The investment in raw materials inventory is estimated on the basis of following equation.

$$\frac{\text{Budgeted productions (in units)} \times \text{Cost of raw materials per unit} \times \text{Average inventory holding period (months or days)}}{\text{12 months/365 days}}$$

(ii) Work-in- Progress (WIP) Inventory

The relevant costs to determine work-in-process inventory are the proportionate share of cost of raw materials and conversion costs such as labour and manufacturing overhead costs excluding depreciation. Depreciation is excluded as it does not involve any cash expenditure.

$$\frac{\text{Budgeted productions (in units)} \times \text{Estimated work-in-progress cost per unit} \times \text{Average time span of work-in-progress inventory (months or days)}}{\text{12 months/365 days}}$$

(iii) Finished Goods Inventory

Working capital required to finance the finished goods inventory is given below:

$$\frac{\text{Budgeted productions (in units)} \times \text{Cost of goods produced per unit (excluding depreciation)} \times \text{Finished goods holding period (months or days)}}{\text{12 months/365 days}}$$

(iv) Debtors

The working capital included in debtors should be estimated in relation to total cost price (excluding depreciation)

$$\frac{\text{Budgeted credit sales (in units)} \times \text{Cost of sales per unit (excluding depreciation)} \times \text{Average debt collection period (months or days) (months or days)}}{\text{12 months/365 days}}$$

(v) Cash and Bank Balances

Apart from working capital needs for financing inventories and debtors, firms also find it useful to have some minimum cash balances with them. It is difficult to lay down the exact procedure of determining such an amount. This would primarily be based on the motives for holding cash balances of the business firm, attitude of management toward risk, the access to the borrowing sources in times of need and past experience, and so on.

Estimation of Current Liabilities

The working capital needs of business firms are lower to the that extent such needs are met through the current liabilities (other than bank credit) arising in the ordinary course of business. The important current liabilities (CL), in this context are, trade creditors, wages and overheads. Estimation of these liabilities are mentioned below:

(i) Trade Creditors

$$\frac{\text{Budgeted yearly productions (in units)} \times \text{Raw material cost per unit} \times \text{Credit period allowed by creditors (months or days)}}{\text{12 months/365 days}}$$

(ii) Direct Wages

$$\frac{\text{Budgeted yearly productions (in units)} \times \text{Direct labour cost per unit} \times \text{Average time-lag in payment of wages (months or days)}}{\text{12 months/365 days}}$$

(iii) Overheads

$$\frac{\text{Budgeted yearly productions (in units)} \times \text{Overhead cost per unit} \times \text{Average time-lag in payment of overheads (months or days)}}{\text{12 months/365 days}}$$

(iv) Goods and Services Tax (GST)

$$\frac{\text{Budgeted yearly productions (in units)} \times \text{GST per unit} \times \text{Average time-lag in payment of GST (weeks or days)}}{\text{12 months/365 days}}$$

Working capital can be estimated by using the following format.

Determination of Working Capital

Particulars	Amount (₹)
A. Estimation of Current Assets	
(i) Minimum desired cash and bank balances	× × ×
(ii) Inventories	
Raw materials	× × ×
Work-in-Progress	× × ×
Finished Goods	× × ×
(iii) Debtors*	× × ×
Total Current Assets	× × ×
B. Estimation of Current Liabilities	
(i) Creditors**	× × ×
(ii) Wages	× × ×
(iii) Overheads	× × ×
(iv) Goods and Services Tax (GST)	× × ×
Total Current Liabilities	× × ×
C. Net Working Capital (A – B)	× × ×
Add: Margin for contingency	× × ×
D. Net Working Capital Required	× × ×
*If payment is received in advance, the item would be listed in Current Liabilities.	× × ×
**If advance payment is to be made to creditors, the item would appear under Current Assets. The same would be the treatment for advance payment of wages and overheads.	× × ×

Illustration 1

PQR Ltd. produces a product with the following revenue cost structure:

Particulars	Cost per unit (₹)
Raw materials	115
Direct labour	80
Overheads	37
Total Cost	**232**
Profit	58
Selling Price	290

The following additional information is available:

(a) Average raw materials in stock: One month.

(b) Average materials in process: Half-a-month, Raw material 100%, Direct labour 50%, overheads 50% complete.

(c) Average finished goods in stock: One month.

(d) Credit allowed by suppliers: One month

(e) Credit allowed to debtors: Two months.

(f) Time lag in payment of wages: Half a month.

(g) Overheads: One month

(h) One-fourth of sales are on cash basis.

(i) Cash balance is expected to be ₹ 1,60,000.

You are required to prepare a statement showing the working capital needed to finance a level of activity of 60,000 units of annual output. The production is carried throughout the year on even basis and wages and overheads accrue uniformly. Debtors are to taken at cost.

Solution:

Statement showing estimate of Working Capital

Particulars	(₹)	(₹)
Current Assets		
Stock of Raw material (60,000 units × ₹115 × 1/12)		5,75,000
Work-in-progress:		
Raw materials (60,000 units × ₹115 × 1/12 × 1/2)	2,87,500	
Direct labour (60,000 units × ₹80 × 1/12 × 1/2 ×1/2)	1,00,000	
Overheads (60,000 units × ₹37 × 1/12 × 1/2 × 1/2)	46,250	4,33,750
Stock of finished goods (60,000 units × ₹232 × 1/2)		11,60,000

Particulars	(₹)	(₹)
Debtors (60,000 units × ₹232 × 3/4 × 2/12)		17,40,000
Cash balance		1,65,000
Total	**(A)**	**40,73,750**
Current Liabilities:		
Creditors for raw material (60,000 units × ₹115 × 1/12)		5,75,000
Creditors for wages (60,000 units × ₹80×1/12 × 1/2)		2,00,000
Creditors for overheads (60,000 units × ₹37 × 1/12)		1,85,000
Total	**(B)**	**9,60,000**
Net Working Capital	**(A) – (B)**	**31,13,750**

Illustration 2

A and B Ltd is desired to purchase a business and has consulted you, and one point on which you are asked to advise them, is the average amount of working capital which will be required in the first year's working.

You are given the following estimates and instructed to add 12 % to your computed figure to allow for contingencies.

Particulars	Amount for the year (₹)
(i) Average amount blocked up for stocks:	
Stocks of finished product	6,000
Stock of stores and materials	7,000
(ii) Average credit given:	
Inland sales: 6 weeks' credit	3,12,000
Export sales: 1.5 weeks' credit	78,000
(iii) Average time lag in payment of wages and other outgoings	
Wages: 1.5 weeks	2,60,000
Stock and materials: 1.5 months	52,000
Rent and royalties: 6 months	12,000
Clerical staff: ½ month	62,400
Manager: ½ month	4,800
Miscellaneous expenses: 1.5 months	52,000
(iv) Payment in advance:	
Sundry expenses (paid quarterly in advance)	8,000
Undrawn profits on an average throughout the year	10,000

Solution:

Statement to determine Net Working Capital for AB Ltd.

Particulars	Amount (₹)
(a) Current assets:	
(i) Stocks of finished product	6,000
(ii) Stock of stores and materials	7,000
(iii) Debtors:	
Inland sales (₹ 3,12,000 × 6/52)	36,000
Export sales (78,000 × 1.5/52)	2,250
(iv) Advance payment of sundry expenses (8,000 × 1/4)	2,000
Total investment in current assets	53,250
(b) Current liabilities:	
(i) Wages (₹2,60,000 × 1.5/52)	7,500
(ii) Stock and materials (₹ 52,000 × 1.5/12)	6,500
(iii) Rent and royalties (₹ 12,000 × 6/12)	6,000
(iv) Clerical staff (₹ 62,400 × 0.5/12)	2,600
(v) Manager (₹ 4,800 × 0.5/12)	200
(vi) Miscellaneous expenses (₹ 52,000 × 1.5/12)	6,500
Total estimate of current liabilities	29,300
(c) Net working capital	
(i) Current assets - Current liabilities (a - b)	23,950
(ii) Add: 12% contingency allowance	2,874
Average amount of working capital required	26,824

Assumptions:

(i) A time period of 52 weeks / 12 months has been assumed in year.

(ii) Undrawn profit has been ignored in the working capital computation for the following reasons:

(a) For the purpose of determining working capital provided by net profit, it is necessary to adjust the net profit for income tax and dividends / drawings, and so on.

(b) Profit need not always be a source of financing working capital. It may be used for other purposes like purchase of fixed assets, payment of long-term loans, and so on. Since the firm does not seem to have such uses, ₹ 10,000 may be treated as source of working capital. But the net working capital will not change.

(iii) Actual working capital requirement would be more than what is estimated here as the cash component of current assets is not known.

Illustration 3

A company has prepared its annual budget, relevant details of which are reproduced below:

(a) Sales ₹ 46.80 lakhs (25% cash sales and balance on credit)	78,000 units
(b) Raw material cost	60% of sales value
(c) Labour cost	₹ 6 per unit
(d) Variable overheads	₹ 1 per unit
(e) Fixed overheads	₹ 5 lakhs (including ₹ 1,10,000 as depreciation)

Budgeted stock levels:	
Raw materials	3 weeks
Work-in-progress	1 week (Material 100%, Labour & Overheads 50%)
Finished goods	2 weeks
Debtors are allowed credit	4 weeks
Creditors allow credit	4 weeks
Wages are paid by-weekly, i.e., by the 3rd week and by the 5th week for the 1st & 2nd weeks and the 3rd & 4th weeks respectively	
Lag in payment of overheads	2 weeks
Cash-in-hand required	₹ 50,000

Prepare the working capital budget for a year for the company, making whatever assumptions that you may find necessary.

Solution:

Unit Selling Price and Cost	(₹)
Selling price (₹46,80,000 ÷ 78,000)	60
Cost:	
Raw materials (60% of ₹46,80,000 ÷ 78,000)	36
Labour	6
Variable overheads	1
Fixed overheads (excluding depreciation)	5
Total cost per unit	**48**

Statement showing Working Capital Requirement

Current Assets		(₹)
Raw materials	(78,000 units × ₹ 36 × 3/52)	1,62,000
Work-in-progress	(78,000 units × ₹ 42 × 1/52)	63,000

Current Assets		(₹)
Finished goods	(78,000 units × ₹ 48 × 2/52)	1,44,000
Debtors	(78,000 units × ₹ 60 × 75/100 × 4/52)	2,70,000
Cash in hand		50,000
Total (A)		**6,89,000**
Current Liabilities		
Creditors	(78,000 units × ₹ 36 × 4/52)	2,16,000
Lag in wages	(78,000 units × ₹ 6 × 2/52)	18,000
Lag in payment of overheads	(78,000 units × ₹ 6 × 2/52)	18,000
Total (B)		**2,52,000**
Net working capital required	(A) – (B)	4,37,000

Note:

1. Total sales for 4 weeks is 6,000 units. Excluding 25% cash sales, credit sales amounts to 4,500 units.
2. One year is assumed to be of 52 weeks.

Illustration 4

A company plans to manufacture and sell 400 units of a domestic appliance per month at a price of ₹ 600 each. The ratio of costs to selling price are as follows:

Particulars	(% of selling price)
Raw materials	30%
Packing materials	10%
Direct labour	15%
Direct expense	5%

Fixed overheads are estimated at ₹ 4,32,000 per annum.

The following norms are maintained for inventory management:

Raw materials	30 days
Packing materials	15 days
Finished goods	200 units
Work-in-progress	7 days

Other particulars are given below:

(a) Credit sales represent 80% of total sales and the dealers enjoy 30 working days credit. Balance 20% are cash sales.

(b) Creditors allow 21 working days credit for payment.

(c) Lag in payment of overheads and expenses is 15 working days.

(d) Cash requirements to be 12% of net working capital.

(e) Working days in a year are taken as 300 for budgeting purpose.

Prepare a Working Capital requirement forecast for the budget year.

Solution:

Selling Price and Cost per unit **(₹)**

Raw materials (₹ 600 × 30/100)	180
Packing materials (₹ 600 × 10/100)	60
Direct labour (₹ 600 × 15/100)	90
Direct expenses (₹ 600 × 5/100)	30
Fixed overheads [₹ 4,32,000 / (400 × 12)]	90
Total cost	450
Profit	150
Selling Price per unit	600

Forecast of Working Capital Requirement: **(₹)**

Current Assets		
Raw materials stock	(₹ 4800 × 180 × 30/300)	86,400
Packing materials stock	(₹ 4800 × 60 × 15/300)	14,400
Working in progress	(₹ 4800 × 285 × 7/300)	31,920
Finished goods stock	(₹ 450 × 200 units)	90,000
Debtors	(₹ 4800 × 80/100 × ₹ 600 × 30/300)	2,30,400
Total (A)		**4,53,120**
Current Liabilities:		
Creditors for raw material suppliers	(₹ 4800 × 180 × 21/300)	60,480
Creditors for packing material	(₹ 4800 × 60 × 21/300)	20,160
Creditors for expenses and overheads	(₹ 4800 × 120 × 15/300)	28,800
Total (B)		**1,09,440**
Net Working Capital (A) – (B)		3,43,680
Add: Cash required (12% of net working capital)		41,242
Total Working Capital Required		3,84,922

Note:

(a) Work-in-progress is valued with raw material cost at 100% and 50% of wages, overheads and expenses.

(b) Debtors are valued at selling price.

Illustration 5

(a) From the following details, prepare an estimate of the requirement of Working Capital:

Production	60,000 units
Selling price per unit	₹ 5
Raw material	60% of selling price
Direct wages	10% of selling price
Overheads	20% of selling price
Materials in hand	2 months requirement
Production Time	1 month
Finished goods in Stores	3 months
Credit for Material	2 months
Credit allowed to Customers	3 months
Average cash balance	₹ 20,000

Wages and overheads are paid at the beginning of the month following. In production, all the required materials are charged in the initial stage and wages and overheads accrue evenly.

(b) What is the effect of double shift working on the requirement of working capital?

Solution:

(a) Computation of requirement of Working Capital

Annual production 60,000 units

Monthly production 5,000 units

Unit Cost Sheet

Particulars		(₹)
Selling price		5.00
Cost of Raw Material 60% of ₹5 =	₹3.00	
Wages 10% of ₹5 =	₹0.50	
Overheads 20% of ₹5 =	₹1.00	
Total cost per unit		4.50
Profit per unit		0.50

Current Assets:		(₹)	(₹)
Stock of Raw material	$3 \times 60{,}000 \times \frac{2}{12}$		30,000
Work in Progress:			

Raw Materials	$3 \times 60,000 \times \frac{1}{12}$	15,000	
Wages and Overheads	$1.50 \times 60,000 \times \frac{1}{12} \times \frac{1}{2}$	3,750	18,750
Stock of Finished Goods	$4.50 \times 60,000 \times \frac{3}{12}$		67,500
Debtors (on sales)	$5.00 \times 60,000 \times \frac{3}{12}$		75,000
Cash			20,000
Total Current Assets	(A)		2,11,250

Current Liabilities:		(₹)
Creditors	$3 \times 60,000 \times \frac{2}{12}$	30,000
Outstanding wages	$0.5 \times 60,000 \times \frac{1}{12}$	2,500
Outstanding overheads	$1 \times 60,000 \times \frac{1}{12}$	5,000
Total Current Liabilities (B)		37,500

Working Capital: (A-B) = 2,11,250 – 37,500 = ₹ 1,73,750

(b) Effects of Double shift working:

The following assumptions are made before estimating the working capital requirement for double shift working:

1. Production will be 10,000 units per month or 1,20,000 units per year.
2. Materials may not be required at double rate. Due to inventory control measures it may be taken as 2/3.
3. WIP will be the same at 5,000 units. This will not increase as WIP of first shift will be handed over to second shift.
4. 50% of overheads are assumed as fixed. This will not increase due to double shift working.

On the basis of above assumptions, the following capital requirement is estimated as follows:

Current Assets:			(₹)
Stock of Raw material	$30,000 + \left(30,000 \times \frac{2}{3}\right)$		50,000

Work in Progress:			
Raw materials	$3 \times 60{,}000 \times \frac{1}{12}$	15,000	
Wages and Overheads	$**1.25 \times 60{,}000 \times \frac{1}{12} \times \frac{1}{2}$	3,125	18,125
Stock of finished Goods	$4.25 \times 1{,}20{,}000 \times \frac{3}{12}$		1,27,500
Debtors (on sales)	$5.00 \times 1{,}20{,}000 \times \frac{3}{12}$		1,50,000
Cash (double)			40,000
Total Current Assets	**(A)**		**3,85,625**

Current liabilities:		(₹)
Creditors	$3 \times 1{,}20{,}000 \times \frac{2}{12}$	60,000
Outstanding wages	$0.5 \times 1{,}20{,}000 \times \frac{1}{12}$	5,000
Outstanding overheads (Fixed Overheads remain same)		2,500
(Variable Overheads double as before)		5,000
Total Current Liabilities	**(B)**	**72,500**

Working Capital required for two shifts: (A-B) = ₹ 3,85,625 – ₹ 72,500 = ₹ 3,13,125

Therefore, additional working capital required for second shift = ₹ 3,13,125 – ₹ 1,73,750 = ₹ 1,39,375

** Calculation of Cost per unit

	Single shift (₹)	Double shift (₹)
Raw material Cost	3.00	3.00
Wages	0.50	0.50
Overhead expenses:		
Fixed	0.50	0.25
Variable	0.50	0.50
Cost per unit	4.50	4.25

Illustration 6

Solaris Ltd. sells goods in domestic market at a gross profit of 25%, not counting on depreciation as a part of the 'cost of goods sold'. Its estimates for next year are as follows:

Amounts ₹ In lakhs

Sales - Home at 1 month's credit	1,200
Exports at 3 months' credit, selling price 10 %below home price	540
Materials used (suppliers extend 2 months' credit)	450
Wages paid, ½ month in arrears	360
Manufacturing expenses, paid 1 month in arrears	540
Administrative expenses, paid 1 month in arrears	120
Sales promotion expenses (payable quarterly - in advance)	60
Income - tax payable in 4 instalments of which one falls in the next financial year	150

The company keeps 1 month's stock of each of raw materials and finished goods and believes in keeping ₹ 20 lakh as cash. Assuming a 15% safety margin, ascertain the estimated working capital requirement of the company (ignore work -in-process).

Solution:

Statement showing determination of Working Capital (Amount in ₹ lakhs)

Current Assets	(₹)	Computation	
Cash	20.00		
Raw Materials	37.50	(450 lakh / 12)	
Finished Goods	122.50	(1,470 lakh / 12)	
Debtors-Domestic market	100.00	(1,200 / 12)	
Export Market	135.00	(540 × 3 / 12)	
Sales Promotion Expense	15.00	(60 lakh × 3 / 12)	
Total Current Assets (A)	**430.00**		
Current Liabilities			(₹)
Raw Materials (450 × 2 / 12)			75.00
Wages (360 / 24)			15.00
Manufacturing Expenses (540 /12)			45.00
Administration Expenses (120/12)			10.00
Total Current Liabilities (B)			**145.00**
Net Current Assets (A-B)			**285.00**
Add: Safety Margin @ 15%			42.75
Working Capital Requirement			**327.75**

Working notes:

1. Cost of Production

	₹ in lakhs
Material used	450
Wages paid	360
Manufacturing exp	540
Administration exp	120
Total	1470

Tax aspect is ignored as it is to be paid out of profits.

Illustration 7

Camellia Industries Ltd. is desirous of assessing its Working Capital requirements for the next year. The finance manager has collected the following information for the purpose.

Estimated cost per unit of finished product	(₹ in lakh)
Raw materials	90
Direct labour	50
Manufacturing and administrative overhead (Excluding depreciation)	40
Depreciation	20
Selling overheads	30
Total Cost	230

The product is subject to excise duty of 10% (levied on cost of production) and is sold at ₹ 300 per unit.

Additional information:

i. Budgeted level of activity is 1,20,000 units of output for the next year.

ii. Raw material cost consists of the following:

Pig iron 65 per unit

Ferro alloys 15 per unit

Cast iron borings 10 per unit

iii. Raw materials are purchased from different suppliers, extending different credit period. Pig iron 2 months

Ferro alloys ½ months

Cast iron borings 1 month.

iv. Product is in process for a period of 1/2 month. Production process requires full unit (100 %) of pig iron and

ferroalloys in beginning of production. Cast iron boring is required only to the extent of 50 % in the beginning and the remaining is needed at a uniform rate during the process. Direct labour and other overheads accrue similarly at a uniform rate throughout production process.

v. Past trends indicate that the pig iron is required to be stored for 2 months and other materials for 1 month.

vi. Finished goods are in stock for a period of 1 month.

vii. It is estimated that one-fourth of total sales are on cash basis and the remaining sales are on credit. The past experience of the firm has been to collect the credit sales in 2 months.

viii. Average time-lag in payment of all overheads is 1 month and ½ month in the case of direct labour.

ix. Desired cash balance is to be maintained at ₹ 10 lakh.

You are required to determine the amount of net working capital of the firm. State your assumptions, if any.

Solution:

Determination of Net Working Capital of Camelia Industries Ltd.

Current Assets	(₹)	(₹)
Minimum desired cash balance	10,00,000	
Raw Materials:		
Pig iron	13,00,000	[1,20,000 × 65 × (2 / 12)]
Ferry alloys	1,50,000	[1,20,000 × 15 × (1 / 12)]
Cast iron borings	1,00,000	[1,20,000 × 10 × (1 / 12)]
Work-in-Progress	6,62,500	[1,20,000 × 132.5 (1/24)]
Finished goods	18,00,000	[1,20,000 × 180 × (1/ 12)]
Debtors	45,00,000	[1,20,000 × 300 × (2/12) × 3/4]
Total Current Assets: (A)	95,12,500	
Current liabilities	**(₹)**	**(₹)**
Creditors:		
Pig iron	13,00,000	[1,20,000 × 65 × (2/12)]
Ferry alloys	75,000	[1,20,000 × 15 × (1 / 24)]
Cast iron borings	1,00,000	[1,20,000 × 10 × (1 / 12)]
Outstanding Wages	2,50,000	[1,20,000 × 50 × (1 / 24)]
Outstanding Total Overheads	7,00,000	[1,20,000 × 70 × (1 / 12)]
Total Current Liabilities (B)	24,25,000	
Working Capital (A) - (B) = ₹95,12,500 – ₹24,25,000 = ₹70,87,500		

Working Notes: (₹ in Lakh)

1. Determination of Work-in-Progress

Particlars	Amount (₹)	Amount (₹)
*Determination of Work in Process		
Pig iron		65.00
Ferry alloys		15.00
Cast iron borings (0.5 × 10)		5.00
Other costs		
Cast iron borings	2.50	
Direct Labour (0.5 × 50)	25.00	
Manufacturing and administration Overheads (0.5 × 40)	20.00	47.50
		132.50

2. Finished goods have been taken at cost but Debtors have been taken at selling price.
3. The depreciation cost of ₹20 per unit, which is a non-cash item, has been ignored for valuation of work-in-progress and finished goods but considered for valuation of debtors.

Receivable Management

6.2

Receivables refers the book debts or debtors owed to the firm by customers arising from sale of goods or services in the ordinary course of business. These constitute an important component of the current assets of a firm. However, debt involves an element of risk and bad debts also. Hence, it calls for careful analysis the important dimensions of the efficient management of receivables within the framework of a firm's objectives of value maximization. The goal of receivables management is to maximize the value of the firm by achieving a tradeoff between risk and profitability.

6.2.1 Meaning and Objectives of Receivables Management

Management of receivables refers to planning and controlling of 'debt' owed to the firm from customer on account of credit sales. It is also called as trade credit management.

The objectives of receivables management are as follows:

(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.

6.2.2 Costs of Maintaining Receivables

The costs with respect to maintenance of receivables can be identified as follows:

(i) **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, 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.

(ii) **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.

(iii) **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.

(iv) **Defaulting Costs:** Sometimes after making all serious efforts to collect money from defaulting customers, the firm may not be able to recover the overdues 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.

6.2.3 Benefits of Maintaining Receivables

Important benefits of maintaining receivables are as follows:

(i) **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.

(ii) **Increase in Profits:** Increase in sales will help the firm (a) to easily recover the fixed expenses and attaining the break-even level, and (b) increase the operating profit of the firm. In a normal situation, there is a positive relation between the sales volume and the profit.

(iii) **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.

6.2.4 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:

(i) **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.

(ii) **Credit Policies:** 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.

(iii) **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 (a) Credit period and (b) Cash discount.

6.2.5 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 "Tradeoff" between liquidity and profitability as shown in the chart below.

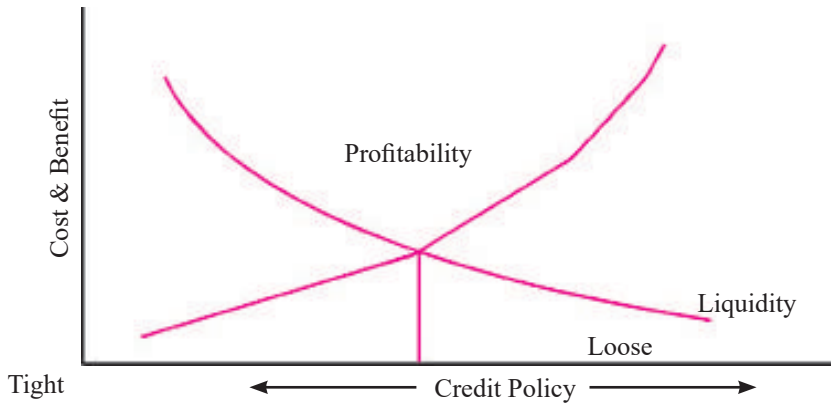

Figure 6.5: Optimum credit policy (Trade off between liquidity and profitability)

The following are the aspects of credit policy:

(a) Level of credit sales required to optimise the profit.

(b) Credit period i.e., duration of credit, whether it may be 15 days or 30 or 45 days etc.

(c) Cash discount, discount period and seasonal offers.

(d) Credit standard of a customer: 5 C's of credit:

  (i) Character of the customer i.e., willingness to pay.

  (ii) Capacity- ability to pay.

  (iii) Capital- financial resources of a customer.

  (iv) Conditions- special conditions for extension of credit to doubtful customers and prevailing economic and market conditions and;

(v) Collateral security.

(e) Profits.

(f) Market and economic conditions.

(g) Collection policy.

(h) Paying habits of customers.

(i) Billing efficiency, record-keeping etc.

(j) Grant of credit size and age of receivables.

6.2.6 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 are 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 organizations.

(ii) **Credit Terms:** Credit terms 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.

(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.

6.2.7 Credit Evaluation of Customer

Credit evaluation of the customer involves the following five stages:

Stage 1: 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 caes, Gazette notifications etc.

Stage 2: 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.

Stage 3: 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.

Stage 4: 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, ₹ 25,000 or ₹ 1,00,000 or so, depending upon the credit analysis and credit-worthiness of the customer.

Stage 5: 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. These facilities faster recovery.

6.2.8 Evaluation of Credit Policy

Example 1

Generally two methods of evaluating the credit policies to be adopted by a company – (a) Total Approach and (b) Incremental Approach. The formats for the two approaches are given as under:

Statement showing the Evaluation of Credit Policies (based on Total Approach)

Particulars	Present Policy	Proposed Policy I	Proposed Policy II	Proposed Policy III
	(₹)	(₹)	(₹)	(₹)
A. Expected Profit				
(a) Credit Sales	×××	×××	×××	×××

Particulars	Present Policy	Proposed Policy I	Proposed Policy II	Proposed Policy III
	(₹)	(₹)	(₹)	(₹)
(b) Total Cost other than Bad Debts				
(i) Variable Costs	×××	×××	×××	×××
(ii) Fixed Costs	×××	×××	×××	×××
	××××	××××	××××	××××
(c) Bad Debts	×××	×××	×××	×××
(d) Cash Discount				
(e) Expected Net Profit before Tax (a-b-c-d)	×××	×××	××	×××
(f) Tax	×××	×××	×××	×××
(g) Expected Profit after Tax (e – f)	××××	××××	××××	××××
B. Opportunity Cost of Investments in Receivables locked up in Collection Period	×××	×××	×××	×××
Net Benefits (A - B)	××××	××××	××××	××××

Comment:

The Policy should be adopted since the net benefits under this policy are higher as compared to other policies.

(i) Total Fixed Cost = [Average Cost per unit - Variable Cost per unit] × No. of units sold on credit under Present Policy

(ii) Opportunity Cost $= \frac{\text{Collection Period (Days)}}{365 \text{ (or } 360)} \times \frac{\text{Required Rate of Return}}{100}$

Example 2

Statement showing aluatithe Evon of Credit Policies (based on Incremental Approach)

Particulars	Present Policy	Proposed Policy I	Proposed Policy II	Proposed Policy III
	(₹)	(₹)	(₹)	(₹)
A. Incremental Expected Profit				
Credit Sales	×××	×××	×××	×××
(a) Incremental Credit Sales	×××	×××	×××	×××
(b) Less: Incremental Costs of Credit Sales				
(i) Variable Costs	×××	×××	×××	×××
(ii) Fixed Cost	×××	×××	×××	×××
(c) Incremental Bad Debt Losses	×××	×××	×××	×××

Particulars	Present Policy	Proposed Policy I	Proposed Policy II	Proposed Policy III
	(₹)	(₹)	(₹)	(₹)
(d) Incremental Cash Discount	×××	×××	×××	×××
(e) Incremental Expected Profit (a-b-c-d)	×××	×××	×××	×××
(f) Tax	×××	×××	×××	×××
(g) Incremental Expected profit after tax (e – f)	×××	×××	×××	×××
B. Required return on Incremental Investments				
(a) Cost of Credit Sales	×××	×××	×××	×××
(b) Collection Period (in days)	----	----	----	----
(c) Investment in Receivable (a × b/365 or 360)	×××	×××	×××	×××
(d) Incremental Investment in Receivables	×××	×××	×××	×××
(e) Required Rate of Return (in %)	%	%	%	%
(f) Required Return on Incremental Investments (d × e)	×××	×××	×××	×××
Incremental Net Benefits (A - B)	×××	×××	×××	×××

Comment:

The Policy should be adopted since net benefits under this policy are higher as compared to other policies.

(i) Total Fixed Cost = [Average Cost per unit - Variable Cost per unit] × No. of units sold on credit under Present Policy

(ii) Opportunity Cost

$$\text{Total Cost of Credit Sales} \times \frac{\text{Collection Period (Days)}}{365 \text{ (or } 360)} \times \frac{\text{Required Rate of Return}}{100}$$

Illustration 8

XYZ Corporation whose current sales are in the region of ₹6 lakh 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;

The selling price per unit is ₹ 3. Average cost per unit is ₹ 2.25 and variable costs per unit are ₹ 2. The current bad debt loss is 1%. Required return on additional investment is 20%. Assume a 360 days year. Which of the above policies would you recommend for adoption?

Solution:

A. Statement showing the Evaluation of Debtors Policies (Total Approach)

	Particulars	Present Policy 30 days	Proposed Policy A 40 days	Proposed Policy B 50 days	Proposed Policy C 60 days	Proposed Policy D 75 days
		(₹)	(₹)	(₹)	(₹)	(₹)
A.	Expected Profit					
	(a) Credit Sales	6,00,000	6,30,000	6,48,000	6,75,000	6,90,000
	(b) Total Cost other than Bad Debts					
	(i) Variable Costs [Sales × ₹ 2/ ₹ 3]	4,00,000	4,20,000	4,32,000	4,50,000	4,60,000
	(ii) Fixed Costs	50,000	50,000	50,000	50,000	50,000
		4,50,000	4,70,000	4,82,000	5,00,000	5,10,000
	(c) Bad Debts	6,000	9,450	12,960	20,250	27,600
	(d) Expected Profit [(a) - (b)-(c)]	1,44,000	1,50,550	1,53,040	1,54,750	1,52,400
B.	Opportunity Cost of Investments in Receivables	7,500	10,444	13,389	16,667	21,250
C.	Net Benefits (A-B)	1,36,500	1,40,106	1,39,651	1,38,083	1,31,150

Recommendation: The Proposed Policy A (i.e., increase in collection period by 10 days or total 40 days) should be adopted since the net benefits under this policy are higher as compared to other policies.

Working Notes:

(i) **Fixed Cost** = [Average Cost per unit - Variable Cost per unit] × No. of units sold

= [₹ 2.25 – ₹ 2.00] × (₹ 6,00,000/3)

= ₹ 0.25 × 2,00,000 = ₹ 50,000

(ii) **Opportunity Cost of Average Investments**

$$\text{Total Cost of Credit Sales} \times \frac{\text{Collection period (Days)}}{365 \text{ (or 360)}} \times \frac{\text{Required Rate of Return}}{100}$$

Present Policy = (4,50,000 × 30 / 360) × (20 / 100) = ₹ 7,500

Policy A = (4,70,000 × 40 / 360) × (20 / 100) = ₹ 10,444

Policy B = (4,82,000 × 50 / 360) × (20 / 100) = ₹ 13,389

Policy C = (5,00,000 × 60 / 360) × (20 / 100) = ₹ 16,667

Policy D = (5,10,000 × 75 / 360) × (20 / 100) = ₹ 21,250

(B) Another method of solving the problem is Incremental Approach. Here we assume that sales are all credit sales.

	Particulars	Present Policy 30 day	Proposed Policy A 40 days	Proposed Policy B 50 days	Proposed Policy C 60 days	Proposed Policy D 75 days
		(₹)	(₹)	(₹)	(₹)	(₹)
A.	Incremental Expected Profit					
	(a) Incremental Credit Sales		30,000	48,000	75,000	90,000
	(b) Incremental Costs					
	(i) Variable Costs	4,00,000	20,000	32,000	50,000	60,000
	(ii) Fixed Costs	50,000	-	-	-	-
	(c) Incremental Bad Debt Losses	6,000	3,450	6,960	14,250	21,600
	(d) Incremental Expected Profit (a - b -c)]		6,550	9,040	10,750	8,400
B.	Required Return on Incremental Investments					
	(a) Cost of Credit Sales	4,50,000	4,70,000	4,82,000	5,00,000	5,10,000
	(b) Collection period	30	40	50	60	75
	(c) Investment in Receivable (a × b/360)	37,500	52,222	66,944	83,333	1,06,250
	(d) Incremental Investment in Receivables	-	14,722	29,444	45,833	68,750
	(e) Required Rate of Return (in %)		20	20	20	20
	(f) Required Return on Incremental Investments (d × e)		2,944	5,889	9,167	13,750
C.	Net Benefits (A - B)	-	3,606	3,151	1,583	5,350

Recommendation: The Proposed Policy 'A' should be adopted since the net benefits under this policy are higher than those under other policies.

(C) Another method of solving the problem is by computing the Expected Rate of Return.

$$\text{Expected Rate of return} = \frac{\text{Incremental Expected Profit}}{\text{Incremental Investment in Receivables}} \times 100$$

For Policy A = ₹6,550 / 14,722 × 100 = 44.49%
For Policy B = ₹9,040 / 29,444 × 100 = 30.70%
For Policy C = ₹10,750 / 45,833 × 100 = 23.45%
For Policy D = ₹8,400 / 68,750 × 100 = 12.22%

Recommendation: The Proposed Policy 'A' should be adopted since the Expected Rate of Return (44.49%) is more than the Required Rate of Return (20%) and is the highest among the given policies compared.

Illustration 9

ABC Corporation is considering relaxing its present credit policy and is in the process of evaluating two proposed policies. Currently the firm has annual credit sales of ₹ 50 lakhs and accounts receivable turnover ratio of 4 times a year. The current level of loss due to bad debts is ₹1,50,000. The firm is required to give a return of 25% on the investment in new accounts receivables. The company's variable costs are 70% of the selling price. Given the following information, which is the better option?

(Amount in ₹)

	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 times	3 times	2.4 times
Bad debt losses	1,50,000	3,00,000	4,50,000

Solution:

Statement showing the Evaluation of Debtors Policies

	Particulars	Present Policy	Proposed Policy I	Proposed Policy II
		(₹)	(₹)	(₹)
A	**Expected Profit**			
	(a) Credit Sales	50,00,000	60,00,000	67,50,000
	(b) Total Cost other than Bad Debts:			
	(i) Variable Costs	35,00,000	42,00,000	47,25,000
	(c) Bad Debts	1,50,000	3,00,000	4,50,000
	(d) Expected Profit [(a) - (b) - (c)]	13,50,000	15,00,000	15,75,000
B	**Opportunity Cost of Investments in Receivables**	**2,18,750**	**3,50,000**	**4,92,188**
C	**Net Benefits (A - B)**	**11,31,250**	**11,50,000**	**10,82,812**

Recommendation: The Proposed Policy 'I' should be adopted since the net benefits under this policy is higher as compared to other policies.

Workings Notes: Calculation of Opportunity Cost of Average Investments

Opportunity Cost = Total Cost × Collection period / 12 × Rate of Return / 100

Present Policy = ₹ 35,00,000 × 3/12 × 25% = ₹ 2,18,750

Proposed Policy I = ₹ 42,00,000 × 4/12 × 25% = ₹ 3,50,000

Proposed Policy II = ₹ 47,25,000 × 5/12 × 25% = ₹ 4,92,188

Illustration 10

A firm is considering pushing up its sales by extending credit facilities to the following categories of customers:

(a) Customers with a 10% risk of non-payment, and

(b) Customers with a 30% risk of non-payment.

The incremental sales expected in case of category (a) are ₹40,000 while in case of category (b) they are ₹50,000.

The cost of production and selling costs are 60% of sales while the collection costs amount to 5% of sales in case of category (a) and 10% of sales in case of category (b).

You are required to advise the firm about extending credit facilities to each of the above categories of customers.

Solution:

Evaluation of Credit Policies

Category (a) 10% Risk of Non-payment

Particulars		(₹)
Incremental sales		40,000
Less: Bad debts @ 10%		4,000
Sales realized		36,000
Less: Cost of production and selling cost (40,000 × 60%)	24,000	
Less: Collection cost (40,000 × 5%)	2,000	26,000
Incremental profit		10,000

Category (b) 30% risk of non-payment

		(₹)
Incremental sales		50,000
Less: Bad debts @ 30% (50,000 × 30%)		15,000
Sales realized		35,000
Less: Cost of production and selling cost (50,000 × 60%)	30,000	
Less: Collection cost (50,000 × 10%)	5,000	35,000
Incremental profit		Nil

Comment: Advise to extend credit facility to category (a) customers alone.

Payable Management

6.3

A substantial part of purchases of goods and services in business are on credit terms rather than against cash payment. While the supplier of goods and services tend to perceive credit as a lever for enhancing sales or as a form of non-price instrument of competition, the buyer tends to look upon it as a loaning of goods or inventory. Generally, the supplier's credit is referred to as Accounts Payable, Trade Credit, Trade Bill, Trade Acceptance, Commercial Draft or Bills Payable depending on the nature of credit provided.

Payables or accounts payables are amounts due to vendors or suppliers for goods or services received that have not yet been paid for. They are short- term deferments of cash payments that the buyer of goods and services is allowed by the seller. Payables constitute current or short-term liabilities representing the buyer's obligation to pay a certain amount on a date in the near future for value of goods or services received. The sum of all outstanding amounts owed to vendors or suppliers or third-party is shown as the accounts payable balance on the company's balance sheet.

Payables management is the handling of a company's unpaid debts to third-party vendors for purchases made on credit. Account payables management involves tasks such as seeking trade credit lines, acquiring favorable terms of purchase, and managing the timing and flow of purchase.

6.3.1 Types of Payables or Trade Credits

Generally, Payables or Trade Credits may be classified into three types:

(a) Open Account

(b) Promissory Notes and

(c) Bills Payable

These are discussed briefly as under:

(a) Open Account: An open account is an arrangement between a business and a customer, where the customer can buy goods and services on a deferred payment basis. In this informal arrangement, the supplier, after satisfying himself about the credit-worthiness of the buyer, despatches the goods as required by the buyer and sends the invoice with particulars of quantity despatched, the rate and total price payable and the payment terms. The customer then pays the business at a later date. When purchases are made under this arrangement, the seller does not charge interest to the buyer. The buyer records his liability to the supplier in his books of accounts and this is shown as payables on open account. The buyer is then expected to meet his obligation on the due date.

(b) Promissory Note: The Promissory note is a formal document signed by the buyer promising to pay the amount to the seller at a fixed or determinable future time. It is a written agreement signed by drawer with a promise to pay the money on a specific date or whenever demanded. This note is a short-term credit tool which is not related to any currency note or banknote. Where the client fails to meet his obligation as per

open credit on the due date, the supplier may require a formal acknowledgement of debt and a commitment of payment by a fixed date.

(c) **Bills Payables:** Bills Payables are instruments drawn by the seller and accepted by the buyer for payment on the expiry of the specified duration. The bill will indicate the banker to whom the amount is to be paid on the due date, and the goods will be delivered to the buyer against acceptance of the bill. The seller may either retain the bill and present it for payment on the due date or may raise funds immediately thereon by discounting it with the banker. The buyer will then pay the amount of the bill to the banker on the due date.

6.3.2 Determinants of Payables/Trade Credit

(a) **Size of the firm:** Smaller firms have increasing dependence on trade credit as they find it difficult to obtain alternative sources of finance as easily as medium or large sized firms. At the same time, larger firms that are less vulnerable to adverse turns in business can command prompt credit facility from the supplier, while smaller firms may find it difficult to sustain credit worthiness during periods of financial strain and may have reduced access to credit due to weak financial position.

(b) **Industry category:** Different categories of industries show varying degrees of dependence on trade credit. In certain lines of business, the prevailing commercial practices may stipulate purchases against payment in most cases. Monopoly firms may insist upon cash on delivery. There could be instances where the firm's inventory, turnover every fortnight but the firm enjoys thirty days credit from suppliers, whereby the trade credit not only finances the firm's inventory but also provides part of the operating funds or additional working capital.

(c) **Nature of product:** Products that sell faster or which have higher turnover may need shorter term credit. Products with slower turnover take longer to generate cash flows and will need extended credit terms.

(d) **Financial position of seller:** The financial position of the seller will influence the quantities and period of credit he wishes to extend. Financially weak suppliers will have to be strict and operate on higher credit terms to buyers. On the other hand, financially stronger suppliers can dictate stringent credit terms but may prefer to extend liberal credit so long as the transactions provide benefits in excess of the costs of extending credit. Suppliers with working capital crunch will be willing to offer higher cash discounts to encourage early payments.

(e) **Terms of sale:** The magnitude of trade credit is influenced by the terms of sale. These terms fall into several broad categories according to the net period within which payment is expected. When the terms of sale are only on cash basis, there can be two situations, viz., Cash on Delivery (COD) and Cash before Delivery (CBD). Under these two situations, the seller does not extend any credit.

(f) **Degree of risk:** Estimate of credit risk associated with the buyer will indicate what credit policy is to be adopted. The risk may be with reference to buyer's financial standing or with reference to the nature of the business the buyer is in.

(g) **Cash discount:** Cash discount influences the effective length of credit. Failure to take advantage of the cash discount could result in the buyer using the funds at an effective rate of interest higher than that of alternative sources of finance available.

(h) **Nature and extent of competition:** Monopoly status facilitates imposition of tight credit term whereas intense competition will promote the tendency to liberalise credit. Newly established companies in competitive fields may more readily resort to liberal trade credit for promoting sales than established firms which are more formal in deciding on credit policies.

(i) **Datings:** In seasonable industries, sellers frequently use datings to encourage customers to place their orders before a heavy selling period. The need for an air-conditioner is felt in the summer, leading to heavy ordering

at a particular point of time. This has double advantages. For manufacturer, they can schedule production more conveniently and reduce the inventory levels. Whereas, the buyer has the advantage of not having to pay for the goods until the peak, of the selling period. Under this arrangement, credit is extended for a longer period than normal.

6.3.3 Computation of Cost of Credit or Payables

Cost of credit can be calculated in two situations:

To calculate nominal cost of credit on an annual basis of not considering discount, the formula is:

$$\frac{d}{(100-d)} \times \left(\frac{365 \text{ days}}{t}\right)$$

Where,

d= Size of discount or discount percentage (%)

t=Allowed payment days – discount days

Illustration 11

A supplier of X Ltd. offers the company 2/15 net 40 payment terms. To translate the shortened description of the payment terms, the supplier will allow a 2% discount if paid within 15 days, or a regular payment in 40 days. Determine the cost of credit related to these terms.

Solution:

Cost of credit can be calculated by using the following formula:

$$\frac{d}{(100-d)} \times \left(\frac{365 \text{ days}}{t}\right)$$

Where,

d = Size of discount or discount percentage (%)

t = Allowed payment days – discount days

$$= \frac{2}{(100-2)} \times \left(\frac{365 \text{ days}}{40-15}\right)$$

$$= \frac{2}{(98)} \times \left(\frac{365 \text{ days}}{25}\right)$$

$$= 0.0204 \times 14.4$$

$$= 0.29376$$

i.e., 29.4%

The above formula does not take into account the compounding effect and. So, the cost of credit shall be even higher. The cost of lost cash discount can be estimated by the formula:

$$\left(\frac{100}{100-\text{d}}\right)^{\frac{365}{\text{t}}} - 1$$

Inventory Management

6.4

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 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 manufacture goods that require further processing to become finished goods. Finished goods are products ready for sale. The classification of inventory and the levels of the components vary from organisation 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 inventory constitute about 50 to 60 % of current assets, the management of inventories is crucial to successful Working Capital Management. Working capital requirements are influenced by inventory holding. Hence, there is a need for effective and efficient management of inventory A good inventory management is important to the successful operations of the most of the organizations, unfortunately the importance of inventory is not always appreciated by top management. This may be due to a failure to recognize the link between inventory and achievement of organisational goals or due to ignorance of the impact that inventory can have on costs and profits. Inventory management refers to an optimum investment in inventory. It should neither be too low to effect the production adversely nor too high to block the funds unnecessarily. Excess investment in inventory is unprofitable for the business. Both excess and inadequate investment in inventory is 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.

The purpose of inventory management is to determine and maintain the optimum level of inventory investment.

6.4.1 Techniques of Inventory Management

The financial managers should aim at an optimum level of inventory on the basis of the trade-off between cost and benefit to maximize owner's health. Many mathematical models are available to handle inventory management problems. These are discussed below:

1. Economic Order Quantity
2. Fixing Levels of Materials
   (a) Minimum Level
   (b) Maximum Level
   (c) Reorder Level
   (d) Danger Level
3. ABC Inventory Control
4. Perpetual Inventory System

5. VED classification
6. Just-In-Time
7. FSN Analysis
8. Inventory Turnover Ratio

These are discussed below:

1. Economic Order Quantity: (EOQ)

The total costs of a material usually consist of Buying Cost, Total Ordering Cost and Total Carrying Cost. Economic Order Quantity is 'The size of the order for which both ordering and carrying cost are minimum'.

Ordering Cost: The costs which are associated with the ordering of material. It includes cost of staff posted for ordering of goods, expenses incurred on transportation, inspection expenses of incoming material etc.

Carrying Cost: The costs for holding the inventories. It includes the cost of capital invested in inventories. Cost of storage, Insurance etc.

Buying Cost: Amount paid / payable to the supplier for the goods. It includes the purchasing price plus all non-deductible taxes.

The assumption underlying the Economic Ordering Quantity: The calculation of economic order of material to be purchased is subject to the following assumptions: -

(a) Ordering cost per order and carrying cost per unit per annum are known and they are fixed.

(b) Anticipated usage of material in units is known.

(c) Cost per unit of the material is constant and is known as well.

(d) The quantity of material ordered is received immediately i.e lead time is Zero.

The famous mathematician 'WILSON' derived the formula used for determining the size of order for each purchase at minimum ordering and carrying costs, which is as below:

Economic Ordering Quantity = $\sqrt{\frac{2AO}{C}}$

Where,

A = Annual demand

O = Ordering Cost

C = Carrying Cost

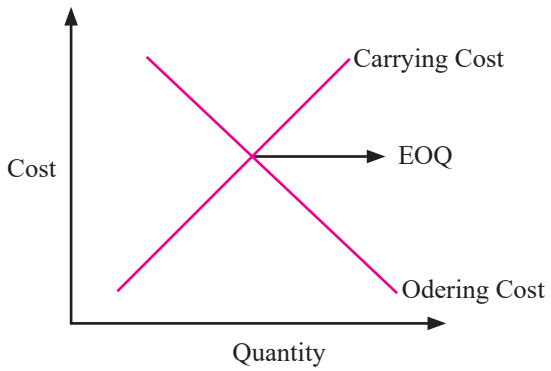

Figure 6.6: Graphical Representation of EOQ

Illustration 12

Calculate the Economic Order Quantity from the following information. Also state the number of orders to be placed in a year.

Consumption of materials per annum	:	10,000 kg
Order placing cost per order	:	₹ 50
Cost per kg. of raw materials	:	₹ 2
Storage costs	:	8% on average inventory

Solution:

Economic Ordering Quantity = $\sqrt{\frac{2AO}{C}}$

Where,

A = Annual demand

O = Ordering Cost

C = Carrying Cost

$$EOQ = \sqrt{\frac{2 \times 10,000 \times 50}{\frac{2 \times 8}{100}}}$$

$$EOQ = \sqrt{\frac{2 \times 10,000 \times 50 \times 25}{4}}$$

EOQ = 2,500 Kg

$$\text{No. of orders to be placed in a year} = \frac{\text{Total consumption of material per annum}}{EOQ}$$

$$= \frac{10,000 \text{ kg}}{2,500 \text{ kg}} = 4 \text{ Orders per year}$$

Illustration 13

The average annual consumption of a material is 18,250 units at a price of ₹36.50 per unit. The storage cost is 20% on an average inventory and the cost of placing an order is ₹ 50. How much quantity is to be purchased at a time?

Solution:

Economic Ordering Quantity = $\sqrt{\frac{2AO}{C}}$

Where,

A = Annual demand

O = Ordering Cost

C = Carrying Cost

$$EOQ = \sqrt{\frac{2 \times 18{,}250 \text{ units} \times \text{₹}50}{\text{₹}36.50 \times 20\%}}$$

$$EOQ = \sqrt{\frac{18{,}25{,}000}{7.3}}$$

EOQ = 500 Units

2. Fixing Levels of Materials

A. Maximum Level:

The Maximum Level indicates the maximum quantity of an item of material that can be held in stock at any time. The stock in hand is regulated in such a manner that normally it does not exceed this level.

While fixing the level, the following factors are to be taken into consideration:

(a) Maximum requirement of the store for production purpose, at any point of time.

(b) Rate of consumption and lead time.

(c) Nature and properties of the Store: For instance, the maximum level is necessarily kept low for materials that are liable to quick deterioration or obsolescence during storage.

(d) Storage facilities that can be conveniently spared for the item without determinant to the requirements of other items of stores.

(e) Cost of storage and insurance.

(f) Economy in prices: For seasonal supplies purchased in bulk during the season, the maximum level is generally high.

(g) Financial considerations: Availability of funds and the price of the stores are to be kept in view. For costly items, the maximum level should be as low as possible. Another point to be considered is the future market trend. If prices are likely to rise, the concern may like to stock-piling for keeping large stock in reserve for long-term future uses and in such a case, the level is pushed up.

(h) Rules framed by the government for import or procurement. If due to these and other causes materials are difficult to obtain and supplies are irregular the maximum level should be high.

(i) The maximum level is also dependent on the economic ordering quantity.

Maximum Level

Re-Order Level + Re-Order Quantity – (Minimum Rate of Consumption × Minimum Re-Order Period)

B. Minimum Level:

The Minimum Level indicates the lowest quantitative balance of an item of material which must be maintained at all times so that there is no stoppage of production due to the material being not available.

In fixing the minimum level, the following factors are to be considered: -

(a) Nature of the item: For special material purchased against customer's specific orders, no minimum level is necessary. This applies to other levels also.

(b) The minimum time (normal re-order period) required replenishing supply: This is known as the Lead Time and are defined as the anticipated time lag between the dates of issuing orders and the receipt of materials. Longer the lead time, lower is minimum level, the re-order point remaining constant.

(c) Rate of consumption (normal, minimum or maximum) of the material.

Minimum Level

Re-Order level – (Normal Rate of Consumption × Normal Re-Order Period)

C. Re-Order Level:

When the stock in hand reaches the ordering or re-ordering level, store keeper has to initiate the action for replenish the material. This level is fixed somewhere between the maximum and minimum levels in such a manner that the difference of quantity of the material between the Re-ordering Level and Minimum Level will be sufficient to meet the requirements of production up to the time the fresh supply of material is received.

The basic factors which are taken into consideration in fixing a Re-ordering Level for a store item include minimum quantity of item to be kept, rate of consumption and lead time which are applied for computing of this level.

Re-Ordering level

Minimum Level + Consumption during lead time

Or

Minimum Level + (Normal Rate of Consumption × Normal Re-order Period)

Another formula for computing the Re-Order level is as below:

Re-Order level

Maximum Rate of Consumption × Maximum Re-Order period (lead time)

D. Danger Level

It is the level at which normal issue of raw materials are stopped and only emergency issues are only made. This is a level fixed usually below the Minimum Level. When the stock reaches this level very urgent action for purchases is indicated. This presupposed that the minimum level contains a cushion to cover such contingencies. The normal lead time cannot be afforded at this stage. It is necessary to resort to unorthodox hasty purchase procedure resulting in higher purchase cost.

The practice in some firms is to fix danger level below the Re-Ordering Level but above the Minimum Level. In such case, if action for purchase of an item was taken when the stock reached the Re-Ordering Level, the Danger Level is of no significance except that a check with the purchases department may be made as soon as the Danger Level is reached to ensure that everything is all right and that delivery will be made on the scheduled date.

Danger Level

Normal Rate of Consumption × Maximum reorder Period for emergency purchases

Illustration 14

The components A and B are used as follows:

Normal usage.....300 units per week each

Maximum usage .....450 units per week each

Minimum usage .....150 units per week each

Reorder Quantity .....A- 2,400 units; B- 3,600 units.

Reorder period..... A -4 to 6 weeks, B -2 to 4 weeks.

Calculate for each component:

(a) Re-order Level, (b) Minimum Level, (c) Maximum Level and (d) Average Stock Level

Solution:

	Particulars	A	B
(a)	Reorder Level (ROL) [Max. Consumption × Max. Re-order Period]	2,700 units (450 × 6)	1,800 units (450 × 4)
(b)	Minimum Level [ROL – (Normal Consumption × Normal Re-order period)]	1,200 units [2,700 – (300×5)]	900 units [1,800 – (300 × 3)]
(c)	Maximum Level [ROL + ROQ – (Min. Consumption × Min. Re-order Period)]	4,500 units [2,700 + 2400 – (150×4)]	5,100 units [1,800 + 3,600 – (150 × 2)]
(d)	Average Stock Level [Min. Level + Max. Level] / 2 Or [Min. Level + ½ Re-order Quantity]	2,850 units [4,500 + 1,200 / 2] (or) 2,400 units 1,200 + ½ (2,400)	3,000 units [5,100 + 900 / 2] (or) 2,700 units 900 + ½ (3,600)

3. ABC Analysis:

The "ABC Analysis" is an analytical method of stock control which aims at concentrating efforts on those items where attention is needed most. It is based on the concept that a small number of the items in inventory may typically represent the bulk money value of the total materials used in production process, while a relatively large number of items may present a small portion of the money value of stores used resulting in a small number of items be subjected to greater degree of continuous control.

Under this system, the materials stocked may be classified into a number of categories according to their importance, i.e., their value and frequency of replenishment during a period. The first category (we may call it group 'A' items) may consist of only a small percentage of total items handled but combined value may be a large portion of the total stock value. The second category, naming it as group 'B' items, may be relatively less important. In the third category, consisting of group 'C' items, all the remaining items of stock may be included which are quite large in number but their value is not high.

This concept may be clear by the following example:

Category	No. of Items	% of the Total No. of Items	Value (₹)	% of the Total Value Item	Average Value (₹)
A	75	6	70,000	70	933
B	375	30	20,000	20	53
C	800	64	10,000	10	12
	1250	100	1,00,000	100	998

Category 'A' items represent 70% of the total investment but as little as only 6% of the number of items.

Maximum control must be exercised on these items. Category 'B' is of secondary importance and normal control procedures may be followed. Category 'C' comprising of 64% in quantity but only 10% in value, needs a simpler, less elaborate and economic system of control.

The advantages of ABC analysis are:

(a) Closer and stricter control of those items which represent a major portion of total stock value is maintained.

(b) Investment in inventory can be regulated and funds can be utilized in the best possible manner. 'A' class items are ordered as and when need arises, so that the working capital can be utilized in a best possible way.

(c) With greater control over the inventories, savings in material cost will be realized.

(d) It helps in maintaining enough safety stock for 'C' category of items.

(e) Scientific and selective control helps in the maintenance of high stock turnover ratio.

4. Perpetual Inventory System

Perpetual Inventory System may be defined as 'a system of records maintained by the controlling department, which reflects the physical movements of stocks and their current balance'. Thus, it is a system of ascertaining balance after every receipt and issue of materials through stock records to facilitate regular checking and to avoid closing down the firm for stock taking. To ensure the accuracy of the perpetual inventory records (bin Card and Stores Ledger), physical verification of stores is made by a programme of continuous stock taking.

The operation of the perpetual inventory system may be as follows:

(a) The stock records are maintained and up to date posting of transactions are made there in so that current balance may be known at any time.

(b) Different sections of the stores are taken up by rotation for physical checking. Every day some items are checked so that every item may be checked for a number of times during the year.

(c) Stores received but awaiting quality inspection are not mixed up with the regular stores at the time of physical verification, because entries relating to such stores have not yet been made in the stock records.

(d) The physical stock available in the store, after counting, weighing, measuring or listing as the case may be, is properly recorded in the bin cards / Inventory tags and stock verification sheets.

Perpetual inventory system should not be confused with continuous stock taking; Continuous stock taking is an essential feature of perpetual inventory system. Perpetual inventory means the system of stock records and continuous stock taking, whereas continuous stock taking means only the physical verification of the stock records with actual stocks.

In continuous stock taking, physical verification is spread throughout the year. Everyday 10 to 15 are taken at random by rotation and checked so that the surprise element in stock verification may be maintained and each item may be checked for a number of times each year. On the other hand, the surprise element is missing in case of periodical checking, because checking is usually done at the end of year.

Advantages of Perpetual Inventory System:

(a) The system obviates the need for the physical checking of all items of stock and stores at the end of the year.

(b) It avoids the dislocation of the routine activities of the organisation including production and despatch.

(c) A reliable and detailed check on the stores is maintained.

(d) Errors, irregularities and loss of stock through other methods are quickly detached and through necessary action recurrence of such things in future is minimized.

(e) As the work is carried out systematically and without undue haste the figures are readily available.

(f) Actual stock can be compared with the authorized maximum and minimum levels, thus keeping the stocks within the prescribed limits. The disadvantages of excess stocks are avoided and capitalised up in stores materials cannot exceed the budget.

(g) The recorder level of various items of stores are readily available thus facilitating the work of procurement of stores.

(h) For monthly or quarterly financial statements like Profit and Loss Account and Balance Sheet the stock figures are readily available and it is not necessary to have physical verification of the balances.

5. VED Analysis

VED stands for Vital, Essential and Desirable- analysis is used primarily for control of spare parts. The spare parts can be classified into three categories i.e Vital, Essential and Desirable- keeping in view the criticality to production.

Vital: The spares, stock-out of which even for a short time will stop the production for quite some time, and where in the stock-out cost is very high are known as Vital spares. For a car Assembly Company, Engine is a vital part, without the engine the assembly activity will not be started.

Essential: The spares or material absence of which cannot be tolerated for more than few hours or a day and the cost of lost production is high and which is essential for production to continue are known as Essential items. For a car assembly company 'Tyres' is an essential item, without fixing the tyres the assembly of car will not be completed.

Desirable: The Desirable spares are those parts which are needed, but their absence for even a week or more also will not lead to stoppage of production. For example, CD player, for a car assembly company.

Some spares though small in value, may be vital for production, requires constant attention. Such spares may not pay attention if the organization adopts ABC analysis.

6. FSN Analysis

FSN analysis is the process of classifying the materials based on their movement from inventory for a specified period. All the items are classified in to F-Fast moving, S- Slow moving and N-Non-moving Items based on consumption and average stay in the inventory. Higher the stay of item in the inventory, the slower would be the movement of the material. This analysis helps the store keeper / purchase department to keep the fast-moving items always available & take necessary steps to dispose off the non-moving inventory.

7. Just-in-Time (JIT)

Just in time (JIT) is a production strategy that strives to improve a business return on investment by reducing in-process inventory and associated carrying costs. Inventory is seen as incurring costs, or waste, instead of adding and storing value, contrary to traditional accounting. In short, the Just-in-Time inventory system focuses on "the right material, at the right time, at the right place, and in the exact amount" without the safety net of inventory.

The advantages of Just-in-Time system are as follows: -

(a) Increased emphasis on supplier relationships. A company without inventory does not want a supply system problem that creates a part shortage. This makes supplier relationships extremely important.

(b) Supplies come in at regular intervals throughout the production day. Supply is synchronized with production demand and the optimal amount of inventory is on hand at any time. When parts move directly from the truck to the point of assembly, the need for storage facilities is reduced.

(c) Reduces the working capital requirements, as very little inventory is maintained.

(d) Minimizes storage space.

(e) Reduces the chance of inventory obsolescence or damage.

8. Inventory Turnover Ratio

Inventory Turnover:

Inventory Turnover signifies a ratio of the value of materials consumed during a given period to the average level of inventory held during that period. The ratio is worked out on the basis of the following formula:

$$\textbf{Inventory Turnover Ratio} = \frac{\text{Value of material consumed during the period}}{\text{Value of average stock held during the period}}$$

The purpose of the above ratio is to ascertain the speed of movement of a particular item. A high ratio indicates that the item is moving fast with a minimum investment involved at any point of time. On the other hand, a low ratio indicates the slow-moving item. Thus, Inventory Turnover Ratio may indicate slow moving dormant and obsolete stock highlighting the need for appropriate managerial actions.

Illustration 15

Compute the Inventory Turnover Ratio from the following:

Opening Stock - ₹1,00,000

Closing Stock - ₹1,60,000

Material Consumed - ₹7,80,000

Solution:

$$\text{Inventory Turnover Ratio} = \frac{\text{Value of material consumed during the period}}{\text{Value of average stock held during the period}}$$

$$\text{Average Stock} = \frac{\text{Opening Stock} + \text{Closing Stock}}{2}$$

$$\text{Average Stock} = \frac{₹1,00,000 + ₹1,60,000}{2}$$

$$= ₹\ 1,30,000$$

$$\therefore \text{ Inventory Turnover Ratio} = \frac{₹7,80,000}{₹1,30,000}$$

$$= 6.$$

Illustration 16

Two components A and B are used as follows:

Normal usage = 50 per week each

Re-order quantity = A- 300; B-500

Maximum usage = 75 per week each

Minimum usage = 25 per week each

Re-order period: A - 4 to 6 weeks; B - 2 to 4 weeks

Calculate for each component

(a) Re-order level; (b) Minimum level; (c) Maximum level; (d) Average stock level.

Solution:

	Particulars	A	B
(a)	Reorder Level [Max. Consumption × Max. Re-order Period]	450 units (75 × 6)	300 units (75 × 4)
(b)	Minimum Level [ROL – (Normal Consumption × Normal Re-order period)]	200 units [450 – (50 × 5)]	150 units [300 – (50 × 3)]
(c)	Maximum Level [ROL + ROQ – (Min. Consumption × Min Re-order period)]	650 units [450 + 300 – (25 × 4)]	750 units [300 + 500 – (25 × 2)]
(d)	Average Stock Level [Min. Level + Max. Level] / 2 or [Min. Level + ½ × ROQ]	425 units [200 + 650 / 2] (or) or 350 units 200 + ½ (300)	450 units [150 + 750 / 2] (or) or 400 units 150 + ½ (500)

Illustration 17

X Ltd. buys its annual requirement of 36,000 units in six installments. Each unit costs ₹1 and the ordering cost is ₹25. The inventory carrying cost is estimated at 20% of unit value. Find the total annual cost of the existing inventory policy. How much money can be saved by using E.O.Q?

Solution:

Economic Ordering Quantity = $\sqrt{\frac{2AO}{C}}$

Where,

A = Annual demand

O = Ordering Cost

C = Carrying Cost

$$EOQ = \sqrt{\frac{2 \times 36,000 \times ₹\ 25}{₹\ 1 \times 20\%}}$$

$$EOQ = \sqrt{\frac{18,00,000}{₹\ 1 \times 20\%}}$$

EOQ = 3,000 Units

	Particulars	Existing Policy (₹)		EOQ (₹)	
(i)	Purchase Cost	(36,000 × 1)	36,000	(36,000 × 1)	36,000
(ii)	Ordering Cost	[36,000 / 6,000 × 25]	150	[36,000 / 3,000 × 25]	300
(iii)	Carrying Cost	[1/2 × 6,000 × 1 × 20%]	600	[1/2 × 3,000 × 1 × 20%]	300
			36,750		36,600

Saving by using EOQ = ₹ 36,750 – ₹ 36,600 = ₹ 150

Illustration 18

The annual demand for an item is 3,200 units. The unit cost is ₹6 and inventory carrying charges is 25% p.a. If the cost of one procurement is ₹150, determine:

(a) E.O.Q (b) No. of orders per year (c) Time between two consecutive orders.

Solution:

(a) Economic Ordering Quantity = $\sqrt{\frac{2AO}{C}}$

$$EOQ = \sqrt{\frac{2 \times 3,200 \times ₹150}{₹6 \times 25\%}}$$

$$EOQ = \sqrt{\frac{9,60,000}{1.5}}$$

EOQ = 800 units

(b) No. of orders per year = A / EOQ = 3200 / 800 = 4 orders

(c) Time between two consecutive orders = No. of months in years / No. of orders

= 12/4 = 3 Months

Illustration 19

A company manufactures a special product which requires a component 'Alpha'. The following particulars are collected for the year 2021.

(i) Annual demand of Alpha 8,000 units

(ii) Cost of placing an order ₹ 200 per order

(iii) Cost per unit of Alpha ₹ 400

(iv) Carrying cost % p.a. 20%

The company has been offered a quantity discount of 4% on the purchase of 'Alpha' provided the order size is 4,000 components at a time.

Required:

(a) Compute the economic order quantity.

(b) Advise whether the quantity discount offer can be accepted.

Solution:

(a) Calculation of Economic Order Quantity

$$\text{Economic Ordering Quantity} = \sqrt{\frac{2AO}{C}}$$

$$EOQ = \sqrt{\frac{2 \times 8,000 \times ₹\ 200}{₹\ 400 \times 20\%}}$$

EOQ = 200 units

(b) Evaluation of profitability of different options of order quantity

(i) When EOQ is ordered (₹)

Purchase Cost	(8,000 units × ₹ 400)	32,00,000
Ordering Cost Carrying Cost	[(8,000 units / 200 units) × ₹ 200]	8,000
	(200 units × ₹ 400 × ½ × 20/100	8,000
Total Cost		**32,16,000**

(ii) When quantity discount is accepted (₹)

Purchase Cost	(8,000 units × ₹ 384)	30,72,000
Ordering Cost Carrying Cost	[(8,000 units / 4,000 units) × ₹ 200]	400
	(4,000 units ₹ 384 × ½ × 20/100)	1,53,600
Total Cost		**32,26,000**

Advise: The total cost of inventory is lower if EOQ is adopted. Hence, the company is advised not to accept the quantity discount.

Management of Cash and Cash Equivalents

6.5

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, there is a need for cash management. It is concerned with the managing of (i) cash inflows and outflows of the firm; (ii) cash flows within the firm and (iii) cash balances held by the firm at a point of time by financing deficit or investing surplus cash.

Significance of Cash Management

The cash management assumes significance for the following reasons:

(i) **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.

(ii) **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.

(iii) **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.

(iv) **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.

6.5.1 Motives of holding Cash

Motives or desires for holding cash refers to various purposes. The purpose may be different from person to person and situation to situation. G.A. Pogue (1969) in his research paper Cash Management: A System Approach, stated

three motives for holding cash such as (i) Transaction motives; (ii) Precautionary motives and (iii) Speculative motives. These are discussed below:

(i) **Transaction Motives:** A firm needs cash for making transactions in the day-to-day operations. The cash is needed to make payments for purchases, wages, salaries, other expenses, taxes, dividend, etc. The need to hold cash would not arise if there were perfect synchronisation between cash receipts and cash payments. When cash payments exceed cash receipts, the firm would maintain some cash balance to be able to make required payments. For transactions purpose, a firm may invest its cash in marketable securities. Generally, the firm will purchase securities whose maturity corresponds with some anticipated payments whose timing is not perfectly matched with cash receipts.

(ii) **Precautionary Motives:** Precautionary motive refers to hold cash as a safety margin to act as a financial reserve. In addition to the non-synchronization of anticipated cash inflows and outflows in the ordinary course of business, a firm may have to pay cash for purposes which cannot be predicted or anticipated. A firm may have to face emergencies such as strikes and lock-up from employees, increase in cost of raw materials, funds and labor, fall in market demand and so on. But how much cash is held against these emergencies depends on the degree of predictability associated with future cash flows. If there is high degree of predictability, less cash balance is sufficient. Some firms may have strong borrowing capacity at a very short notice, so that they can borrow at the time when emergencies occur. Such a firm may hold very minimum amount of cash for this motive.

(iii) **Speculative Motives:** It refers to the need to hold cash in order to be able to take advantage of negotiating purchases that might happen, appealing interest rates and positive exchange rate fluctuations. Some firms hold cash in excess than transaction and precautionary needs to involve in speculation.

The advantages of speculative motives for holding cash are:

(a) An opportunity to purchase raw materials a reduced price on payment of immediate cash;

(b) Delay purchases of raw materials on the anticipation of a decline in price;

(c) A chance to speculate on interest rate movements by buying securities when interest rates are expected to decline; and

(d) Make a purchase at a favorable price.

Besides, another motive to hold cash balance is to compensate banks for providing certain services and loans.

(iv) **Compensating Motives:** Banks provide a variety of services to business firms such as clearance of cheque, credit information, transfer of funds and so on. Bank either charge commission, fees for these services or seek indirect compensation. Usually, clients are required to maintain a minimum balance of cash to the bank. This balance is called compensating balance. Firms cannot utilize this balance for transaction purposes, rather banks can use this amount to earn a return.

6.5.2 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. Keeping in view, these two conflicting aspects of cash management, it requires to determine the need of cash balances and review of the approaches to achieve optimum cash balances. There is a need to discuss the factors affecting cash needs.

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, organisation to organisation. The factors determining the cash needs of the industry is explained as follows:

(a) 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 coincided 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.

(b) Short Costs: short costs are defined as the expenses incurred as a result of shortfall of cash. The short costs include, 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 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.

(c) Cost of Excess Cash 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.

(d) Uncertainty in Business: The first requirement of cash management is a precautionary cushion to cope with irregularities in cash flows, unexpected delays in collections and disbursements and defaults. 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.

(e) 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.

6.5.3 Models of Cash Management

The strategies for cash management or cash management models are discussed in detail in the following lines:

I. 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. Cash budget involves various elements.

The first element of a cash budget is the selection of period of time i.e., budget period. It is called planning horizon. The planning horizon means the time span and the sub-periods within that time span over which cash flows are to be projected.

The second element of the cash budget is the selection of the factors that have a bearing on cash flows. The factors are generally divided into two broad categories: (a) Operating and (b) Financial.

II. Determining Optimal Level of Cash holding by the Company

The optimal level of cash holding by a company can be determined with the help of the following models:

(a) Inventory Model (Economic Order Quantity) to Cash Management (Baumol Model)

(b) Stochastic (Miller-Orr) Model

(c) Probability Model

These are discussed below:

(a) Inventory Model (EOQ) to Cash Management (Baumol Model)

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 whereas cost of giving to the market means cost of liquidating marketable securities in cash.

Optimum level of cash balance can be determined as follows:

$$C = \sqrt{\frac{2A \times F}{O}}$$

Where,

C = Optimum cash balance

A = Annual (or monthly) cash disbursement

F = Fixed cost per transaction

O = Opportunity cost of one rupee per annum (or per month)

Assumptions of the Baumol Model:

The following are the assumptions of Baumol's model:

(i) The first assumption of this model is that the firm is able to forecast correctly and precisely the amount of cash required by it. Cash needs of the firms are known with certainty.

(ii) The firm makes its cash payments uniformly over a period of time. Thus, the cash payments arise uniformly over the future time period.

(iii) The firm very well understands the opportunity cost of the cash held by it. The opportunity cost of interest for gone by not investing in marketable securities. Such holding cost per annum is assumed to be constant.

(iv) The transaction cost of the firm is constant and known. The transaction cost is the cost incurred whenever the firm converts its short-term securities to cash.

(v) The surplus cash is invested into marketable securities and those securities are again disposed off to convert them again into cash. Such purchase and sale transactions involve certain costs like clerical brokerage registration and other costs. The cost to be incurred for each such transaction is assumed to be constant / fixed. In practice, it would be difficult to calculate the exact transaction cost.

(vi) The short-term marketable securities can be freely brought and sold. Existence of free market for marketable securities is a perquisite of the Baumol model.

Limitations of the Baumol Model

The limitations in Baumol's Model are as follows:

(i) The model can be applied only when the payments position can be reasonably assessed.

(ii) The major demerit of this model is that it does not allow the cash flows to fluctuate. The cash flows are assumed to be constant and known over the time period, which practically is not possible in real world. Firms are not able to use their cash balance uniformly.

(iii) Similarly, the firms cannot predict their daily cash inflows and outflows.

(iv) Degree of uncertainty is high is predicting the cash flow transactions. Behaviour of cash inflow and out flow is assumed to be too smooth and certain. Cash inflow and outflow of businesses are too erratic. Dail cash balance may fluctuate, leading to an unpredictable pattern of cash flow. Thus, at no point an ideal optimum cash balance C be maintained practically.

(v) The model merely suggests only the optimal balance under a set of assumptions. But in actual situation it may not hold good. Nevertheless, it does offer a conceptual framework and can be used with caution as a benchmark.

Illustration 20

The outgoings of X Ltd. are estimated to be ₹ 5,00,000 p.a., spread evenly throughout the year. The money on deposit earns 12% p.a. more than money in a current account. The switching costs per transaction are ₹150. Calculate to optimum amount to be transferred.

Solution:

According to Baumol, the optimum amount to be transferred each time is ascertained as follows:

$$C = \sqrt{\frac{2AF}{O}}$$

Where, C = Optimum transaction size

A = Estimate cash outgoings per annum i.e., ₹ 5,00,000

F = Fixed Cost per transaction i.e., ₹ 150

O = Opportunity cost of one rupee per annum = Interest rate on fixed deposit i.e. 12% p.a.

$$C = \sqrt{\frac{2 \times 150 \times 5,00,000}{0.12}} = ₹\ 35,355 \text{ say } ₹\ 35,000$$

Number of transaction p.a.	= ₹ 5,00,000/ ₹35,000	= 14 transactions
Average balance in the short notice account	= ₹ 35,000/2	= ₹ 17,500
Aggregate of Fixed cost	= 14 transactions × ₹ 150	= ₹ 2,100

Illustration 21

ABC Ltd. has an estimated cash payments of ₹8,00,000 for a one-month period and the payments are expected to steady over the period. The fixed cost per transaction is ₹250 and the interest rate on marketable securities is 12% p.a. Calculate the optimum transaction size.

Solution:

The optimum transaction size will be calculated as under:

$$C = \sqrt{\frac{2AF}{O}}$$

Where, A = Estimate monthly cash payment i.e., ₹ 8,00,000

F = Cost per transaction i.e., ₹ 250

O = Interest per annum i.e., 12%p.a. (For one month, the rate of interest is 1% or 0.01)

Optimum Cash Balance $= \sqrt{\frac{2 \times 250 \times 8,00,000}{0.01}}$ = ₹ 2,00,000

Optimum transaction size = ₹ 2,00,000

Average Cash Balance = ₹ 2,00,000/2 = ₹ 1,00,000

Number of Transactions = ₹ 8,00,000 / ₹ 2,00,000 = 4 Transactions

(b) Stochastic (Miller-Orr) Model:

The important limitation of the Baumol Model is that it does not allow the cash flows to fluctuate. So, the firms do not use their cash balance uniformly nor are they able to predict daily cash inflows and outflows. The Miller-Orr overcomes this shortcoming and allows for daily cash variation.

This model assumes that net cash flows are normally distributed with a zero value of mean and standard deviation. Miller-Orr model provides two control limits, Upper control Limit (UCL) and Lower Control Limit (LCL) as well as return point. When the cash flows of the firm fluctuate randomly and hit the upper limit, then it buys sufficient marketable securities to come back to a normal level of cash balance i.e., return point. Similarly, when the firm's cash flows wander and hit the lower limit, then the firm sells sufficient marketable securities to bring the cash balance back to the normal level i.e., return point. This is shown in a diagram below:

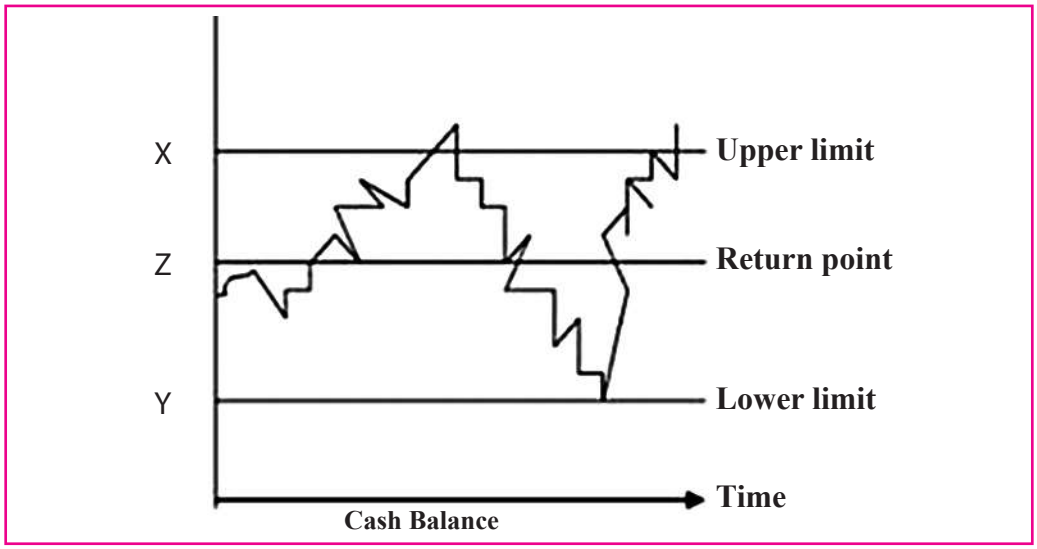

Figure 6.7: Stochastic (Miller-Orr) Model

The difference between the upper limit and the lower limit depends on the following factors:

(a) Transaction costs (c)

(b) Interest rate (k)

(c) Standard deviation of the net cash flows

The optimal point of cash balance (Z) is determined by using the formula:

$$Z = \left(\frac{3}{4} \times \frac{c\sigma^2}{k} \right)^{\frac{1}{3}}$$

Where,

Z = Target cash balance (Optimal cash balance)

c = Transaction cost

k = Interest rate

σ = Standard deviation of net cash flows.

It is observed from the above that the upper and lower limits will be far off from each other, if transaction cost is higher or cash flows show greater fluctuations. The limits will come closer as the interest increases. Z is inversely related to the interest rate. The upper and lower control limits can be shown:

Upper limit = Lower limit + Z

Return Point = Lower limit + Z

Limitations: This model is subjected to some practical problems

(i) 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.

(ii) The cost of time devoted by financial managers in dealing with the transfers of cash to securities and vice versa.

(iii) The model does not take into 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.

Illustration 22

The management of X Ltd. has a policy of maintaining a minimum cash balance of ₹5,00,000. The standard deviation of the company's daily cash flows is ₹2,00,000. The annual interest rate is 14%. The transaction cost of buying or selling securities is ₹150 per transaction. Determine the upper control limit and the return point cash balance of X Ltd. as per the Miller-Orr Model.

Solution:

The optimal point of cash balance (Z) is determined by using the formula:

$$Z = Z = \left(\frac{3}{4} \times \frac{c\sigma^2}{k}\right)^{\frac{1}{3}}$$

Where,

Z = Target cash balance (Optimal cash balance)

c = Transaction cost

k = Interest rate

σ = Standard deviation of net cash flows.

$$Z = \left(\frac{3}{4} \times \frac{150 \times 2,00,000}{0.14/365}\right)^{\frac{1}{3}} = ₹\ 2\ 22,227$$

The upper control limit = Lower Limit +3Z

= ₹5,00,000 + (3×₹222,227)

= ₹1,181,680

Return Point = Lower Limit + Z

= ₹500,000 + ₹222,227

= ₹727,227

Average cash balance = Lower Limit + 4/3Z

= ₹500,000 + 4/3(₹222,227)

= ₹802,969.

(c) Probability Model

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:

(i) Cash is invested in marketable securities at the end of the planning period say a week or a month.

(ii) Cash inflows take place continuously throughout the planning period.

(iii) Cash inflows are of different sizes.

(iv) Cash inflows are not fully controllable by the management of firm.

(v) Sale of marketable securities and other short-term investments will be affected at the end of the planning period.

The probability model prescribed the decision rule for the finance manager that he 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.

(III) 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 moment a payment to the company is mailed and the moment 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.

(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;

(ii) Making pay roll periods less frequent;

(iii) Solving disbursement by use of drafts;

(iv) Playing the float;

(v) Centralised payment system;

(vi) By transferring funds from one bank to another bank firm can maximize its cash turnover.

Illustration 23

United Industries Ltd. projects that cash outlays of ₹ 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 ₹ 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 = $\sqrt{\frac{2FA}{0}} = \sqrt{\frac{2\times40\times37,50,000}{0.12}} = 50,000$

(b) Average cash balance = ₹25,000

(c) No of transactions per year = ₹37,50,000/50,000 = 75

(d) Total annual cost

Transaction cost	=	75 × ₹40	=	₹3,000
Opportunity cost	=	₹50,000 × 1/2 × 12%	=	₹3,000
			=	₹6,000

Illustration 24

The Cyberglobe 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 ₹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 ₹1,000 and minimum cash balance to be maintained is ₹10,000.

Compute the upper limit, return point and average cash balances.

Solution:

The optimal point of cash balance (Z) is determined by using the formula:

$Z = Z = \left(\frac{3}{4}\times\frac{c\sigma^2}{k}\right)^{\frac{1}{3}}$

Where,

Z = Target cash balance (Optimal cash balance)

c = Transaction cost =₹1,000

k = Interest rate = 6%/365 (daily)

σ = Standard deviation of net cash flows= ₹1,000

$$z = \left(\frac{3}{4} \times \frac{1,000 \times 1,000^2}{0.06/365} \right)^{\frac{1}{3}} = ₹3,573$$

The upper control limit	= Lower Limit +3Z	= ₹10,000 + (3 × ₹3,573)
		= ₹10,000 + ₹10,719
		= ₹20,719
Return Point	= Lower Limit + Z	= ₹10,000 + ₹3,573
		= ₹13,573
Average cash balance	= Lower Limit + 4/3Z	= ₹10,000 + 4/3 × (₹3,573)
		= ₹10,000 + ₹4,764
		= ₹14,764

Financing Working Capital

6.6

Long-term sources of finance primarily support fixed assets and secondarily provide the margin money for working capital. Whereas, short-term sources of finance more or less exclusively support the current assets. The need for working capital financing mainly because the investment in working capital/current assets i.e., raw materials, work-in-progress, finished goods and receivables which are typically fluctuates during the year. The main sources of working capital finance are shown below in a diagram:

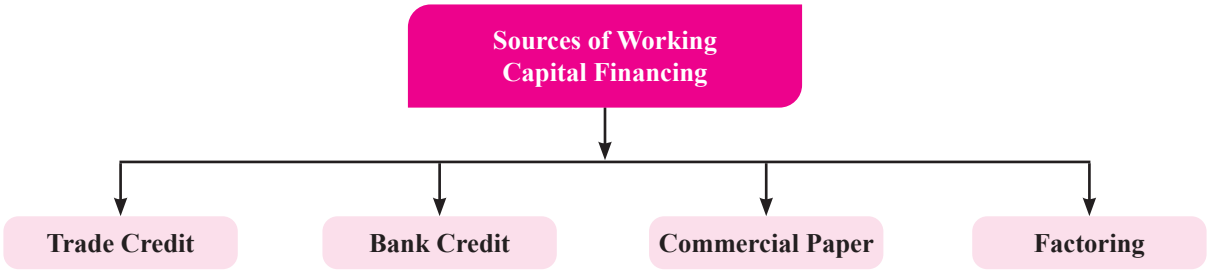

Figure 6.8: Sources of Working Capital Financing

The two important sources of finance for working capital are: (a) trade credit and (ii) bank credit or borrowings. Other sources of finance for working capital are (c) factoring and (d) commercial paper.

(a) Trade Credit

Trade credit represents the credit extended by the supplier of goods and services. In practice, the purchasing firms do not have to pay cash immediately for the purchase made. This deferral of payments is a short-term financing that is called trade credit. Trade credit 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 in different industries. Trade credit is mostly an informal arrangement and is granted on an open account basis. Open account trade credit appears as sundry creditors known as accounts payable. Trade credit may also take the form of bills payable.

(b) Bank Credit/ Borrowings

Working capital advances by commercial banks represents the most important source for financing current assets. In India, banks may give financial assistance in different shapes and forms. The usual form of bank credits are as follows:

(i) Overdraft

(ii) Cash Credit

(iii) Loans

(iv) Bills Purchased and Bills Discounting

(v) Letter of Credit

(vi) Working Capital Term Loan

(vii) Funded Interest Term Loan

These are discussed below:

(i) Overdrafts: Under the overdraft arrangement, a borrower is allowed to withdraw funds in excess of the balance in his current account up to a pre-determined limit for borrowing is specified by the bank. Though the overdraft amount is repayable on demand, it generally continues for a longer period by annual renewals of the limits. Interest is charged on daily balances on the amount actually withdrawn subject to some minimum charges. The borrower operates the account through cheques.

(ii) Cash Credit: The cash credit is a very popular method of bank finance for working capital in India. It is more or less similar to overdraft facility. Under this method, a borrower is allowed to withdraw funds from the bank up to a sanctioned credit limit.

(iii) 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.

(iv) Purchase / Discounting 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 goods 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.

(v) Letter of Credit: Letter of Credit is a formal document issued by a bank on behalf of customer, mentioning the conditions under which the bank will honour the commitments of the customer. 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.

(vi) Working Capital Term Loan: At the time the computation of maximum permissible bank finance under the third method or new system of lending, in some cases the net working capital was negative while in others it was equal to 25 % of working capital gap. The Tandon Committee allowed this deficiency to be financed, in addition to the permissible bank finance, by banks. This kind of credit facility is called working capital term loan. The working capital term loan was not allowed to be raised in the subsequent years. For additional credit requirement arising in subsequent years, the borrower's long-term sources were required to provide 25 % of the additional working capital gap. The banks could grant regular term loans against fixed assets.

(vii) Funded Interest Term Loan (FITL): As per the Reserve Bank of India, the unrealised portion of interest in the existing borrowal accounts may be funded and treated as funded interest term loan. The FITL will have a repayment period of 7 years inclusive of a moratorium period of 2 years.

(c) Commercial Paper

Commercial paper is an unsecured, short-term promissory note issued by highly reputed and credit rated companies, mostly on a discount basis. Generally, large firms with considerable financial strength are able to issue commercial paper. Features, issuers and other aspects of commercial paper are discussed in section 6.3.3.

(d) Factoring

Factoring, as a fund based financial service, provides resources to finance receivables as well as facilities the collection of receivables. It is another method of raising short-term finance through accounts 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.

6.6.1 Maximum Permissible Bank Finance (MPBF) Calculation

Maximum Permissible Banking Finance (MPBF) in Indian Banking Sector is mainly a method of working capital assessment. 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 MPBF, 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 and the Chore Committee.

However, in recent years, in the wake of financial liberalization, 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.

Dehejia Committee Report

The committee analysed the deficiencies of the then existing system of bank lending, based on cash credit system in 1968. The committee concluded that the diversion of bank finance for the acquisition of fixed and other non-current assets was made possible by the banker's fixation on security under the cash credit lending system. The committee found that while theoretically commercial bank lending was for short-term purposes, in actual practice, it was not so. According to their report, a large part of bank lending was really long-term in character, and was repayable on demand only in name.

The major weaknesses in the then existing system of working finance to industry, as pointed out by the Dehejia Committee and again identified by the Tandon Committee, are summarized below:

(i) It is the borrower who decides how much he would borrow; the banker does not decide how much he

would lend and is, therefore, not in a position to do credit planning.

(ii) The bank credit is treated as the first source of finance and not as supplementary to other sources of finance.

(iii) The amount of credit extended is based on the amount of security available, not on the level of operations of borrower.

(iv) Security does not by itself ensure safety of bank funds since all bad and sticky advances are secured advances; safety essentially lies in the efficient follow-up of the industrial operations of the borrower.

Tandon Committee Report

The recommendations of the Dehejia Committee regarding plugging the loop holes in the existing credit system and change in the lending policy of the banks remained unimplemented. As a result, banks 'oversold credit' and large part of it remained unutilized. There was no exchange of information between the banks and the customer. The Reserve Bank in July, 1974, formed a committee under the chairmanship of Shri P.L. Tandon, then Chairman of the Punjab National Bank to review the system.

The recommendations of the Tandon Committee are based on the following notions:

(a) Operating plan: The borrower should indicate the likely demand for credit. So, the borrower should draw operating plans for the ensuing year and supply them to the banker. This procedure will facilitate credit planning at the banks' level.

(b) Production-based financing: The banker should finance only the genuine production needs of the borrower. The borrower should maintain reasonable levels of inventory and receivables; he should hold just enough to carry on his target production.

(c) Partial bank financing: The working capital needs of the borrower cannot be entirely financed by the banker. The banker will finance only a reasonable part of it; for the remaining the borrower should depend upon his own funds, generated internally and externally.

Major recommendations of the committee are being summarized below:

(i) Inventory and Receivable Norms: The Committee pointed out that the borrower should be allowed to hold only a reasonable level of current assets, particularly inventory and receivables. Only the normal inventory, based on a production plan, lead time of supplies, economic ordering levels and reasonable factor of safety, should be financed by the banker. The committee suggested that for fifteen major industries excluding heavy engineering and highly seasonal industries, like sugar, the norms were applied to all industrial borrowers including small scale industries with aggregate limits from the banking system in excess of ₹10 lakh.

(ii) Lending norms: The Committee felt that the main function of a banker as a lender was to supplement the borrower's resources to carry an acceptable level of current assets. This norm highlighted the following issues such as: (a) the level of current assets must be reasonable and based on norms, (b) a part of the fund requirements for carrying current assets must be financed from long-term funds comprising owned funds and term borrowings, including other non-current liabilities. The banker was required to finance only a part of the working capital gap; the other part was to be financed by the borrower from the long-term sources. Working capital gap is defined as current assets minus current liabilities, excluding bank borrowings. Current assets will be taken at estimated values or values as per the Tandon Committee norms, whichever is lower. Current assets will consist of inventory and receivables, referred to as chargeable current assets (CCA) and other current assets (OCA).

(iii) Maximum Permissible Bank Finance (MPBF): The Committee suggested three methods of determining the permissible level of bank borrowings. These three methods are discussed later on.

(iv) **Style of credit:** The Committee reviewed the deficiencies of lending system also suggested a change in the style of bank lending. The Committee recommended the bifurcation of total credit limit into fixed and fluctuating parts. The fixed component was to be treated as a demand loan for the year representing the minimum level of borrowings, which the borrower expected to use throughout the year. The fluctuating component was to be taken care of by a demand cash credit. The cash credit portion could be partly used by way of bills.

(v) **Information system:** Another important recommendation of the Tandon Committee related to the flow of information from the borrower to the bank. The Committee argued for the greater flow of information, both for operational purposes and for the purpose of supervision and follow-up credit. Information was sought to be provided in three loans—operating statement, quarterly budget and funds flow statement.

The Tandon Committee Report has been widely debated and criticized. At the same time, it is true that bankers found difficulties in implementing the committee's recommendations. However, the Tandon Committee report has brought about a perceptible change in the outlook and attitude of both the bankers and their customers. The report has helped in bringing a financial discipline through a balanced and integrated scheme for bank lending.

Methods of Maximum Permissible Bank Finance (MPBF)

The Tandon Committee suggested three methods of assessing Maximum Permissible Bank Finance which are discussed below:

First Method

In this method, the borrower will contribute 25 % of the working capital gap; the remaining 75 % can be financed from bank borrowings. This method will give a minimum current ratio of 1:1.

Thus, the MPBF: 0.75 (CA-CL)-CL

Current Ratio will be: $CR = \frac{CA}{(CL+MPBF)}$

Second Method

In the second method, the borrower will contribute 25% of the total current assets. The remaining of the working capital gap (i.e., the working capital gap less the borrower's contribution) can be bridged from the bank borrowings. This method will give a current ratio of 1.3:1.

The permissible bank borrowings with an example of above two methods are shown below:

Particulars	1st Method (₹)	2nd Method (₹)
Current Assets (CA)	100	100
Current liabilities, excluding bank borrowings, (CL)	20	20
Working Capital Gap (CA-CL) [A-B]	80	80
Borrower's Contribution	20 25% of (C)	25 25% of (A)
Permissible Bank Finance (C-D)	60	55

Third Method

In the third method, borrower will contribute 100 % of core assets, as defined and 25 % of the balance of current assets. The remaining of the working capital gap can be met from the borrowings. This method will further strengthen the current ratio.

After introducing the new system of lending, in some cases the net working capital was negative while in others it was equal to 25% of working capital gap. Then the Committee allowed this deficiency to be financed, in addition to the permissible bank finance, by banks. However, it was regularized over a period of time depending upon the funds generating capacity and ability of the borrower. This type of credit facility was called working capital term loan. Generally, the working capital term loan was not allowed to be raised in the subsequent years. For additional credit requirement arising in subsequent years, the borrower's long-term sources were required to provide 25% of the additional working capital gap. The banks could grant regular term loans against fixed assets.

Illustration 25

Compute "Maximum Bank Borrowings" permissible under Method I, II & III of Tandon Committee norms from the following figures and comment on each method.

Current Liabilities		₹ in lakh	Current Assets	₹ in lakh
Creditors for purchases	200		Raw materials	400
Other current liabilities	100	300	Work in progress	40
Bank borrowings including bills discounted with bankers		400	Finished goods	180
			Receivable including bills discounted with bankers	100
			Other current assets	20
Total		**700**	**Total**	**740**

Assume core current assets are ₹190 lakhs.

Solution:

As per Tandon Committee norms -

Method 1

Under Method 1 the proprietor should contribute 25% of Working Capital Gap from their long-term source of finance and the balance is the Maximum Permissible Bank Borrowings.

In the given problem -

Working Capital Gap

Working Capital Gap = Current Assets - Current Liabilities (except bank borrowings)

Particulars	₹ in lakh
Total Current Assets	740
Less: Current liabilities excluding bank borrowings	300
Working Capital Gap	440
Less: Contribution from long term source of finance (25%)	110
Maximum Permissible Bank Borrowings	330

Comment: Maximum Permissible Bank Borrowings under method 1 is ₹.330 lakhs. But existing bank borrowing is ₹ 400 lakhs. Therefore, the excess bank borrowings of ₹ 70 lakhs convert into term loan.

Method 2

Under Method- 2 the proprietor should contribute 25% of Current Assets from their long-term source of finance and the balance is the Maximum Permissible Bank Borrowings.

In the given problem -

Particulars	₹ in lakh
Total Current Assets	740
Less: Current liabilities excluding bank borrowings	300
Working Capital Gap	440
Less: Contribution from long term source of finance (25% of 740)	185
Maximum Permissible Bank Borrowings	255

Comment: Maximum Permissible Bank Borrowings under method 2 is ₹ 255 lakhs. But existing bank borrowing is ₹ 400 lakhs.

Therefore, the excess bank borrowings of ₹ 145 lakhs convert into term loan.

Method 3

Under Method 3 the proprietor should contribute the entire investment in Core Current Assets and 25% of remaining current assets from their long-term source of finance and the balance is the Maximum Permissible Bank Borrowings.

In the given problem -

Particulars	₹ in lakh
Total Current Assets	740
Less: Current liabilities excluding bank borrowings	300
Working Capital Gap	440
Less: Contribution from long term source of finance (190+ 25% of (740-190))	328
Maximum permissible bank borrowings	112

Comment: Maximum permissible bank borrowings under method 3 is ₹ 112 lakh. But existing bank borrowing is ₹ 400 lakh.

Therefore, the excess bank borrowings of ₹ 288 lakhs convert into term loan.

Chore Committee Report

In April 1979, the Reserve Bank of India constituted a working group to review the system of cash credit under the chairmanship of Mr. K.B. Chore. The main terms of reference for the group were to review the cash credit system and suggest modifications and/or alternate types of credit facilities to promote greater credit discipline and relate credit limits to production. The major recommendations of the Committee are as follows:

(i) Reduced dependence on bank credit: Borrowers should contribute more funds to finance their working capital requirements, and reduce dependence on bank credit. Therefore, the group recommended firms to be placed in the second method of lending as explained by the Tandon Committee. In case the borrower was unable to comply with this requirement immediately, he would be granted excess borrowing in the form of working capital term loan (WCTL). WCTL should be repaid in semi-annual instalments for a period not exceeding five years and at a higher rate of interest than under the cash credit system would be charged.

(ii) Credit limit to be separated into 'peak level' and 'normal non-peak level' limits: Banks should appraise and fix separate limits for the 'peak level' and 'normal non-peak level' credit requirements for all borrowers in excess of ₹10 lakh, indicating the relevant periods. Within the sanctioned limits for these two periods the borrower should indicate in advance, his need for funds during a quarter. Any deviation in utilization beyond 10% tolerance limit should be treated as an irregularity and appropriate action should be taken.

(iii) Existing lending system to continue: The existing system of three types of lending such as Cash credit, loans and bills should continue. Cash credit system should, however, be replaced by loan and bills wherever possible. Cash credit accounts in case of large borrowers should be scrutinized once in a year. Bifurcation of cash credit account into demand loan and fluctuating cash credit component, practiced as per the Tandon Committee recommendation should discontinue. Advances against book debts should be converted to bills wherever possible and at least 50% of the cash credit limit utilized for financing purchase of raw material inventory should also be changed to this bill system.

(iv) Information system: The discipline relating to the submission of quarterly statements to be obtained from the borrowers, under the existing system, should be strictly adhered to in respect of all borrowers having working capital limits of ₹50 lakhs and over from the banking system.

6.6.2 Commercial Paper

Commercial Paper (CP) is an unsecured money market instrument issued in the form of a promissory note. However, the important features of commercial paper are as follows:

(i) In India, the maturity period of commercial paper usually ranges from 91 days to 360 days.

(ii) 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.

(iii) Commercial paper is either directly placed with investors who intend holding it till its maturity.

Hence, there is no well-developed secondary market for commercial paper.

Commercial Paper: Eligibility, Use and Maturity

Eligibility and Use

In India, the Reserve Bank of India regulates the issue of commercial papers. Those companies are allowed to issue commercial papers which have a tangible net worth of ₹5 crore, i.e., ₹50 million, the fund based working

capital limit of not less than ₹5 crore, and the firm should be listed and it is required to obtain necessary credit rating from credit rating agencies. The minimum current ratio should be 1.33:1. All issue expenses will be borne by the issuing company. These norms imply that only the large, highly rated companies are able to operate in the commercial paper market in India.

The Vaghul Working Group had recommended that the size of a single issue should be at least ₹1 crore and the size of each commercial paper should not be less than ₹5 lakh. The RBI had provided for the minimum issue of ₹25 lakh (rather than ₹5 lakh as recommended by the Vaghul Committee)

Maturity Period

As per the RBI Guidelines, initially, corporates were permitted to issue CP with a maturity between a minimum of three months and a maximum of upto six months from the date of issue. Since October 18, 1993, the maximum maturity period of CP was increased to less than one year. Subsequently, the minimum maturity period had been reduced from time to time and since May 25, 1998, it was reduced to 15 days. Presently, CP can be issued for maturity period between a minimum of 15 days and a maximum upto one year from the date of issue.

In USA, there is no prescription of minimum and maximum maturity period of CP but for practical matter, it is limited upto 270 days. However, 1-day to 7-day CPs are very popular of which 1-day CP constitutes the substantial component of the CP market. In UK also, there is no restriction but in France, initial maturity ranges from 1 day to upto 1 year.

Cost

Though the Reserve Bank of India regulates the issue of commercial paper, the market determines the interest rate. In USA, the interest rate on a commercial paper is a function of prime lending rate, maturity, credit-worthiness of the issuer and the rating of the paper provided by the rating agency.

In India, the cost of a CP will include the following components:

- Discount
- Rating charges
- Stamp duty
- Issuing and Paying Agent (IPA) charges

Interest rate on commercial paper is generally less than the bank borrowing rate. A firm does not pay interest on commercial paper rather sells it at a discount rate from face value. The yield of commercial papers can be calculated as follows:

$$\text{Interest yield} = \frac{\text{Face value - Sale price}}{\text{Sale price}} \times \frac{360 \text{ days}}{\text{Days of maturity}}$$

Suppose a firm sells 120-day commercial paper (₹100 face value) for ₹96 net, the interest yield will be 12.5%.

$$\text{Interest yield} = \frac{₹\,100 - ₹\,96}{₹\,96} \times \frac{360 \text{ days}}{120 \text{ days}}$$

$$= 0.125$$

$$= 12.5\%$$

Interest on CP is tax deductible: therefore, the after-tax interest will be less. Assuming that the firm's marginal tax rate is 35 %, the after-tax interest yield is 8.13%.

Therefore, interest yield after tax = 0.125 (1 – 0.35) = 0.0813 or 8.13%.

Illustration 26

XYZ Ltd. issued commercial paper as per the following details:

Date of issue	17th December, 2023
Date of Maturity	17th March, 2024
Size of issue	₹10 crore
No. of Days	90 Days
Interest rate	11.25%
Face value	₹100

What was the net amount received by the company on issue of commercial paper?

Solution:

Interest yield for investor of commercial paper

$$\frac{\text{Face Value} - \text{Net amount realised}}{\text{Net amount realised}} \times \frac{360}{\text{Maturity period}}$$

$$0.1125 = \frac{100 - \text{Net amount realised}}{\text{Net amount realised}} \times \frac{360}{90}\text{days}$$

Or, Net amount realised = ₹ 9.73 crore

Thus, the company issues a commercial paper worth ₹10 crore and company receive ₹9.73 crore

6.6.3 Export Financing – Pre-Shipment and Post-Shipment Packing Credit

Export finance is a process of funding the exporters to facilitate their business in the global market. In simple words, it is a cash flow solution for exporters to cater to their production and other global transaction requirements including working capital. International businessmen require export finance when they want to assure the affordability of the production of goods along with an assurance of getting paid on-time while sending goods to another country.

Importance of Export Finance

Export finance services help the exporters mitigate their risk of default of payment on the hands of the importers as well as fills the gap between manufacturers and overseas suppliers. The exporter agrees on the payment terms of the importer and ships the goods overseas but the payment is at risk to be received later. Export finance allows the businesses to sell their goods & services to another country and enables them to get access to working capital requirements before the importer pays the amount for the purchased products.

There are several other reasons to get export finance such as:

- To establish a new export business with secured financial support;
- To cater to your business's working capital requirements;
- To expand your business in the global market etc.

Types of Export Finance/Credit

Export finance can broadly be classified under tow heads:

Pre-shipment Finance:

This includes –

(i) Packing Credit, and

(ii) Advance against receivables from the Government like duty back, international price reimbursement scheme (IPRS) etc.

Post-shipment Finance:

This consists of -

(i) Purchased/discounted/negotiated of export documents,

(ii) Advance against bills sent on collection basis,

(iii) Advance against exports on consignment basis,

(iv) Advance against indrawn balances, and

(v) Advance against receivables form the Government like duty draw back etc.

Pre-shipment Export Credit or Packing Credit

'Pre-shipment / Packing Credit' means any loan or advance granted or any other credit provided by a bank to an exporter for financing the purchase, processing, manufacturing or packing of goods prior to shipment / working capital expenses towards rendering of services on the basis of letter of credit opened in his favour or in favour of some other person, by an overseas buyer or a confirmed and irrevocable order for the export of goods / services from India or any other evidence of an order for export from India having been placed on the exporter or some other person, unless lodgement of export orders or letter of credit with the bank has been waived. Packing credit is sanctioned/granted on the basis of letter of credit or a confirmed and irrevocable order for the export of goods / services from India or any other evidence of an order for export from India.

Pre-shipment Finance is issued by a financial institution when the seller wants the payment of the goods before shipment. The main objectives behind pre-shipment finance or pre-export finance are to enable exporter to:

- Procure raw materials.
- Carry out manufacturing process.
- Provide a secure warehouse for goods and raw materials.
- Process and pack the goods.
- Ship the goods to the buyers.
- Meet other financial cost of the business.

Requirement of getting Packing Credit

This facility is provided to an exporter who satisfies the following criteria

- A ten-digit importer/exporter code number allotted by DGFT.
- Exporter should not be in the caution list of RBI.
- If the goods to be exported are not under OGL (Open General Licence), the exporter should have the required license /quota permit to export the goods.

Packing credit facility can be provided to an exporter on production of the following evidences to the bank:

- Formal application for release the packing credit with undertaking to the effect that the exporter would be

ship the goods within stipulated due date and submit the relevant shipping documents to the banks within prescribed time limit.

- Firm order or irrevocable L/C or original cable / fax / telex message exchange between the exporter and the buyer.
- Licence issued by DGFT if the goods to be exported fall under the restricted or canalized category. If the item falls under quota system, proper quota allotment proof needs to be submitted.

The confirmed order received from the overseas buyer should reveal the information about the full name and address of the overseas buyer, description quantity and value of goods (FOB or CIF), destination port and the last date of payment.

Eligibility

Pre shipment credit is only issued to that exporter who has the export order in his own name. However, as an exception, financial institution can also grant credit to a third-party manufacturer or supplier of goods who does not have export orders in their own name.

In this case some of the responsibilities of meeting the export requirements have been out sourced to them by the main exporter. In other cases where the export order is divided between two more than two exporters, pre shipment credit can be shared between them.

Post-shipment Export Finance

Post-shipment finance or credit means any loan or advance granted or any other credit provided by a bank to an exporter of goods / services from India from the date of extending credit after shipment of goods / rendering of services to the date of realisation of export proceeds as per the period of realization prescribed by Reserve Bank of India (RBI). This includes any loan or advance granted to an exporter, in consideration of, or on the security of any duty drawback allowed by the Government from time to time. As per extant guidelines of RBI, the period prescribed for realisation of export proceeds is 12 months from the date of shipment.

Post-shipment advance can mainly take the form of -

(i) Export bills purchased / discounted/negotiated.

(ii) Advances against bills for collection.

(iii) Advances against duty drawback receivable from Government

(v) Advance against exports on consignment basis

(vi) Advance against undrawn balances

(i) Export bills purchased/discounted/negotiated

In the first two instances, the exporter submits the bill of lading or airway bill, commercial invoice, packing list, certificate of origin, purchase order and other necessary export documents with the bank. The bank extends post-shipment credit at a concessional interest rate by purchasing or discounting these bills. In the third option (export bills negotiated), finance is provided under a letter of credit – a document issued by the importer's bank (called an issuing bank) as a promise to pay the exporter an agreed upon sum of money. Post-shipment credit under a letter of credit is considered more secure as the issuing bank guarantees payment to the lending bank.

(ii) Advances against bills for collection

Instead of submitting export bills for discount or purchase, the exporter may arrange for them to be sent to the overseas buyer for collection of payment. In such a scenario, the bank grants the exporter an advance against a portion of the collection bills. When payment is received from the importer, it is credited as post-shipment credit. Exporters use this option when there are discrepancies in bills drawn under the letter of credit.

(iii) Advances against duty drawback receivable from Government

In India, duty drawback is a government scheme that supports exports by offering exporters a rebate on customs and excise duties charged on imported or excisable material used in the production of goods meant for export. It is disbursed by the customs department on submission of export documents. Banks offer credit against such duty drawback receivable from the government after confirming the exporter's eligibility. The lending bank must also be authorized to receive the claim amount from the concerned government authority.

(iv) Advance against export on consignment basis

Banks also extend post-shipment credit against exports made on consignment basis – which means the exporter ships the goods to an agent, who sells the goods and makes remittances to the exporter as and when the goods are sold. The exporter receives payment only for the quantity that gets sold. Precious and semi-precious stones, tea, coffee, and wool are examples of goods exported on consignment basis. To avail of post-shipment credit against such exports, the exporter must provide an undertaking that the sales proceeds will be delivered by a specified date. The advance is adjusted against the proceeds realized later.

(v) Advance against undrawn balance

In some cases, exporters leave a small portion of the invoice value undrawn for final adjustments towards differences in exchange rates, consignment weight, quality factors, and so on. This undrawn balance is usually 10 % of the total invoice value. Banks offer advances against undrawn balances provided the exporter gives an undertaking that they will make good on the balance amount within six months of the payment due date or date of shipment, whichever is earlier. The lender also takes into account the importer's track record before making such an advance.

Who can get post-shipment finance?

- All kinds of exporters, including merchant exporters, manufacturer exporters, export houses, trading houses, and manufacturers who supply to merchant exporters, export houses and trading houses.
- Both individuals as well as companies involved in export.
- Any other legal entity engaged in the export of goods.

What documents are required for post-shipment credit?

An exporter will be expected to submit shipping documents that serve as evidence that the goods have been shipped for export. These include:

- Bill of lading/airway bill

- Commercial invoice
- Packing list
- Certificate of origin
- Inspection certificate
- Insurance certificate
- Import Export Code (IEC) certificate
- Additionally, an original copy of the letter of credit is mandatory if credit has been availed under the letter of credit

Apart from these documents, the lender might demand additional documents depending on the type of post-shipment credit availed.

Solved Case 1

From the following projections of XYZ Ltd for the next year, you are required to work out the working capital (WC) required by the company. (₹)

Annual sales	14,40,000
Cost of production including depreciation, ₹120000	12,00,000
Raw material purchases	7,05,000
Monthly expenses	30,000
Anticipated opening stock of raw materials	1,40,000
Anticipated closing stock of raw materials	1,25,000
Inventory norms:	
Raw material (month)	2
Work-in-progress (days)	15
Finished goods (month)	1

The firm enjoys a credit of 15 days on its purchases, and allows 1 month's credit on its supplies. The company has received an advance of ₹15,000 on sales orders.

You may assume that production is carried on evenly throughout the year, and the minimum cash balance desired to be maintained is ₹10,000.

Solution:

Statement showing determination of Net Working Capital (NWC)	(₹)	(₹)
(A) Current assets:		
Cash balance		10,000
Inventories:		
Raw materials: Opening stock	1,40,000	
Add purchases	7,05,000	
Less closing stock	1,25,000	
Annual consumption	7,20,000	
Two months requirements = (₹720000 × 2 / 12)		1,20,000
Work-in-process (yearly cost of production excluding depreciation):		
(₹12,00,000 – ₹1,20,000) [₹10,80,000* × 1)/(2 × 12)]		45,000
Finished goods (₹10,80,000)/12		90,000
Debtors (₹10,80,000)/12		90,000**
Total		**3,55,000**
(B) Current liabilities:		
Trade creditors (₹ 7,05,000 ×1 / 2 × 1 / 12)		29,375
Advances received from debtors		15,000
Total		**44,375**
(C) Net Working Capital (A – B)		**3,10,625**

*[₹7,20,000 + ₹3,60,000 (monthly expenditure, ₹30,000 × 12)]

**It is assumed that there is neither a opening nor closing stock of finished goods and, therefore, cost of sales is ₹10,80,000, excluding depreciation.

Solved Case 2

XYZ Ltd. sells its products on a gross profit of 20 % on sales. The following information is extracted from its annual accounts for the current year ended March 31.

	(₹)
Sales at 3 months' credit	40,00,000
Raw material	12,00,000
Wages paid–average time lag 15 days	9,60,000
Manufacturing expenses paid-one month in arrears	12,00,000
Administrative expenses paid-one month in arrears	4,80,000
Sales promotion expenses-payable half-yearly in advance	2,00,000

The company enjoys one month's credit from the suppliers of raw materials and maintains 2-month's stock of raw materials and 1.5 months' stock of finished goods. The cash balance is maintained at ₹1,00,000 as a precautionary measure. Assuming a 10 % margin, find out the working capital requirements of XYZ Ltd.

Solution:

Statement showing the determination of working capital	(₹)	(₹)
(A) Current Assets:		
Cash balance		1,00,000
Inventories:		
Raw materials (₹12,00,000 × 2 /12)	2,00,000	
Finished goods (₹32,00,000 × 1.5/12)	4,00,000	6,00,000
Debtors (₹32,00,000 × 3) / 12		8,00,000
Prepaid sales expenses (₹2,00,000 × 6) / 12		1,00,000
Total		16,00,000
(B) Current Liabilities:		
Creditors for goods (₹12,00,000 × 1) / 12		1,00,000
Wages (₹9,60,000 × 0.5)/12		40,000
Manufacturing expenses (₹12,00,000 × 1) / 12		1,00,000
Administrative expenses (₹4,80,000 × 1) / 12		40,000
Total		2,80,000
(C) Net Working Capital (A – B)		13,20,000
Add: Margin (0.10)		1,32,000
Net working capital requirement		14,52,000

Working notes	**(₹)**
Sales	40,00,000
Less: gross profit (0.20)	8,00,000
Cost of production	32,00,000

Solved Case 3

ABC Ltd wishes to arrange for overdraft facilities with its bankers during the period April to June of a particular year when it will be manufacturing mostly for stock.

a. Prepare a cash budget for the above period from the following data, indicating the extent of bank facilities the company will require at the end of the each month.

Month	Sales (₹)	Purchases (₹)	Wages (₹)
February	1,80,000	1,24,000	12,000
March	1,92,000	1,44,000	14,000
April	1,08,000	2,43,000	11,000
May	1,74,000	2,46,000	10,000
June	1,26,000	2,68,000	15,000

b. 50% of the credit sales are realised in the month following the sales, and the remaining sales in the second month following; creditors are paid in the month following the purchase.

c. Cash in bank on April 1 (estimated) ₹25,000.

Solution:

Cash Budget of ABC Ltd: April-June			
	April (₹)	**May (₹)**	**June (₹)**
(A) Cash inflows: collections			
(i) During month of sale	--	--	--
(ii) During second month (0.50)	90,000	96,000	54,000
(iii) During third month (0.50)	96,000	54,000	87,000
Total	1,86,000	1,50,000	1,41,000
(B) Cash outflows			
Purchase (one-month time-lag)	1,44,000	2,43,000	2,46,000
Wages (paid same month)	11,000	10,000	15,000
Total	1,55,000	2,53,000	2,61,000
(C) Net cash receipts (deficits)	31,000	(1,03,000)	(1,20,000)
Cash at start of month (overdraft	25,000	56,000	(47,000)
Cash balance (overdraft) (cumulative)	56,000	(47,000)	(1,67,000)
(Overdraft) facilities required		(47,000)	(1,20,000)

Exercise

A. Theoretical Questions:

⊙ Multiple Choice Questions

1. Working capital is calculated as _____
   A. Core current assets less core current liabilities
   B. Current assets less current liabilities
   C. Core current assets less current liabilities
   D. Liquid assets less current liabilities

2. The basic current liabilities are _____
   A. accounts payable and bills payable
   B. bank overdraft
   C. outstanding expenses.
   D. All of the above

3. There are two concepts of working capital – gross and ____
   A. Zero
   B. Net
   C. Cumulative
   D. distinctive

4. Working capital is also known as___ capital.
   A. Current asset
   B. Operating
   C. Projecting
   D. Operation capital

5. _____ working Capital refers to the firm's investment in current assets.
   A. Zero
   B. Net
   C. Gross
   D. Distinctive

6. In finance, "working capital" means the same thing as _____ assets.
   A. Current
   B. Fixed
   C. Total
   D. All of the above

7. _____ working capital refers to the difference between current assets and current liabilities.
   A. Zero
   B. Net
   C. Gross
   D. Distinctive

8. A _____ net working capital will arise when current assets exceed current liabilities.
   A. Summative
   B. Negative
   C. Excessive
   D. Positive

9. A _____ net working capital occurs when current liabilities are in excess of current assets.
   A. Positive
   B. Negative
   C. Excessive
   D. Zero

10. _____is not an advantages of trade credit.
   A. buyout financing
   B. informality
   C. easy availability
   D. flexibility

11. _____ refers to the funds, which an organisation must possess to finance its day to day operations.
   A. Retained earnings
   B. Fixed capital
   C. Working Capital
   D. All of the above

12. Investment in current assets should be _____
   A. just adequate
   B. more
   C. less
   D. maximum

13. _____ varies inversely with profitability.
   A. Risk
   B. Assets
   C. Liquidity
   D. Revenue

14. Capital intensive firms rely on _____
   A. debt
   B. retained earnings
   C. short term debts
   D. Equity

15. On the basis of _____, working capital is classified as gross working capital and net working capital.
    A. concept
    B. time
    C. future
    D. work

16. _____ cycle analyzes the accounts receivable, inventory, and accounts payable cycles in terms of a number of days?
    A. Business
    B. Current asset
    C. Operation
    D. Operating

17. _____ method is not used for calculating working capital cycle.
    A. Trial and error method
    B. Regression analysis method
    C. Percentage of sales method
    D. Operating cycle approach

18. On the basis of _____, working capital may be classified as: 1) Permanent or fixed working capital. 2) Temporary or variable working capital.
    A. concept
    B. time
    C. future
    D. work

19. Operating cycle is also called as _____
    A. Business cycle
    B. Working capital cycle
    C. Working cycle
    D. Current asset cycle

20. Spontaneous financing consists of _____
    A. a line of credit
    B. short-term loans
    C. accounts receivable
    D. accounts payable

21. Conversation of marketable securities into cash entails a fixed cost of ₹1,000 per transaction. What will be the optimal conversation size as per Baumol model of cash management?
    A. ₹ 315,628
    B. ₹ 316,228
    C. ₹ 317,678
    D. ₹ 318,426

22. Average collection period is 2 months, cash sales and average receivables are ₹5,00,000 and ₹6,50,000 respectively. The sales amount would be-
    A. ₹ 40,00,000
    B. ₹ 42,00,000
    C. ₹ 44,00,000
    D. ₹ 48,50,000

23. If the current ratio is 2.4:1 and working capital is ₹25,20,000, find the amount of current assets and current liabilities.
    A. Current Assets ₹ 43,20,000 and Current Liabilities ₹ 18,00,000
    B. Current Assets ₹ 44,00,000 and Current Liabilities ₹ 18,50,000
    C. Current Assets ₹ 45,50,000 and Current Liabilities ₹ 19,00,000
    D. Current Assets ₹ 46,60,000 and Current Liabilities ₹ 19,30,000

24. X Ltd. distributes its products to more than 500 retailers. The company's collection period is 30 days and keeps its inventory for 20 days. The operating cycle would be
    A. 40 Days
    B. 43 Days
    C. 45 Days
    D. 50 Days

Answers:

1	**D**
4	**B**
7	**B**
10	**S**
13	**C**
16	**D**
19	**B**
22	**C**

2	**D**
5	**C**
8	**D**
11	**C**
14	**A**
17	**A**
20	**D**
23	**A**

3	**B**
6	**A**
9	**B**
12	**A**
15	**A**
18	**B**
21	**B**
24	**D**

⊙ **State True or False**

1. Working capital is primarily required due to non-synchronous nature of the expected cash inflows and required cash outflows.
2. Higher net working capital leads to higher liquidity and higher profitability.
3. Conservative approach warrants that long-term fund should be used to finance the permanent part of the current assets and the temporary/seasonal requirements should be financed by short-term funds.
4. According to hedging approach, current assets should be financed from long-term sources.
5. Trade-off plan, in general, is considered an appropriate financing strategy for working capital.
6. There is an inverse relationship between the length of operating cycle of a firm and its working capital requirements.

7. In general, manufacturing enterprises require higher working capital than trading firms.
8. The longer the production cycle, the higher is the working capital needed or vice- versa.
9. There is a positive correlation between level of business activity and working capital needs of a business firm.
10. Efficiency of operation accelerates the pace of cash cycle of a firm but it does not affect its working capital requirements.
11. A firm should carry higher working capital than required to execute smoothly its planned level of business activity.
12. The entire sum of net profit earned by a corporate can, per-se, be considered a source of financing working capital.
13. Cash cost approach is an appropriate basis of computing working capital requirements of a business firm.
14. Working capital tied up with debtors should be estimated in relation to the selling price.
15. From the perspective of determining net working capital, all current liabilities including short-term sources of finance are considered.
16. Cash, in a narrow sense, implies currency and bank balances only.
17. Cash, in broad sense, includes marketable securities and time deposits in banks.
18. Transaction, precautionary and speculative are three motives for holding cash.
19. Speculative motive cash balance serves to provide a cushion to meet unexpected contingencies.
20. To meet the payment schedule and to minimize funds committed to cash balance are two basic objectives of cash management.
21. Costs caused due to inadequate cash are referred to as short costs.
22. Baumol model takes into account all motives of holding cash.
23. Miller-Orr model assumes that cash balances randomly fluctuate between an upper bound and lower bound.
24. Orgler's model is based on the use of a simple linear programming model.
25. Cash budget is based on operating cash flows.
26. The higher the period of cash cycle, the higher is cash turnover.
27. Time taken by the bank in collecting payment from the customer's bank is referred to as deposit float.
28. Investment in marketable securities is intended to obtain a return on temporarily idle cash.
29. The financial framework of analysis of various decision areas in receivable management should factor all measurable costs and benefits.

Answers:

1	**T**	**2**	**F**	**3**	**F**
4	**F**	**5**	**T**	**6**	**F**

7	T
10	F
13	T
16	F
19	F
22	F
25	F
28	T

8	T
11	F
14	F
17	T
20	T
23	T
26	F
29	T

9	T
12	F
15	F
18	F
21	T
24	F
27	F

⊙ Fill in the Blanks

1. Higher net working capital leads to _____ (higher / lower) liquidity and higher profitability.
2. Baumol model takes into account all motives of holding _____.
3. Working Capital equals the aggregate value of current assets _____ aggregate value of current liabilities.
4. _____ = Inventory alteration period + Receivables alteration period.
5. Cash conversion cycle = _____ – Payable delay period.
6. Gross Working Capital refers to the firm's investment in _____.
7. There exists a close association between sales fluctuations and invested amounts in _____.
8. Under the conventional method, ... enters into the calculation of working capital.
9. A company's operating cycle naturally consists of three most important activities: _____, _____ and _____
10. The _____ shows the time period over which additional no impulsive sources of working capital financing must be obtained to carry out the firm's actions.
11. The unit price of producing goods would not differ with the amount _____
12. There are _____ among the borrowing and lending rates for savings and financing of equivalent risk.
13. _____deals with the likelihood that a firm will encounter financial difficulty, such as the incapability to pay bills on time.
14. Short-term interest rates tend to change _____ over time than long-term interest rates.
15. The _____ level of working capital investment is the level predictable to maximize shareholder's assets.
16. _____ single working capital investment strategy is necessarily most favourable for all organizations.
17. The objective of a corporation is to generate value for it's_____.
18. Under _____ working capital strategy, investment in current assets is extremely low.
19. Too much working capital is expensive, falling _____ and _____.

Answer:

1	**higher**	**2**	**cash**	**3**	**minus**
4	**Operating cycle**	**5**	**Operating cycle**	**6**	**Current Assets**
7	**Current assets**	**8**	**Cash**	**9**	**Purchasing resources, producing the product, selling the product**
10	**Cash alteration cycle**	**11**	**Produced**	**12**	**Spreads**
13	**Risk**	**14**	**More**	**15**	**Most favourable**
16	**No**	**17**	**Shareholders**	**18**	**Aggressive**
19	**Profitability, return on capital**				

⊙ Short Essay Type Questions

1. What do you mean by Working Capital?
2. Discuss different types of Working Capital.
3. What are the significances of Working Capital Management?
4. Explain in brief the Working Capital Cycle and Cash Cycle.
5. Discuss the importance of Receivables Management.
6. What do you mean by Payable Management? Explain.
7. What do you mean by Inventory Management? Explain.
8. State the objectives of Cash Management.
9. Write a short note on 'Monthly Cash Flow Forecast'.
10. How to calculate Maximum Permissible Bank Finance (MPBF)?
11. Write a short note on Commercial Paper.

⊙ Essay Type Questions

1. Discuss different models of Cash Management.
2. What is Export Financing? Discuss about Pre-Shipment and Post-Shipment Packing Credit.
3. How are net working capital, liquidity, technical insolvency, and risk related?
4. What is the basic premise of the hedging approach for meeting funds requirements? What are the effects of this approach on the profitability and risk?
5. What is the conservative approach to financing funds requirements? What kind of profitability-risk trade-off is involved?
6. If a firm has constant funds requirement throughout the year, which, if any, of the three financing plans is preferable? Why?
7. Length of operating cycle is a major determinant of working capital needs of a business firm. Explain.
8. Distinguish between: (a) Gross working Capital and Net Working Capital, (b) Permanent and Temporary Working Capital (c) Production and Operating Cycle.

B. Numerical Questions:

⊙ Comprehensive Numerical Problems

1. ABC Ltd. has the following selected assets and liabilities: (₹)

Cash	45,000
Retained earnings	1,60,000
Equity share capital	1,50,000
Debtors	60,000
Inventory	1,11,000
Debentures	1,00,000
Provision for taxation	57,000
Expenses outstanding	21,000
Land and building	3,00,000
Goodwill	50,000
Furniture	25,000
Creditors	39,000

You are required to determine (i) gross working capital, and (ii) net working capital.

2. While preparing a project report on behalf of a client, you have collected the following data. Estimate the net working capital required for that project. Add 10% to your computed figure to allow for contingencies.

Estimated cost per unit of production	(₹)
Raw material	80
Direct labour	30
Overheads (exclusive of depreciation)	60
Total	**170**

Additional information

(i) Selling price, ₹200 per unit.

(ii) Level of activity, 1,04,000 units of production per annum.

(iii) Raw material in stock, average 4 weeks.

(iv) Work-in-progress (assume 50% completion stage), average 2 weeks.

(v) Finished goods in stock, average 4 weeks.

(vi) Credit allowed by suppliers, average 4 weeks.

(vii) Credit allowed by debtors, average 8 weeks.

(viii) Lag in payment of wages, average 1.5 weeks.

(ix) Cash in bank is expected to be ₹25,000.

You may assume that the production is carried on evenly throughout the year (52 weeks) and wages and overheads accrue similarly. All sales are on credit.

3. The balance sheet of X Ltd. stood as follows as on March 31 of the current year.

Liabilities	(₹)	Assets	(₹)
Current liabilities (CL)	2,000	Current assets (CA)	8,000
Long-term funds	22,000	Fixed assets (FA)	16,000
	24,000		24,000

If Current assets earn 2%, Fixed assets earn 14%, Current liabilities cost 4% and long-term funds cost 10%, calculate (a) total profits on assets and the ratio of Current assets to total assets, (b) the cost of financing and the ratio of Current liabilities to total assets, and (c) net profitability of the current financial plan.

4. Prudential Ltd. has investigated the profitability of its assets and the cost of its funds. The results indicate:

(i) Current assets earn 1 %

(ii) Fixed assets earn 13 %

(iii) Current liabilities cost 3 %

(iv) Average cost of long-tern funds, 10 %

The current balance sheet is as follows:

Liabilities	(₹)	Assets	(₹)
Current liabilities	5,000	Current assets	10,000
Long-term funds	35,000	Fixed assets	30,000
	40,000		40,000

(a) What is the net profitability?

(b) The company is contemplating lowering its net working capital to ₹3,500 by (i) either shifting current assets into fixed assets, or (ii) shifting ₹1,500 of its long-term funds into current liabilities. Work out the profitability for each of these alternatives. Which one do you prefer and why?

(c) Can both these alternatives be implemented simultaneously? How would it affect the net profitability?

Answers:

1	(i) ₹2,16,000, (ii) 99,000.
2	₹49,66,000
3	(a) ₹2,400; 0.33 (b) ₹2,280; 0.08 (c) ₹120
4	(a) ₹350, (b) (i) ₹530 (ii) ₹455; Profitability is more under alternative (b) (i), (c) ₹635.

Unsolved Case(s)

1. An engineering company is considering its working capital investment for the next year. Estimated fixed assets and current liabilities for the next year are ₹5.20 crore and ₹84.6 crore, respectively. Sales and profit before interest and taxes (PBIT) depend on current assets investment—particularly inventories and book debts. The company is examining the following alternative working capital policies:

₹ (Crore)

Working capital policy	Investment in current assets	Estimated sales	EBIT
Conservative	9.00	24.60	2.46
Moderate	7.80	23.00	2.30
Aggressive	5.20	20.00	2.00

You are required to calculate the following for each policy (a) rate of return on total assets, (b) net working capital position, (c) current ratio, and (d) current asset to fixed asset ratio.

Also discuss the return-risk trade-offs of the three policies.

2. P Ltd. wishes to evaluate its cash conversion cycle. A financial analyst company, X Ltd. indicates that on an average the firm holds items in inventory for 80 days, pays its suppliers 40 days after purchase and collects its receivables after 60 days. The company's annual sales (on all credit) are about ₹100 crore. Its cost of goods sold represent 70% of sales and purchases represent about 30% of cost of goods sold. Assume a 365-day year.

   (a) What is P Ltd.'s operating cycle (OC) and cash conversion cycle (CCC)?

   (b) What amount of rupees does P Ltd. invested in (i) inventory, (ii) accounts receivable (iii) accounts payable and (iv) total CCC.

   (c) If P Ltd. shorten its cash conversion cycle by reducing its inventory holding period by 10 days, what effect would it have on its total resource investment in (b) (iv) above.

   (d) If P Ltd. shorten its cash conversion cycle by 10 days, would it be best to reduce the inventory holding period, reduce the receivable collection period, or extend the accounts payable period? Why?

3. R Ltd. feels a lock-box system can shorten its accounts receivable collection period by 3 days. Credit sales are estimated at ₹ 365 lakh per year, billed on a continuous basis. The firm's opportunity cost of funds is 15%. The cost of lock box system is ₹ 50,000.

   (a) Will you advise 'R' to go for lock-box system?

   (b) Will your answer be different if accounts receivable collection period is reduced by 5 days?

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Financing Decisions of a Firm 7

This Module Includes

7.1 Capital Structure and Capital Stacking

7.2 Leverage Analyses and EBIT – EPS Analysis

7.3 Dividend Decisions and Dividend Theories

Financing Decisions of a Firm

SLOB Mapped against the Module:

To develop critical thinking and problem-solving competencies so that students can assist the management in selecting a suitable capital structure that caters to a balanced approach towards risk, return and value.

Module Learning Objectives:

After studying this module, the students will be able to –

- Know the basic concept of financing decisions of a firm;
- Understand the basic concept of capital structure;
- Understand the basic concept of capital stacking;
- Understand the basic concept of collateral;
- Discuss the meaning and concept of covenant (financial and non-financial), negative covenants and cross default;
- Explain the relation between capital stacking and risk analysis;
- State the importance of senior and junior debt management;
- Discuss the meaning, concept, importance and types of capital structure;
- Evaluate different theories of capital structure;
- Discuss the leverage analysis and EBIT – EPS analysis;
- Compute DOL, DFL and DCL;
- Equip themselves with detail understanding of Dividend Decisions and Dividend Theories;
- Evaluate different models on dividend policy with illustrations.

Introduction

7

Financing decision is concerned with the capital structure of the firm. The decision is basically taken about the proportion of equity capital and debt capital in total capital of the firm. Higher the proportion of debt in capital of the firm, higher is the risk.

Financial decisions may be classified as long-term finance decisions and short-term finance decisions in broad manner.

Again, there are four main financial decisions –

(a) Capital Budgeting or Long-term Investment Decision

(b) Capital Structure or Financing Decision

(c) Dividend Decision, and

(d) Working Capital Management Decision.

This module is dealt with mainly capital structure or financing decision. A firm's capital structure or financing decision is concerned with obtaining funds to meet firm's long-term investment requirements. It refers to the specific mixture of long-term debt and equity, which the firm uses to finance its assets. The finance manager has to decide exactly how much funds to raise, from which sources to raise and when to raise.

Different feasible combinations of raising required funds must be carefully evaluated and an optimal combination of different sources of funds should be selected. The optimal capital structure is one which minimises overall cost of capital and maximises firm's value. Capital structure decision gives rise to financial risk of a firm.

Capital Structure and Capital Stacking

7.1

Capital Structure – A firm needs funds for long-term requirements and working capital. These funds are collected through different sources both short-term and long term. The long-term funds required by a firm are mobilized through owner's funds (equity share, preference shares and retained earnings) and long-term debt (debentures and bonds). A mix of various long-term sources of funds employed by a firm is called capital structure.

According to Gerestenberg, 'capital structure of a company refers to the composition or make-up of its capitalization and it includes all long-term capital resources, viz, loans, bonds, shares and reserves'. Thus, capital structure is made with debt and equity securities and refers to permanent financing of a firm.

Financial Manager has to plan the appropriate mix of different securities in total capitalization in such a way as to minimize the cost of capital and maximize the earnings per share to the equity shareholders.

There may be four fundamental patterns of capital structure as follows:

(a) Equity capital only (including Reserves and Surplus)

(b) Equity and preference capital

(c) Equity, preference and long-term debt i.e. debentures, bonds and loans from financial institutions etc.

(d) Equity and long-term debt.

Some authors use capital structure and financial structure interchangeably. But both are different concepts. Financial structure refers to the way in which the total assets of a firm are financed. In other words, financial structure refers to the entire liabilities side of the Balance Sheet. But capital structure represents only long-term sources of funds and excludes all short-term debt and current liabilities. Thus, financial structure is a broader one and capital structure is only part of it.

On the other hand, the capital stack is one of the most important concepts for investors interested in evaluating real estate risk and projected rate of return. Understanding the capital stack to assess trade-offs can protect your investment from undue risk, or insufficient gains.

Capital Staking:

In simple terms, the capital stack refers to the layers of capital. The capital stack represents the underlying financial structure of a commercial real estate deal. Often, the capital stack is presented as a graphic that shows the different types of capital in a deal stacked above each other, like a cake with many layers. The capital stack is typically comprised of four sections in the following order: common equity, preferred equity, mezzanine debt, and senior debt. Although common equity is listed first in the stack, it holds the lowest priority, meaning common equity lenders are paid last.

The graphical presentation of capital stack is -

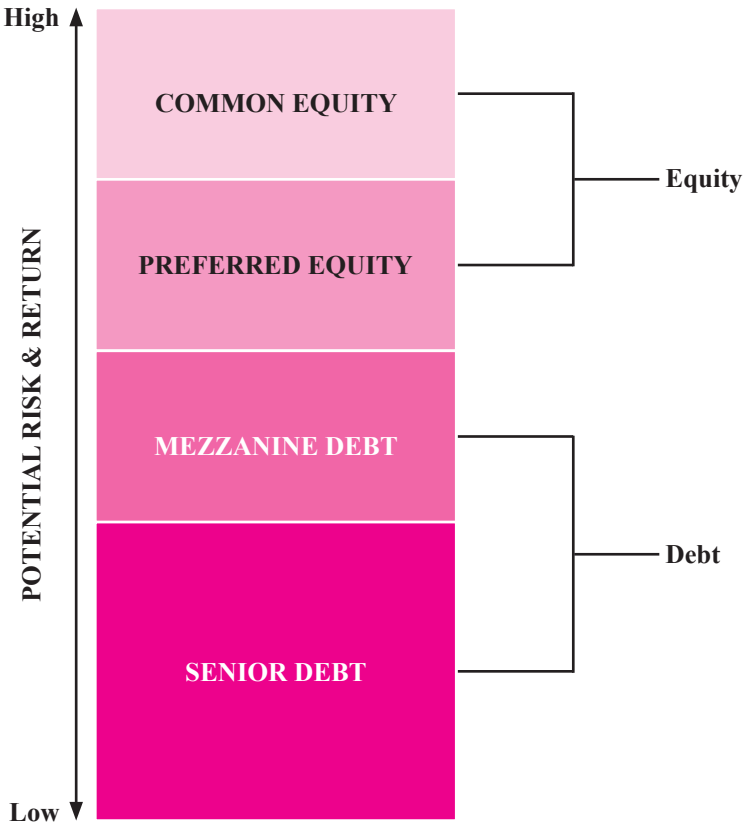

Figure 7.1: The Capital Stack or Layers of Capital

Senior Debt

Senior debt is the bedrock of the capital stack, which typically takes up the most significant portion of the stack. It is also the least risky position, as it's first in line to get paid back in the event of a default or bankruptcy. As an investor, you should consider a senior debt investment if you want the least amount of risk.

Senior debt is generally secured by a mortgage or deed to the property, which will serve as collateral for the loan. It's low risk because, in a worst-case scenario of asset underperformance, you can initiate a foreclosure process to recover your full capital investment before any other participant. Its low-risk nature also delivers the lowest potential return to investors, which is a low fixed interest rate.

Mezzanine Debt

Mezzanine debt, sometimes called junior debt, is next in line to get paid out. This debt is often financed by investors rather than a bank. Because this debt is only paid back after all the senior debt has been paid back, it holds more risk than the senior debt. To compensate for this risk, investors earn a higher interest rate than the senior debt, meaning they have a higher potential return.

Mezzanine debt is often critical to the success of a transaction because senior debt holders will typically only lend up to 50% - 60% of a project in some cases, and unless the equity holders can come up with the remaining,

then mezzanine debt is necessary. Sometimes mezzanine debt can be called "bridge financing" because it bridges that gap between the senior debt and equity.

Equity Financing

As mentioned before, equity investors buy shares of ownership of the property. These shares will go up and down in value relative to the property valuation. If the property appreciates, the value of the shares will go up. If the property sells at a higher valuation than initially purchased, the investors will profit. But even in the equity stack, not all shares are created equal.

Common Equity

Last in line for payouts are common equity holders. Being a common equity investor means being an owner of the deal. Common equity has the highest return potential, but it's also the riskiest because holders can only be paid after all debt holders, and preferred equity investors have received their returns.

However, in exchange for being last in line, common equity investors will receive all the profit upon the property sale. In the event of the property appreciates significantly in value, they stand to earn the most substantial return. Unlike the other stacks, there is also no cap on your potential profit or a fixed term for expected returns.

Preferred Equity

After all the debts been paid off, preferred equity shares are next in the payback line. Preferred equity often acts as a hybrid between equity and debt. While technically equity shares, they also often have a payout schedule similar to mezzanine debt (but paid back after the mezzanine debt is paid back in full). Unlike debt, these shares are not backed by any collateral, which means they hold significant risk in the event of a bankruptcy. While investors hold significant risk here, they are rewarded with an even higher interest rate than the mezzanine debt and a preference to be paid back before the common equity.

Features of an Appropriate Capital Structure

A capital structure will be considered to be appropriate if it possesses following features:

(a) Profitability: The capital structure of the company should be most profitable. The most profitable capital structure is one that tends to minimize cost of financing and maximize earnings per equity share.

(b) Solvency: The pattern of capital structure should be so devised as to ensure that the firm does not run the risk of becoming insolvent. Excess use of debt threatens the solvency of the company. The debt content should not, therefore, be such that which increases risk beyond manageable limits.

(c) Flexibility: The capital structure should be flexible to meet the requirements of changing conditions. Moreover, it should also be possible for the company to provide funds whenever needed to finance its profitable activities.

(d) Conservatism: The capital structure should be conservative in the sense that the debt content in the total capital structure does not exceed the limit which the company can bear. In other words, it should be such as is commensurate with the company's ability to generate future cash flows.

(e) Control: The capital structure should be so devised that it involves minimum risk of loss of control of the company.

Determinants of Capital Structure

The following are the factors influencing the capital structure decisions.

The capital structure of a firm depends on a number of factors and these factors are of different importance. Generally, the following factors should be considered while determining the capital structure of a company.

(a) Trading on Equity and EBIT-EPS Analysis

The use of long-term debt and preference share capital, which are fixed income bearing securities, along with equity share capital is called financial leverage or trading on equity. The use of long-term debt capital increases the earnings per share as long as the return on investment is greater than the cost of debt. Preference share capital will also result in increasing EPS. But the leverage effect is more pronounced in case of debt because of two reasons:

(i) Cost of debt is usually lower than the cost of preference share capital.

(ii) The interest paid on debt is tax deductible.

Because of its effects on the earnings per share, financial leverage is one of the important considerations in planning the capital structure of a company. The companies with high level of Earnings Before Interest and Taxes (EBIT) can make profitable use of the high degree of leverage to increase the return on the shareholders equity. The EBIT-EPS analysis is one important tool in the hands of the financial manager to get an insight into the firms' capital structure planning. He can analyse the possible fluctuations in EBIT and their impact on EPS under different financing plans.

Under favourable conditions, financial leverage increases EPS, however it can also increase financial risk to shareholders. Therefore, the firm should employ debt to such an extent that financial risk does not spoil the leverage effect.

(b) Growth and Stability of Sales

This is another important factor which influences the capital structure of a firm. Stability of sales ensures stable earnings, so that the firm will not face any difficulty in meeting its fixed commitments of interest payment and repayment of debt. So, the firm can raise a higher level of debt. In the same way, the rate of growth in sales also affects the capital structure decision. Usually, greater the rate of growth of sales, greater can be the use of the debt in the financing of a firm. On the other hand, the firm should be very careful in employing debt capital if its sales are highly fluctuating and declining.

(c) Cost of capital

Cost of capital is another important factor that should be kept in mind while designing the capital structure of a firm. The capital structure should be designed in such a way that the firm's overall cost of capital is the minimum. Cost of capital is the minimum return expected by its suppliers. Of all the sources of capital, equity capital is the costliest as the equity shareholders bear the highest risk. On the other hand, debt capital is the cheapest source because the interest is paid on it by the firm whether it makes profits or not. Moreover, interest on debt capital is tax deductible which makes it further cheaper.

Preference share capital is also cheaper than equity capital as the dividends is paid at a fixed rate on preference shares. So, the overall cost of capital depends on the proportion in which the capital is mobilized from different sources of finance. Hence, capital structure should be designed carefully so that overall cost of capital is minimized.

(d) Control

Sometimes, the designing of capital structure of a firm is influenced by the desire of the existing management to retain the control over the firm. Whenever additional funds are required, the management of the firm wants to raise the funds without any loss of control over the firm. If equity shares are issued for raising funds, the control of the existing shareholders is diluted. Because of this, they may raise the funds by issuing fixed charge bearing debt and preference share capital, as preference shareholders and debt holders do not have any voting right. The Debt financing is advisable from the point of view of control. But over-dependence on debt capital may result in heavy burden of interest and fixed charges and may lead to liquidation of the company.

(e) Flexibility

Flexibility means the firm's ability to adapt its capital structure to the needs of the changing conditions. Capital structure should flexible enough to raise additional funds whenever required, without much delay and cost. The capital structure of the firm must be designed in such a way that it is possible to substitute one form of financing for another to economise the use of funds. Preference shares and debentures offer the highest flexibility in the capital structure, as they can be redeemed at the discretion of the firm.

(f) Marketability and Timing

Capital market conditions may change from time to time. Sometimes there may be depression and at over times there may be boom condition in the market. The firm should decide whether to go for equity issue or debt capital by taking market sentiments into consideration. In the case of depressed conditions in the share market, the firm should not issue equity shares but go for debt capital. On the other hand, under boom conditions, it becomes easy for the firm to mobilise funds by issuing equity shares.

The internal conditions of a firm may also determine the marketability of securities. For example, a highly levered firm may find it difficult to raise additional debt. In the same way, a firm may find it very difficult to mobilise funds by issuing any kind of security in the market merely because of its small size.

(g) Floatation Costs:

Floatation costs are not a very significant factor in the determination of capital structure. These costs are incurred when the funds are raised externally. They include cost of the issue of prospectus, brokerage, commissions, etc. Generally, the cost of floatation for debt is less than for equity. So, there may be a temptation for debt capital. There will be no floatation cost for retained earnings. As is said earlier, floatation costs are not a significant factor except for small companies. Floatation costs can be an important consideration in deciding the size of the issue of securities, because these costs as a percentage of funds raised will decline with the size of the issue. Hence, greater the size of the issue, more will be the savings in terms of floatation costs. However, a large issue affects the firm's financial flexibility.

(h) Purpose of Financing

The purpose for which funds are raised should also be considered while determining the sources of capital structure. If funds are raised for productive purpose, debt capital is appropriate as the interest can be paid out of profits generated from the investment. But, if it is for unproductive purpose, equity should be preferred.

(i) Legal Requirements

The various guidelines issued by the Government from time to time regarding the issue of shares and debentures should be kept in mind while determining the capital structure of a firm. These legal restrictions are very significant as they give a framework within which capital structure decisions should be made.

7.1.1 Collateral

Collateral term is very much related and relevant for determining of capital structure as well as capital stacking. The term collateral refers to an asset that a lender accepts as security for a loan. Collateral may take the form of real estate or other kinds of assets, depending on the purpose of the loan. The collateral acts as a form of protection for the lender. That means, if the borrower defaults on their loan payments, the lender can seize the collateral asset and sell it to recoup some or all of its losses.

7.1.2 Covenant (Financial and Non-financial), Negative Covenants and Cross Default

In legal and financial terminology, a covenant is a promise in an indenture, or any other formal debt agreement, that certain activities will or will not be carried out or that certain thresholds will be met. Covenants in finance

most often relate to terms in a financial contract, such as a loan document or bond issue stating the limits at which the borrower can further lend. Covenants are often put in place by lenders to protect themselves from borrowers defaulting on their obligations due to financial actions detrimental to themselves or the business.

Covenants are most often represented in terms of financial ratios that must be maintained, such as a maximum debt-to-asset ratio or other such ratios. Covenants can cover everything from minimum dividend payments to levels that must be maintained in working capital to key employees remaining with the firm.

Financial Vs. Non-Financial Covenants

Comparing financial and non-financial covenants in a loan agreement helps us to better understand how agreements are formulated and the way they are executed across various industries. Covenants are a type of promise that exists in contract law and are a part of many borrowing agreements throughout corporate and personal finance.

Financial Covenants

Financial covenants are aspects of an agreement (generally loans) that limit or provide restrictions on how a company or individual operates their finances. A financial covenant can stipulate how much debt a company can take on or even how stringent financial ratios must be maintained as a part of such an agreement. Financial covenants, by their very definition, revolve around the financial aspects of an agreement or contract.

Non-Financial Covenants

Non-financial covenants also serve the purpose of a safety net to the lender. They are usually undertaken by a lender as a measure to prevent the risks related to money-lending activities. Non-financial covenants come with many of the complementary aspects to an agreement that do not discuss finances. They are a critical part of financial agreements that help guide the terms of a contract, as well as provide barriers for one or either party to operate between. It helps to ensure the faithful execution of the contract that occurs in good faith by the two signing parties.

Positive Covenants

A positive covenant is a clause in a loan contract that requires a borrower to perform specific actions. Examples of positive covenants include requirements to maintain adequate levels of insurance, requirements to furnish audited financial statements to the lender, compliance with applicable laws, and maintenance of proper accounting books and credit rating, if applicable. Positive covenant is also known as affirmative covenant.

A violation of a positive covenant ordinarily results in outright default. Certain loan contracts may contain clauses that provide a borrower with a grace period to remedy the violation. If not corrected, creditors are entitled to announce default and demand immediate repayment of principal and any accrued interest.

Negative Covenants

Negative covenants are put in place to make borrowers refrain from certain actions that could result in the deterioration of their credit standing and ability to repay existing debt. The most common forms of negative covenants are financial ratios that a borrower must maintain as of the date of the financial statements. For instance, most loan agreements require a ratio of total debt to a certain measure of earnings not to exceed a maximum amount, which ensures that a company does not burden itself with more debt than it can afford to service.

Another common negative covenant is an interest coverage ratio, which says that Earnings Before Interest and Taxes (EBIT) must be greater in proportion to interest payments by a certain number of times. The ratio puts a check on a borrower to make sure that he generates enough earnings to afford paying interest.

Cross Default

Cross default is a clause added to certain loans or bonds that stipulate that a default event triggered in one

instance will carry over to another. Cross default is a provision in a bond indenture or loan agreement that puts a borrower in default if the borrower defaults on another obligation. For example, a cross-default clause in a loan agreement may say that a person automatically defaults on his car loan if he defaults on his mortgage. The cross-default provision exists to protect the interest of lenders, who desire to have equal rights to a borrower's assets in case of default on one of the loan contracts.

Cross-default is caused by an event of default of a borrower on another loan. Default typically occurs when a borrower fails to pay interest or principal on time, or when he violates one of the negative or affirmative covenants. A negative covenant requires a borrower to refrain from certain activities, such as having indebtedness to profits above certain levels or profits insufficient to cover interest payment. Affirmative covenants obligate the borrower to perform certain actions, such as furnishing audited financial statements on a timely basis or maintaining certain types of business insurance.

If a borrower defaults on one of his loans by violating covenants or not paying principal or interest on time, a cross-default clause in another loan document triggers an event of default as well. Typically, cross-default provisions allow a borrower to remedy or waive the event of default on an unrelated contract before declaring a cross-default.

7.1.3 Capital Stacking and Risk Analysis

In simple terms, the capital stack represents the underlying capital structure. When looking at large investments, an important component to review is the 'capital stack.' The capital stack is the organization and hierarchy of all the capital contributed to the financing of a deal. Each part of the stack represents a different slice of the investment, and your position in the stack will determine where and when you are entitled to payouts and returns on your investment.

A simple way to imagine a capital stack is to think of it as a pyramid. This pyramid (as given in previous section) represents all the amounts invested into a deal. As we know, imagine that this pyramid is broken down into levels, and each level is a different source of capital used to finance the project - both debt and equity.

Capital stack may be used as an instrument to mitigate the risk in investment. There are two key considerations with any investment: risk and return. In terms of risk, investors always need to consider what the outcome will be if things do not go according to the plan. Capital stack will help investors in this situation. However, understanding where you fall in the capital stack is essential toward recognizing the full risk and reward potential of an investment. There will always be a trade-off in return potential in exchange for getting paid back sooner. Investing is all about risk mitigation. Understanding the risk tolerance and the time horizon for earning returns will help to determine whether or not a specific opportunity is a right fit for your portfolio. The capital stack helps in this matter to investors.

The capital stack generally tells the order of priority of payout with respect to other positions within the capital stack. Starting at the bottom of the capital stack, the senior debt will be paid out first, then the mezzanine debt, then the preferred equity and finally the common equity. If the real estate investment doesn't perform as projected, there may not be enough money to repay all money invested along with returns. The bottom layers will be repaid first, and the top layers will incur losses before anyone else.

Thus, your position in the capital stack directly relates to your risk. If you happen to be towards the top of a capital stack, you will inherently have more risk than the lower layers. If you are in the bottom of the capital stack, your investment will be safer relative to the other higher positions in the capital stack.

7.1.4 Senior and Junior Debt Management

Debt management is a way to get debt under control through financial planning and budgeting. The goal of a debt management plan is to use these strategies to help you lower your current debt and move toward eliminating

it completely. The main objective of debt management is to ensure that the organisation's financing needs and its payment obligations are met at the lowest possible cost over the medium to long run, consistent with a prudent degree of risk.

However, senior debt and junior debt (subordinated debt or mezzanine debt), both are long-term liabilities or non-current liabilities of the company. They are an important source of finance in debt financing. There are times when the Cost of Equity exceeds the cost of debt, in such a situation preference shifts from equity to debt. Senior Debt and Junior Debt is important tool for debt financing. They help the company in both, in the short as well as long term. Though their ultimate objective to gather resources are almost the same, they have different characteristics altogether. They both act as a source of finance for the issuing company, but they both carry different levels of risk, interest rate, repayment priority, and may attract different kinds of investors or lenders, etc.

Senior debt is often secured. Secured debt is debt secured by the assets or other collateral of a company and can include liens and claims on certain assets. When a company files for bankruptcy, the issuers of senior debt, typically bondholders or banks are having the best chance of being repaid. Next in line are junior debt holders, preferred stockholders, and common stockholders. In some cases, these parties are paid by selling collateral that has been held for debt repayment.

Senior debt and subordinated debt are long-term sources of debt finance serving different purposes. It would be absolutely wrong to say, one debt is more important than the other. So, both kinds of debt are equally important and should be managed properly for any organisation.

7.1.5 Capital Structure Theories

The existence of an optimum capital structure is not accepted by all. There are two extreme views or schools of thought regarding the existence of an optimum capital structure. As per one view, capital structure influences the value of the firm and cost of capital and hence there exists an optimum relevance and hence there exists an optimum capital structure. On the other hand, the other school of thought advocates that capital structure has no relevance and it does not influence the value of the firm and cost of capital. Reflecting these views, different theories of capital structure have been developed. The main contributors to the theories are David Durand, Ezra Solomon, Modigliani and Miller.

The important theories of capital structure are:

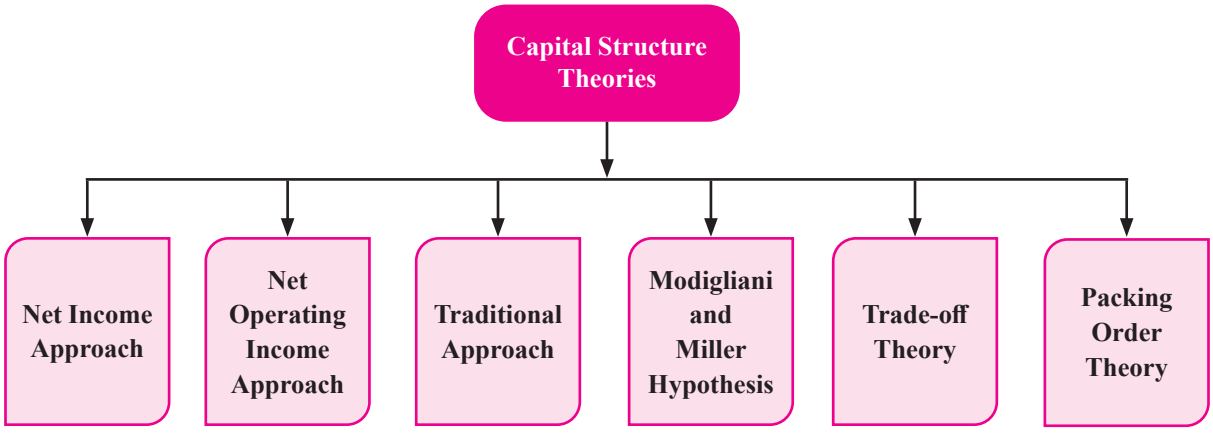

Figure 7.2: The important theories of Capital structure

Assumptions underlying the theories:

In order to have a clear understanding of these theories and the relationship between capital structure and value of the firm or cost of capital, the following assumptions are made:

(a) Firms employ only debt and equity.

(b) The total assets of the firm are given.

(c) The firm's total financing remains constant. The degree of leverage can be changed by selling debt to repurchase shares or selling shares to retire debt.

(d) The firm has 100% payout ratio, i.e., it pays 100% of its earnings as dividends.

(e) The operating earnings (EBIT) of the firm are not expected to grow.

(f) The business risk is assumed to be constant and independent of capital structure and financial risk.

(g) Investors have the same subjective probability distribution of expected future operating earnings for a given firm.

(f) There are no corporate and personal taxes. This assumption it relaxed later.

In analysing the capital structure theories, the following basic definitions are used:

S = Market value of common shares

D = Market value of debt

V = Market value of the firm = S + D

NOI = X = Expected net operating income, i.e., Earnings Before Interest and Taxes (EBIT)

NI = NOI - Interest = Net Income or shareholder's earnings.

1. Net Income Approach

This approach was identified by David Durand. According to this approach, capital structure has relevance, and a firm can increase the value of the firm and minimise the overall cost of capital by

employing debt capital in its capital structure. According to this theory, greater the debt capital employed, lower shall be the overall cost of capital and more shall be the value of the firm.

This theory is subject to the following assumptions:

(a) The cost of debt is less than cost of equity.

(b) The risk perception of investors is not affected by the use of debt. As a result, the equity capitalisation rate (k_e) and the debt - capitalisation rate (k_d) don't change with leverage.

(c) There are no corporate taxes.

According to the above assumptions, cost of debt is cheaper than cost of equity and they remain constant irrespective of the degree of leverage. If more debt capital is used because of its relative cheapness, the overall cost of capital declines and the value of the firm increases.

According to this approach:

V = S + D

S = Market Value of Equity = NI / k_e

D = Market Value of Debt

k_o = Overall Cost of Capital = EBIT/ V

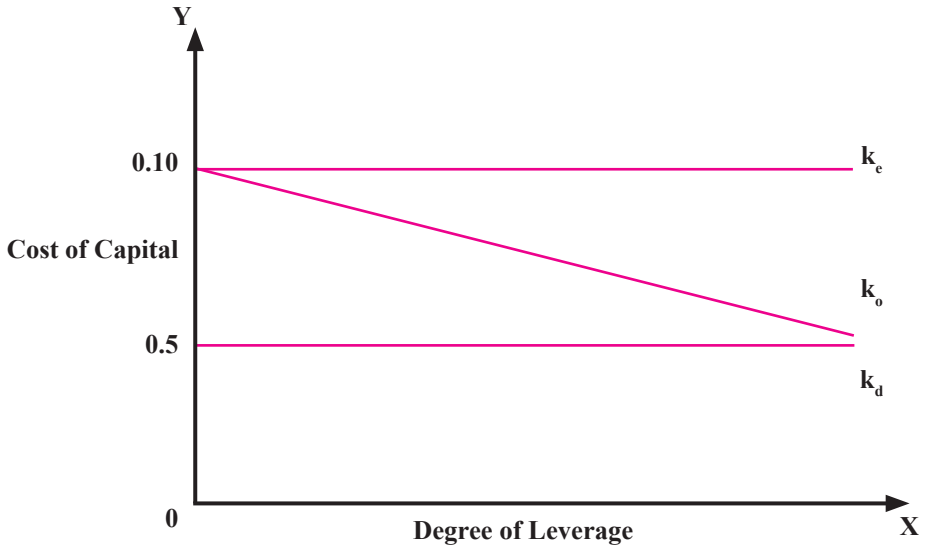

Figure 7.3: Net Income Approach

It is evident from the above diagram that when degree of leverage is zero (i.e., no debt capital employed), overall cost of capital is equal to cost of equity ($k_o = k_e$). If debt capital is employed further and further which is relatively cheap when compared to cost of equity, the overall cost of capital declines, and it becomes equal to cost of debt (k_d) when leverage is one (i.e., the firm is fully debt financed). Thus, according to this theory, the firm's capital structure will be optimum, when degree of leverage is one.

2. Net Operating Income Approach

This net operating income (NOI) approach is also suggested by David Durand. This represents another extreme view that capital structure and value of the firm are irrelevant. This capital structure of the firm does not influence cost of capital and value of the firm. The value of the firm (V) is determined as follows:

$$V = S + D = \frac{NOI}{k_o}$$

k_O The overall cost of capital and depends on the business risk of the firm. It is not affected by financing mix.

The critical assumptions of this theory are:

(a) The market capitalises the value of the firm as a whole. Thus, the split between debt and equity is not important.

(b) The business risk remains constant at every level of debt – equity mix.

(c) There are no corporate taxes.

(d) The debt capitalisation rate (k_d) is constant.

According to this theory, the use of less costly debt increases the risk to equity shareholders. This causes the equity capitalisation rate (k_e) to increase. As a result, the low cost advantage of debt is exactly offset by the increase in the equity capitalisation rate. Thus, the overall capitalisation rate (k_o) remains constant and consequently the value of the firm does not change.

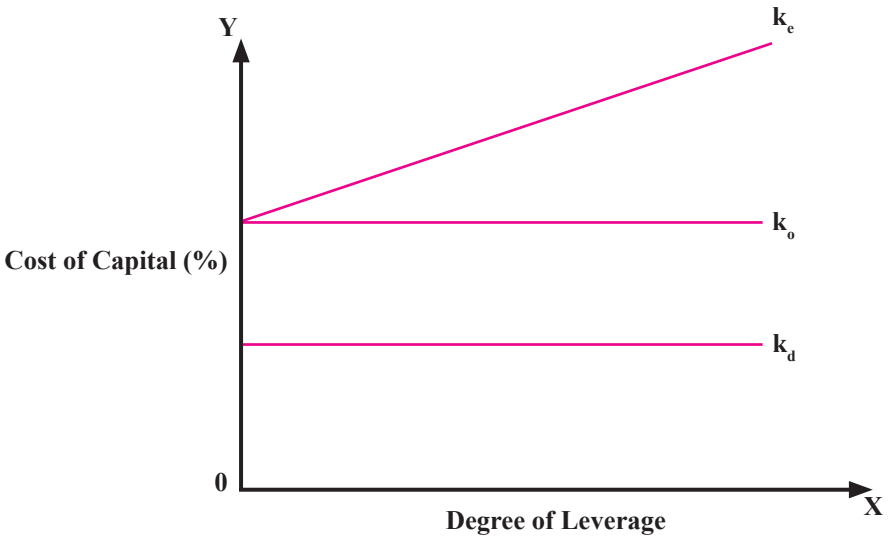

Figure 7.4: Net Operating Income Approach

The above diagram shows that k_o and k_d are constant and k_e increases with leverage continuously. The increase in cost of equity (k_e) exactly offsets the advantage of low-cost debt, so that overall cost of capital (k_o) remains constant, at every degree of leverage. It implies that every capital structure is optimum and there is no unique optimum capital structure.

3. The Traditional Approach

This approach, which is also known as intermediate approach, has been popularised by Ezra Solomon. It is a compromise between the two extremes of Net Income Approach and Net Operating Income Approach. According to this approach, cost of capital can be reduced or the value of the firm can be increased with a judicious mix of debt and equity. This theory says that cost of capital declines with increase in debt capital up to a reasonable level, and later it increases with a further rise in debt capital. The way in which the overall cost of capital reacts to changes in capital structure can be divided into three stages under traditional position.

Stage I

In this stage, the cost of equity (k_e) and the cost of debt (k_d) are constant and cost of debt is less than cost of equity. The employment of debt capital up to a reasonable level will cause the overall cost of capital to decline due to the low-cost advantage of debt.

Stage II

Once the firm has reached a reasonable level of leverage, a further increase in debt will have no effect on the value of the firm and the cost of capital. This is because of the fact that a further rise in debt. Capital increases the risk to equity shareholders which leads to a rise in equity capitalisation rate (k_e).

This rise in cost of equity exactly offsets the low–cost advantage of debt capital so that the overall cost of capital remains constant.

Stage III

If the firm increases debt capital further and further beyond reasonable level, it will cause an increase in risk to both equity shareholders and debt holders, because of which both cost of equity and cost of debt start rising in this

stage. This will in turn to cause an increase in overall cost of capital. If the overall effect of all the three stages is taken, it is evident that cost of capital declines and the value of the firm increases with a rise in debt capital up to a certain reasonable level. If debt capital is further increased beyond this level, the overall cost of capital (k_o) tends to rise and as a result the value of the firm will decline.

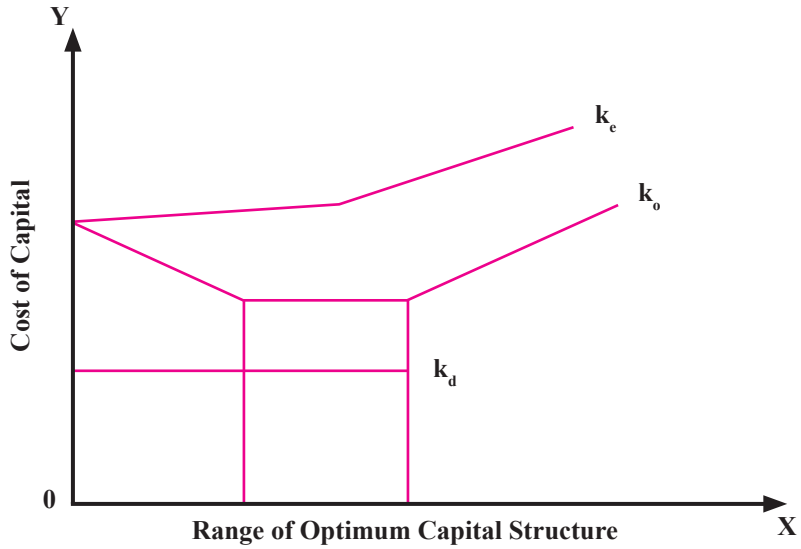

Figure 7.5: The Traditional Approach

It is seen from above graph that the overall cost of capital declines with an increase in leverage up to point L and it increases with rise in the leverage after point L1. Hence, the optimum capital structure lies in between L and L1.

4. Modigliani – Miller (M-M) Hypothesis

The Modigliani – Miller hypothesis is identical with the Net Operating Income Approach. Modigliani and Miller argued that, in the absence of taxes the cost of capital and the value of the firm are not affected by the changes in capital structure. In other words, capital structure decisions are irrelevant and value of the firm is independent of debt–mix.

Basic Propositions:

M-M Hypothesis can be explained in terms of two propositions of Modigliani and Miller. They are:

(a) The overall cost of capital (k_o) and the value of the firm are independent of the capital structure.

The total market value of the firm is given by capitalising the expected net operating income by the rate appropriate for that risk class.

(b) The financial risk increases with more debt content in the capital structure. As a result cost of equity (k_e) increases in a manner to offset exactly the low – cost advantage of debt. Hence, overall cost of capital remains the same.

Assumptions of the M-M Approach:

(a) There is a perfect capital market. Capital markets are perfect when–

(i) Investors are free to buy and sell securities,

(ii) They can borrow funds without restriction at the same terms as the firms do,

(iii) They behave rationally,

(iv) They are well informed, and

(v) There are no transaction costs.

(b) Firms can be classified into homogeneous risk classes. All the firms in the same risk class will have the same degree of financial risk.

(c) All investors have the same expectation of a firm's net operating income (EBIT).

(d) The dividend payout ratio is 100%, which means there are no retained earnings.

(e) There are no corporate taxes. This assumption has been removed later.

Proposition I

According to Modigliani–Miller, for the firms in the same risk class, the total market value is independent of capital structure and is determined by capitalising net operating income by the rate appropriate to that risk class. Proposition I can be expressed as follows:

$$V = S + D = \frac{X}{k_e} = \frac{NOI}{k_o}$$

Where, V = The market value of the firm

S = The market value of equity

D = The market value of debt

According the Proposition I the average cost of capital is not affected by degree of leverage and is determined as follows:

$k = X/V$

According to M –M, the average cost of capital is constant as shown in the following figure.

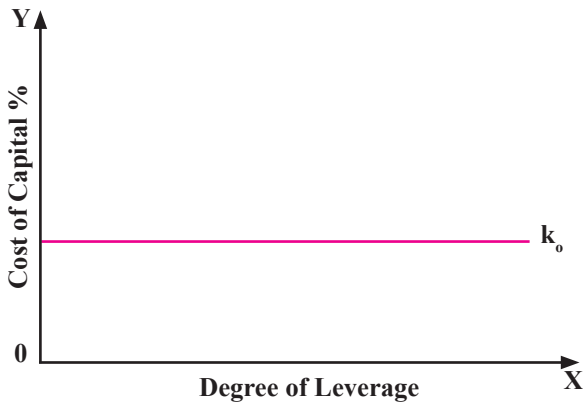

Figure 7.6: MM Approach (Modiglani–Miller Approach) Theory

Arbitrage Process

According to Modigliani–Miller Hypothesis, two firms identical in all respects except their capital structure, cannot have different market values or different cost of capital. In case, these firms have different market values, the arbitrage will take place and equilibrium in market values is restored in no time. Arbitrage process refers to switching of investment from one firm to another. When market values are different, the investors will try to take advantage of it by selling their securities with high market price and buying the securities with low market price. The use of debt by the investors is known as personal leverage or homemade leverage.

Because of this arbitrage process, the market price of securities in higher valued market will come down and the market price of securities in the lower valued market will go up, and this switching process is continued until the equilibrium is established in the market values. So, Modigliani–Miller, argue that there is no possibility of different market values for identical firms.

Reverse Working of Arbitrage Process

Arbitrage process also works in the reverse direction. Leverage has neither advantage nor disadvantage.

If an unlevered firm (with no debt capital) has higher market value than a levered firm (with debt capital) arbitrage process works in reverse direction. Investors will try to switch their investments from unlevered firm to levered firm so that equilibrium is established in no time.

Thus, Modigliani–Miller proved in terms of their proposition I that the value of the firm is not affected by debt-equity mix.

Proposition II

Modigliani–Miller's proposition II defines cost of equity. According to them, for any firm in a given risk class, the cost of equity is equal to the constant average cost of capital (k_o) plus a premium for the financial risk, which is equal to debt – equity ratio times the spread between average cost and cost of debt.

Thus, cost of equity is:

$k_e = k_o + (k_o - k_d) \times D/S$

Where, k_e = Cost of equity; k_o = Average cost of capital

D/S = Debt – Equity ratio; k_d = Cost of debt

Modigliani–Miller argue that k_o will not increase with the increase in the leverage, because the low – cost advantage of debt capital will be exactly offset by the increase in the cost of equity as caused by increased risk to equity shareholders. The crucial part of the Modigliani–Miller Thesis is that an excessive use of leverage will increase the risk to the debt holders which results in an increase in cost of debt (k_d). However, this will not lead to a rise in k_o. Modigliani–Miller maintain that in such a case k_e will increase at a decreasing rate or even it may decline. This is because of the reason that at an increased leverage, the increased risk will be shared by the debt holders. Hence k_o remain constant. This is illustrated in the figure given below:

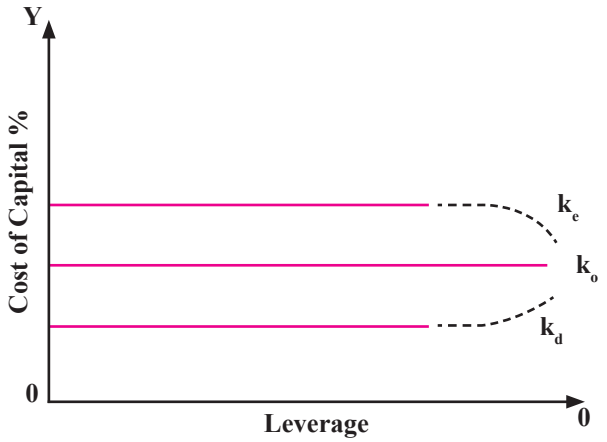

Figure 7.7: M–M Hypothesis and Cost of Capital

Criticism on M–M Hypothesis

The arbitrage process is the behavioural and operational foundation for M–M Hypothesis. But this process fails the desired equilibrium because of the following limitations.

(i) Rates of interest are not the same for the individuals and firms. The firms generally have a higher credit standing because of which they can borrow funds at a lower rate of interest as compared to individuals.

(ii) Home – Made leverage is not a perfect substitute for corporate leverage. If the firm borrows, the risk to the shareholder is limited to his shareholding in that company. But if he borrows personally, the liability will be extended to his personal property also. Hence, the assumption that personal or home – made leverage is a perfect substitute for corporate leverage is not valid.

(iii) The assumption that transaction costs do not exist is not valid because these costs are necessarily involved in buying and selling securities.

(iv) The working of arbitrage is affected by institutional restrictions, because the institutional investors are not allowed to practice home – made leverage.

(v) The major limitation of Modigliani–Miller hypothesis is the existence of corporate taxes. Since the interest charges are tax deductible; a levered firm will have a lower cost of debt due to tax advantage when taxes exist.

M – M Hypothesis Corporate Taxes

Modigliani and Miller (M–M) later recognised the importance of the existence of corporate taxes. Accordingly, they agreed that the value of the firm will increase or the cost of capital will decrease with the use of debt due to tax deductibility of interest charges. Thus, the optimum capital structure can be achieved by maximising debt component in the capital structure.

According to this approach, value of a firm can be calculated as follows:

$$\text{Value of Unlevered firm (Vu)} = \frac{EBIT \times (1-t)}{k_e}$$

Where, EBIT = Earnings Before Interest and Taxes

k_o = Overall cost of capital

D = Value of debt capital

t = Tax rate

Value of levered firm (Vl) = Value of Unlevered firm + Debt (tax rate)

5. Trade-off Theory

When a firm is unable to meet its obligations, it results in financial distress that can lead to bankruptcy. When a firm experiences financial distress several things can happen such as:

(i) The legal and administrative costs associated with bankruptcy proceedings are quite high.

(ii) Bankruptcy cases often take years to settle and during this period machineries and equipments rust, buildings deteriorate, inventories become obsolete, so on and so forth. If assets are sold under distress conditions, they may fetch a price that is significantly less than their economic value.

(iii) Employees, customers, suppliers, distributors, investors, and other stakeholders dilute their commitment to the firm and this has an adverse impact on sales, operating costs, and financing costs.

A major contributor to financial distress is debt. The greater the level of debt and the larger the debt servicing burden associated with it, the higher the probability of financial distress.

The trade-off theory of capital structure is the idea that a company chooses how much debt finance and how much equity finance to use by balancing the costs and benefits. The trade-off theory of capital structure postulates that managers attempt to balance the benefits of interest tax shields against the present value of the possible costs of financial distress.

According to the trade-off theory, every firm has an optimal debt-equity ratio that maximises its value. The optimal debt-equity ratio of a profitable firm that has stable, tangible assets would be higher than the optimal debt-equity ratio of an unprofitable firm with risky, intangible assets. A profitable firm can avail of tax shield associated with debt fully. Further, when assets are stable and tangible, financial distress costs and agency costs tend to be lower.

How well does the trade-off theory explain corporate financing behaviour? It explains reasonably well some industry differences in capital structures. For example, power companies and refineries use more debt as their assets are tangible and safe. Software companies, on the other hand, borrow less because their assets are mostly intangible and somewhat risky. The trade-off theory, however, cannot explain why some profitable companies depend so little on debt. Some companies having highly profitable, use very little debt. They pay large amounts by way of income tax which they can possibly save to some extent by using debt without causing any concern about their solvency.

6. Pecking Order Theory

The pecking order theory has emerged as alternative theory to the trade-off theory. Rather than introducing corporate taxes and financial distress into the M-M framework. The pecking order theory states that internal financing is preferred over external financing, and if external finance is required, firms should issue debt first and equity as a last resort. Moreover, the pecking order seems to explain why profitable firms have low debt ratios: This happens not because they have low target debt ratios, but because they do not need to obtain external financing. Thus, unlike the trade-off theory the pecking order theory is capable of explaining differences in capital structures within industries.

This leads to the following **pecking order** in the financing decision:

1. Retained Earnings
2. Non-convertible Debt
3. Preference Shares
4. Hybrid Securities like Convertible Debentures
5. Equity

The significant implications of the pecking-order theory are as follows:

(a) No Target-Capital Structure: The pecking-order choice ignores the concept of target or optimal debt-equity mix. In fact, a firm's capital structure is dictated essentially with reference to the availability of current retained earnings, vis-à-vis its current investment requirement. In case of a deficiency, debt is to be raised, disregarding the requirement of target/optimal capital structure.

(b) Relatively Less Use of Debt by Profitable Firms: Profitable firms having large internal cash accruals at their disposal to meet their investment requirements, tend to use less amount of debt as external financing requirement not because they have low target debt-ratios, but because of preference for internally-generated funds. This against the tenets of finance theory.

(c) Need to Build-up Cash Reserves: Corporates would need to have reserves in the form of cash and marketable securities so that they are readily available to finance investment projects.

(d) Tax-shield on Interest is Secondary: In the pecking-order theory, the tax-shield on interest is regarded as the secondary consideration and relegated to the second place in designing capital structure.

Illustration 1

The expected annual net operating income of a company (EBIT) is ₹50,000. The company has ₹2,00,000, 10% debentures. The equity capitalisation rate (k_e) of the company is 12.5%. Find the value of the firm and overall cost of capital under Net Income approach.

Solution:

Calculation of value of firm and overall cost of capital under Net Income Approach

Value of firm = MV of Equity + MV of Debt	
EBIT	₹50,000
Less: Interest (₹2,00,000 × 10%)	₹20,000
Equity Earnings to equity shareholders (NI)	₹30,000
Equity Capitalisation Rate (k_e)	12.5%

Therefore,

Market Value of Equity (S) = $\frac{NI}{k_e}$ = ₹30,000 / 12.5% = ₹ 2,40,000

Market Value of Debt (given) (D) = ₹ 2,00,000

Value of Firm (V) = (S + D) = ₹ 4,40,000

Overall cost of capital (K_O) = $\frac{EBIT}{V}\% = 11.36\%$

Alternatively,

k_O = 0.10 (₹2,00,000 / ₹4,40,000) + 0.125 (₹2,40,000 / ₹4,40,000)

k_e = 11.36%

Illustration 2

Assuming no taxes and given the Earnings Before Interest and Taxes (EBIT), interest (I) at 10% and equity capitalisation rate (k_e) below, calculate the total market value of each firm under Net Income approach:

Firms	EBIT	I	k_e
	(₹)	(₹)	
X	2,00,000	20,000	12.0%
Y	3,00,000	60,000	16.0%
Z	5,00,000	2,00,000	15.0%
W	6,00,000	2,40,000	18.0%

Also determine the Weight Average Cost of Capital (WACC) for each firm.

Solution :

Calculation of valuation of each firm under Net Income Approach

Value of firm = Value of equity + Value of debt				
FIRM	**X (₹)**	**Y (₹)**	**Z (₹)**	**W (₹)**
EBIT	2,00,000	3,00,000	5,00,000	6,00,000
Less: Interest	20,000	60,000	2,00,000	2,40,000
Equity Earnings	1,80,000	2,40,000	3,00,000	3,60,000
Cost of Equity (k_e)	12%	16%	15%	18%
Capitalized Value of Equity	15,00,000	15,00,000	20,00,000	20,00,000
Add: MV of Debt	2,00,000	6,00,000	20,00,000	24,00,000
Value of Firm	17,00,000	21,00,000	40,00,000	44,00,000
WACC(k_o)	11.76%	14.19%	12.50%	13.64%

Note 1: Value of debt = Interest / k_d

Note 2: k_o = EBIT / Value of firm

Illustration 3

The existing capital structure of XYZ Ltd. is as under: (₹)

Equity Shares of ₹100 each	40,00,000
Retained Earnings (₹)	10,00,000
9% Preference Shares (₹)	25,00,000
7% Debentures (₹)	25,00,000

The existing rate of return on the company's capital is 12% and the income-tax rate is 50%.

The company requires a sum ₹ 25,00,000 to finance an expansion programme for which it is considering the following alternatives:

(i) Issue of 20,000 equity shares at a premium of ₹ 25 per share.

(ii) Issue of 10% preference shares.

(iii) Issue of 8% debentures.

It is estimated that the P/E ratios in the cases of equity preference and debenture financing would be 20,17 and 16 respectively.

Which of the above alternatives would you consider to be the best?

Solution:

Evaluation of various financial alternatives

	Plan I (Equity) (₹)	Plan II (Preference Shares) (₹)	Plan III (Debentures) (₹)
1. EBIT	15,00,000	15,00,000	15,00,000
2. Interest:			
Existing	1,75,000	1,75,000	1,75,000
Additional	-	-	2,00,000
Total Interest	1,75,000	1,75,000	3,75,000
3. PBT (1-2)	13,25,000	13,25,000	11,25,000
4. TAX (50%)	6,62,500	6,62,500	5,62,500
5. PAT (3-4)	6,62,500	6,62,500	5,62,500
6. Preference dividend			
Existing	2,25,000	2,25,000	2,25,000
Additional	-	2,50,000	-
Total Preference Dividend	2,25,000	4,75,000	2,25,000
7. Equity Earnings (5-6)	4,37,500	1,87,500	3,37,500
8. No. of Equity Shares	*60,000	40,000	40,000
9. EPS (7/8)	7.29	4.69	8.44
10. P/E Ratio (Given)	20	17	16
11. Market Price per Share	145.80	79.73	135.04

*** Note 1:** No. of shares under Plan I

Existing shares	40,000
Additional shares	20,000
Total shares	60,000

Illustration 4

XL Limited provides you with following figures:

Particulars	Amount (₹)
Profit	2,60,000
Less: Interest on Debentures@12%	60,000
	2,00,000

Particulars	Amount (₹)
Income tax @50%	1,00,000
Profit After Tax (PAT)	**1,00,000**
Number of Equity shares (of ₹ 10 each)	40,000
EPS (Earning per Share)	2.50
Ruling Price in Market	25
P/E Ratio (i.e. Price/EPS)	10

The company has undistributed reserves of ₹6,00,000. The company needs ₹2,00,000 for expansion. This amount will earn at the same rate as funds already employed. You are informed that a debt equity ratio more than 35% will push the P/E ratio down to 8 and raise the interest rate on additional amount borrowed to 14%. You are required to ascertain the probable price of the share.

(i) If the additional funds are raised as debt; and

(ii) If the amount is raised by issuing equity shares.

Solution:

Computation of existing capital and return on capital employed:

	(₹)	(₹)
Equity Share Capital	(40,000 × 10)	4,00,000
12% Debentures	(60,000 / 12%)	5,00,000
Undistributed Reserves		6,00,000
Existing Capital		15,00,000
Return on Capital Employed	(2,60,000/15,00,000) × 100	=17.33%

Calculation of Debt Equity Ratio

	Plan I (Debt Plan)	Plan II (Equity Plan)
Existing equity (Capital +Reserve) (₹)	10,00,000	10,00,000
Additional equity (₹)	-	2,00,000
Total equity(A) (₹)	10,00,000	12,00,000
Existing debt (₹)	5,00,000	5,00,000
Additional debt (₹)	2,00,000	-
Total debt(B) (₹)	7,00,000	5,00,000
Debt Equity Ratio = (Debt /Debt + Equity)	(7,00,000/15,00,000) × 100	(5,00,000/ 5,00,000 + 12,00,000)
	= 41.18%	= 29.41%
Applicable P/E Ratio	8	10

Computation of Probable Market price of Share after Expansion

	Plan-I (Debt)	Plan-II (Equity)
1. EBIT (17,00,000 × 17.33%) (₹)	2,94,610	2,94,610
2. Interest (Existing + Additional) (₹)	88,000	60,000
3. PBT (1 - 2) (₹)	2,06,610	2,34,610
4. Tax@ 50% (₹)	1,03,305	1,17,305
5. PAT (3 - 4) (₹)	1,03,305	1,17,305
6. Preference Dividend	-	-
7. Equity Earnings (5 - 6)	1,03,305	1,17,305
8. No. of Equity Shares (Existing + Additional)	40,000	*48,000
9. EPS (= 7 ÷ 8)	2.58	2.44
10. P/E Ratio	8	10
11. Market Price [= EPS × P/E Ratio]	20.64	24.40

The Market price is higher for Plan II. So, the company has to adopt Plan II i.e. raising additional funds by issuing equity shares is preferable.

***Note:** Additional equity issued at prevailing market price i.e. ₹ 25.

Illustration 5

From the following data find out the value of each firm and value of each equity share as per the Modigliani-Miller approach:

	X (₹)	Y (₹)	Z (₹)
EBIT (₹)	13,00,000	13,00,000	13,00,000
No. of shares	3,00,000	2,50,000	2,00,000
12% debentures (₹)		9,00,000	10,00,000

Every firm expect 12% return on investment.

Solution:

Calculation of value of each firm under Modigliani–Miller Approach:

Value of firm = EBIT / k_o			
Firm	**X (₹)**	**Y (₹)**	**Z (₹)**
1. EBIT (₹)	13,00,000	13,00,000	13,00,000
2. ROI = k_o	12%	12%	12%
3. Value of Firm; (1/2) (₹)	1,08,33,333	1,08,33,333	1,08,33,333

Calculation of value of each equity share for each firm

Firm	X (₹)	Y (₹)	Z (₹)
1. Value of Firm (₹)	1,08,33,333	1,08,33,333	1,08,33,333
2. Debt (₹)	-	9,00,000	10,00,000
3. Value of equity(1-2) (₹)	1,08,33,333	99,33,333	98,33,333
4. No. of equity shares	3,00,000	2,50,000	2,00,000
5. Market price; (3/4) (₹)	36.11	39.73	49.17

Illustration 6

Z Co. has a capital structure of 30% debt and 70% equity. The company is considering various investment proposals costing less than ₹ 30 lakh. The company does not want to disturb its present capital structure.

The cost of raising the debt and equity are as follows:

Project Cost	Cost of Debt	Cost of Equity
Above ₹ 5 lakh	9%	13%
Above ₹ 5 lakh and up to ₹ 20 lakh	10%	14%
Above ₹ 20 lakh and up to ₹ 40 lakh	11%	15%
Above ₹ 40 Lakh and up to ₹ 1 crore	12%	15.55%

Assuming the tax rate is 50%, compute the cost of two projects A and B, whose fund requirements are ₹ 8 lakh and ₹ 22 lakh respectively. If the projects are expected to yield after tax return of 11%, determine under what conditions if would be acceptable.

Solution:

Capital Structure: (given) = 30% Debt and 70% Equity

Calculation of overall cost of capital at different investment outlays

Project Cost	$k_{d(1-t)}$	k_e	$k_o = W_d k_d + k_e W_e$
Up to ₹5 lakh	9% (1- 0.5) = 4.5%	13%	(0.3 × 4.5) + (0.7 × 13) = 10.450%
₹5 lakh to 20 lakh	10% (1- 0.5) = 5%	14%	(0.3 × 5) + (0.7 × 14) = 11.300%
₹20 lakh to 40 lakh	11% (1- 0.5) = 5.5%	15%	(0.3 × 5.5) + (0.7 × 15) = 12.150%
₹40 lakh to 1 crore	12% (1- 0.5) = 6%	15.55%	(0.3 × 6) + (0.7 × 15.55) =12.685%

Evaluation of given projects:

Project	Investment	k_o	Project Return	Result
A	8 lakh	11.3%	11%	Return< k_o
B	22 lakh	12.15%	11%	Return< k_o

Comment: Both the projects, A and B, are not acceptable as the cost of capital is more than the expected yield of the project. In order to accept the project, the Expected return should always greater than the cost of capital.

Illustration 7

Company X and Company Y are in the same risk class, and are identical in every fashion except that Company X uses debt while Company Y does not. The levered firm has 9,00,000 debentures, carrying 10% rate of interest. Both the firms earn 20% before interest and taxes on their total assets of ₹15 lakh.

Assume perfect capital markets, rational investors and so on; a tax rate of 50% and capitalisation rate of 15% for an all equity company.

(i) Compute the value of firms X and Y using the Net Income (NI) approach.

(ii) Compute the value of each firm using the Net Operating Income (NOI) approach.

(iii) Using the NOI approach, calculate the overall cost of capital (k_o) for firms X and Y.

(iv) Which of these two firms has an optimal capital structure according to the NOI approach? Why?

Solution:

(i) Computation of Value of Firms X and Y using NI Approach:

NI approach assumes no taxes. Since, the tax rate is given in the problem, we have to work out of NI approach.

Value of Firm = MV of Equity + MV of Debt		
	X (₹)	Y (₹)
EBIT	3,00,000	3,00,000
Less: Interest	90,000	-
PBT	2,10,000	3,00,000
Less: Tax @ 50%	1,05,000	1,50,000
PAT (Earnings for equity holders	1,05,000	1,50,000
K_e	15%	15%
Capitalized value of equity	7,00,000	10,00,000
Market Value of Debt	9,00,000	-
Market Value of Firm	16,00,000	10,00,000

(ii) Computation of value of firms X and Y using NOI approach:

Net Operating Income approach assumes no taxes. Since the tax rate is given in the problem, we have to work out using MM approach, which is an extension of NOI approach.

$$\text{Value of unlevered firm (Y)} = \frac{EBIT \times (1-t)}{k_e}$$

$$= ₹\ 3,00,000\ (1 - 0.05) / 0.15$$

$$= ₹\ 10,00,000$$

Value of Levered Firm (X) = Value of Unlevered Firm + Debt (Tax rate)

= Value of Y Ltd. + Debt (Tax rate)

= ₹10,00,000 + (₹9,00,000 × 50%)

= ₹ 14,50,000

(iii) Computation of Overall Cost of Capital (k_o) using NOI approach:

For Y Ltd –

$k_o = k_e = 15\%$ (as there is no debt)

For Firm X –

Value of firm (₹)	14,50,000
Less: Value of debt (₹)	9,00,000
Market value of equity (₹)	5,50,000

$$k_e = \frac{\text{Equity Earnings}}{\text{Market Value of Equity}} \times 100$$

$$= \frac{₹\,1,05,000}{₹\,5,50,000} \times 100 = 19\%$$

$k_d = 0.10 \times (1.0 - 0.50) = 5\%$

$$k_o = 19 \times \frac{₹\ 5,50,000}{₹\ 14,50,000} + 5 \times \frac{₹\ 9,00,000}{₹\ 14,50,000} = 10.31\%$$

(iv) Out of two firms, Firm Y seems to have optimum capital structure as it has lower cost of capital higher value of firm.

Illustration 8

A Company's current operating income is ₹4 lakh. The firm has ₹10 lakh of 10% debt outstanding. Its cost of equity capital is estimated to be 15%.

(i) Determine the current value of the firm using traditional valuation approach.

(ii) Calculate the firm's overall capitalisation ratio as well as both types of leverage ratios (a) B/S (b) B/V.

Solution:

(i) Calculation of value of firm under Traditional Approach:

Value of firm = Value of Debt + Value of equity	
Particulars	**Amount (₹)**
1. EBIT	4,00,000
2. Interest (₹10,00,000 × 10%)	1,00,000
3. Equity Earnings (1-2)	3,00,000
4. Equity Capitalisation rate (%)	15%

Value of firm = Value of Debt + Value of equity	
Particulars	**Amount (₹)**
5. Value of Equity	20,00,000
6. Value of Debt	10,00,000
7. Value of Firm (5+6)	30,00,000

(ii) Calculation overall capitalization rate and leverage ratios

$$\text{Overall Capital Rate } (k_o) = \frac{\text{EBIT}}{\text{Value of firm}} \times 100$$

$$= \frac{₹\ 4,00,000}{₹\ 30,00,000} \times 100$$

$$= 13.33\%$$

Leverage Ratios

(a) B/S Ratio =Borrowing/ Shareholders funds $= \frac{₹\ 10,00,000}{₹\ 20,00,000} = 0.5$

(b) B/V Ratio =Borrowing/Value of firm $= \frac{₹\ 10,00,000}{₹\ 30,00,000} = 0.33$

Leverage Analyses and EBIT – EPS Analysis

7.2

7.2.1 Meaning and Concept of Leverage

When a lever is used properly, a force applied at one point is transformed, or magnified, into another, larger force or motion at some other point. This comes most readily to mind when considering mechanical leverage, such as that which occurs when using a crowbar. In a business context, however, leverage refers to the use of fixed costs in an attempt to increase (or lever up) profitability. In this chapter we explore the principles of both operating leverage and financial leverage. The former is due to fixed operating costs associated with the production of goods or services, whereas the latter is due to the existence of fixed financing costs – in particular, interest on debt. Both types of leverage affect the level and variability of the firm's after-tax earnings, and hence the firm's overall risk and return.

Leverage is used to describe the firm's ability to use fixed cost assets or funds to magnify the return to its owner James van Home has defined leverage, as "the employment of an asset or funds for which the firm pays a fixed cost or fixed return." In other words, Leverage is the employment of fixed assets or funds for which a firm has to meet fixed costs or fixed rate of interest obligation irrespective of the level of activities or the level of operating profit.

7.2.2 Importance of Leverage

With the understanding of leverage, a finance manager can increase earnings per share and dividend per share to equity shareholders as well as market value of the firm. When the rate of return on investment is more than the cost of debt capital, it gives more rate of return on equity capital. This in turn maximises shareholders' wealth, which is the basic objective of financial management. The leverage can help increase both the EPS and EBT.

The importances of leverage are discussed below:

(a) Leverage is an important technique in deciding the optimum capital structure of a firm. With the help of this technique, it is easy to determine the ratio of various securities comprising the capital structure of a firm at which the average cost of capital is minimum. If financial leverage is present in a firm, it is possible to increase EPS by increasing the EBIT in a firm.

(b) Leverage is also very helpful in taking a capital budgeting decision. If contribution in a firm is not able to meet the fixed operating costs, then business will suffer loss. In other words, the degree of operating leverage must be greater than 1 to make the project operationally profitable.

(c) Leverage is most important in assessing the risk involved in a firm. Operating leverage measures the business risk of a firm. Financial leverage measures the financial risk in a firm. The combined leverage measures the total risk involved in a firm.

In leverage analysis, it is assumed that cost of capital always remains constant. But, after a certain limit, the cost of financing generally starts increasing. The use of more debt capital increases the risk level in a firm which results

in reduction in the value of shares. Thus, in leverage analysis, explicit cost of debt capital is considered, while its implicit costs are ignored. Leverage principle assumes that the required additional debt capital should be raised till the expected rate of return on investment is higher than cost of debt capital.

7.2.3 Types of Leverages

There are three commonly used measures of leverages in financial analysis. These are:

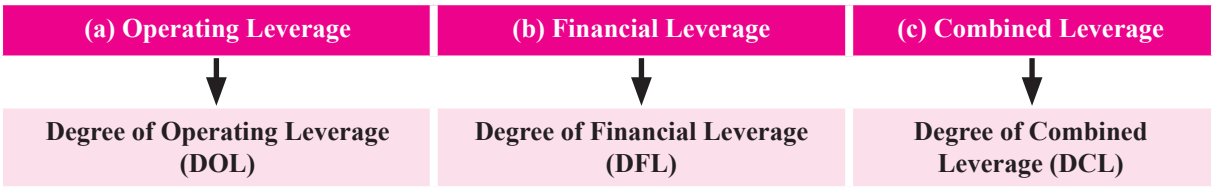

Figure 7.8: Types of Leverage

(a) Operating Leverage

Operating leverage is actually the use of fixed operating costs by the firm. Operating leverage is defined as "the firm's ability to use fixed operating costs to magnify effects of changes in sales on its Earnings Before Interest and Taxes". In other words, operating leverage is the tendency of the operating profit to vary disproportionately with sales. It is said to exist when a firm has to pay fixed cost regardless of volume of output or sales.

The operating leverage shows the relationship between the changes in sales and the changes in fixed operating income. Thus, the operating leverage has an impact mainly on fixed costs and also on variable costs and contribution. Of course, there will be no operating leverage if there are no fixed operating costs.

Operating leverage is present any time a firm has fixed operating costs – regardless of volume. In the long run, of course, all costs are variable. Consequently, our analysis necessarily involves the short run. We incur fixed operating costs in the hope that sales volume will produce revenues more than sufficient to cover all fixed and variable operating costs. One of the more dramatic examples of an effect of operating leverage is the airline industry, where a large proportion of total operating costs is fixed. Beyond a certain break-even load factor, each additional passenger essentially represents straight operating profit (Earnings Before Interest and Taxes, or EBIT) to the airline.

Degree of Operating Leverage (DOL)

Earlier, we said that one potential effect of operating leverage is that a change in the volume of sales results in a more than proportional change in operating profit (or loss). A quantitative measure of this sensitivity of a firm's operating profit to a change in the firm's sales is called the degree of operating leverage (DOL). The **degree of operating leverage DOL** of a firm at a particular level of output (or sales) is simply the percentage change in operating profit over the percentage change in output (or sales) that causes the change in profits. In other words, **Degree of Operating Leverage DOL** measures the sensitivity of a company's operating income with changes in sales; a higher DOL implies a higher proportion of fixed cost in the business operations, whereas lower DOL implies lower fixed cost investment in running the business.

The formula of Degree of Operating Leverage (DOL) is represented as,

Degree of Operating Leverage (DOL) = (Sales – Variable cost) / (Sales – Fixed Cost – Variable Cost)

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

OR,

$$\frac{\text{EBIT + Fixed Cost}}{\text{EBIT}} \text{ or, } 1 + \frac{\text{Fixed Cost}}{\text{EBIT}}$$

OR,

$$\text{Degree of Operating Leverage (DOL)} = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in Sales}}$$

Note: Operating leverage affects a firm's operating profit (EBIT).

Relationship between Operating Leverage and CVP Analysis

There is a relation between Operating Leverage and CPV.

We know that,

Margin of Safety (MOS) = Actual Sales (S) – Break-Even Sales (BES)

Again, Margin of Safety Ratio (MOSR) $= \frac{(S - BES)}{S}$

$= 1 - BES / S$

$= 1 - (F / PV\ Ratio) / S$

[F = Fixed Cost, PV Ratio= Profit-Volume Ratio, BES = Fixed Cost / Profit-Volume Ratio]

$= 1 - (F / C / S) / S$

[C = Contribution, PV Ratio = Contribution / Sales]

$= 1 - (F / C)$

$= (C - F) / C$

$= EBIT / C$

$= 1 / (C / EBIT)$

$= 1 / DOL$ [since DOL = C / EBIT, DOL = Degree of Operating Leverage]

So, it is evident that there exists an inverse relationship between DOL and margin of safety. It implies that with an increase in DOL margin of safety decreases and vice versa

Illustration 9

Calculate the operating leverage for each of the four firms, A, B, C and D from the following price and cost data. What conclusions can you draw with respect to levels of fixed cost and the **degree of operating leverage DOL** result? Explain. Assume number of units sold is 5,000.

	Firms			
	A	B	C	D
Sale Price per Unit (₹)	20	32	50	70
Variable Cost per Unit (₹)	6	16	20	50
Fixed Operating Cost (₹)	80,000	40,000	2,00,000	Nil

Solution:

	Firms			
	A (₹)	B (₹)	C (₹)	D (₹)
Sales (Units)	5,000	5,000	5,000	5,000
Sales revenue (Units × Price)	1,00,000	1,60,000	2,50,000	3,50,000
Less: Variable cost (Units × VC per unit)	30,000	80,000	1,00,000	2,50,000
Less: Fixed Operating Costs	80,000	40,000	2,00,000	Nil
EBIT	(10,000)	40,000	(50,000)	1,00,000

$$DOL = \frac{\text{Current Sales (S) - Variable Costs (VC)}}{\text{Current EBIT}}$$

$$DOL_{(A)} = \frac{₹\ 1,00,000 - ₹\ 30,000}{₹\ 10,000}$$

$$= 7$$

$$DOL_{(B)} = \frac{₹\ 1,60,000 - ₹\ 80,000}{₹\ 40,000}$$

$$= 2$$

$$DOL_{(C)} = \frac{₹\ 2,50,000 - ₹\ 1,00,000}{₹\ 50,000}$$

$$= 3$$

$$DOL_{(D)} = \frac{₹\ 3,50,000 - ₹\ 2,50,000}{₹\ 1,00,000}$$

$$= 1$$

The operating leverage exists only when there are fixed costs. In the case of firm D, there is no magnified effect on the EBIT due to change in sales, 20% increase in sales has resulted in a 20% increase in EBIT. In the case of other firms, operating leverage exists. It is maximum in firm A, followed by firm C and minimum in firm B. The interpretation of DOL of 7 is that 1% change in sales results in 7% change in EBIT level in the direction of the change of sales level of firm A.

(b) Financial Leverage

Financial leverage is actually the use of fixed financing costs by the firm. The financial leverage is defined as the ability of a firm to use fixed financial charges to magnify the effects of changes in operating profits, on the firm's earning per share. In other words, the financial leverage is the tendency of a residual net income to vary disproportionately with operating profit. It indicates the change that takes place in the taxable income as a result of change in the operating income.

The British expression is gearing. Financial leverage involves the use of fixed cost financing. Interestingly, financial leverage is acquired by choice, but operating leverage sometimes is not. The amount of operating leverage (the amount of fixed operating costs) employed by a firm is sometimes dictated by the physical requirements of

the firm's operations. For example, a steel mill by way of its heavy investment in plant and equipment will have a large fixed operating cost component consisting of depreciation. Financial leverage, on the other hand, is always a choice item. No firm is required to have any long-term debt or preferred stock financing. Firms can, instead, finance operations and capital expenditures from internal sources and the issuance of common stock. Nevertheless, it is a rare firm that has no financial leverage.

The most commonly used measures of financial leverages are:

(i) Debt Ratio $= \frac{\text{Debt}}{\text{Total Capital (V)}} = \frac{\text{Debt (D)}}{\text{Debt (D) + Shareholders Equity (E)}}$

(ii) Debt-Equity Ratio: $= \frac{\text{Debt (D)}}{\text{Shareholders Equity (E)}}$

(iii) Interest Coverage Ratio $= \frac{\text{EBIT}}{\text{Interest}}$

Degree of Financial Leverage (DFL)

A quantitative measure of the sensitivity of a firm's earnings per share to a change in the firm's operating profit is called the degree of financial leverage (DFL). The **degree of financial leverage DFL** at a particular level of operating profit is simply the percentage change in earnings per share over the percentage change in operating profit that causes the change in earnings per share.

The formula of Degree of Financial Leverage (DFL) is represented as,

$$\text{Degree of Financial Leverage (DFL)} = \frac{\text{EBIT}}{\text{EBT}}$$

OR,

$$\text{Degree of Financial Leverage (DFL)} = \frac{\text{Percentage change in Earnings per Share}}{\text{Percentage change in Operating Profit (EBIT)}}$$

Note: (i) Financial Leverage is the change in the level of EPS due to change in EBIT.

(ii) Financial leverage occurs die to presence of fixed financial cost (Interest) in the business.

Illustration 10

A company uses the DFL formula as DFL = $\frac{\text{EBIT}}{\text{EBT}}$ and finds DFL when EBIT = ₹ 2,06,000 and EBT = ₹ 1,72,000.

Solution:

Here, DFL = (EBIT) / (EBT) = ₹206,000 / ₹172,000 = 1.2

The company's degree of financial leverage is 1.2, indicating a lower level of fluctuation in its earnings, which means it could likely take on substantial additional debt.

(c) Combined Leverage or Total Leverage

Combined leverage is a leverage which refers to high profits due to fixed costs. It includes fixed operating expenses with fixed financial expenses. It indicates leverage benefits and risks which are in fixed quantity. The degrees of operating and financial leverages are combined to see the effect of total leverage on EPS associated with a given change in sales.

Computationally, we can make use of the fact that the degree of total leverage is simply the product of the degree of operating leverage and the degree of financial leverage as follows:

Degree of Combined Leverage (DCL) = (Contribution /EBIT) × (EBIT/EBT)

= Contribution/EBT

OR,

$$\text{Degree of Combined Leverage (DCL)} = \frac{\%\text{ Change in EBIT}}{\%\text{ Change in Sales}} \times \frac{\%\text{ Change in EPS}}{\%\text{ Change in EBIT}} = \frac{\%\text{ Change in EPS}}{\%\text{ Change in Sales}}$$

For eample, if operating leverage of a firm= 1.4 whereas financial leverage = 2, then the degree of combined leverage equals 1.4 × 2 = 2.8.

Illustration 11

The ABC Ltd. has the following balance sheet and income statement information:

Balance sheet as on March 31, 2024			
Liabilities	**Amount (₹)**	**Assets**	**Amount (₹)**
Equity capital (₹ 10 per share)	8,00,000		
10% Debt	6,00,000	Net fixed assets	10,00,000
Retained earnings	3,50,000	Current assets	9,00,000
Current liabilities	1,50,000		
Total	**19,00,000**	**Total**	**19,00,000**

Income statement for the year ending March 2024	
Particulars	**Amount (₹)**
Sales	3,40,000
Operating Expenses (including ₹ 60,000 depreciation)	1,20,000
EBIT	2,20,000
Less: Interest	60,000
Earnings Before Tax (EBT)	1,60,000
Less: Taxes	56,000
Net Earnings after Tax (EAT)	1,04,000

(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% and (ii) decrease by 20%, what will be the earnings per share in the new situation?

Solution:

(a) DOL $= \dfrac{₹\ 3,40,000 - ₹\ 60,000}{₹\ 2,20,000} = 1.27$

$$DFL = \frac{₹\ 2,20,000}{₹\ 1,60,000} = 1.37$$

DCL = DOL × DFL = 1.27 × 1.37 = 1.75

(b) Earnings per share at the new sales level

Particulars	Amount (₹)	Amount (₹)
Sales level (Volume)	4,08,000	2,72,000
Less: Variable expenses	72,000	48,000
Less: Fixed cost	60,000	60,000
Earnings Before Interest and Taxes	2,76,000	1,64,000
Less: Interest	60,000	60,000
Earnings before taxes	2,16,000	1,04,000
Less: Taxes	75,600	36,400
Earnings after taxes (EAT)	1,40,400	67,600
Number of equity shares (N)	80,000	80,000
EPS	1.75	0.84

Working Notes

(i) Variable costs = ₹ 60,000 (total cost – depreciation).

(ii) Variable costs = (a) at sales level, ₹ 4,08,000 = ₹ 72,000, (b) at the sales level, ₹ 2,72,000 = ₹ 48,000

Illustration 12

A firm's sales, variable costs and fixed cost amount to ₹ 75 lakh, ₹ 42 lakh and ₹ 6 lakh respectively. It has borrowed ₹ 45 lakh at 9% and its equity capital totals ₹ 55 lakh.

(a) What is the firm's ROI?

(b) Does it have favorable financial leverage?

(c) If the firm belongs to an industry whose asset turnover is 3, does it have high or low asset leverage?

(d) What are the operating, financial and combined leverages of the firm?

(e) If the sales drop to ₹ 50 lakh what will the new EBIT be?

(f) At what level will the EBT of the firm equal to zero?

Solution:

(a) ROI = EBIT/Investment

EBIT = Sales – VC – FC

= ₹ 75 lakh – ₹ 42 lakh – ₹ 6 lakh

= ₹ 27 lakh

ROI = ₹ 27 lakh/₹ 100 lakh

= 27 %

(b) Yes, the firm has favourable financial leverage as its ROI is higher than the interest on debt.

(c) Asset turnover = Sales/Total Assets or Total Investments = ₹ 75 lakh/₹ 100 lakh = 0.75. It is lower than the industry average.

(d) Operating Leverage $= \frac{\text{Sales - Variable costs}}{\text{EBIT}} = \frac{₹\ 75\ \text{lakh} - ₹\ 42\ \text{lakh}}{₹\ 27\ \text{lakh}} = 1.22$

Financial Leverage $= \frac{\text{EBIT}}{\text{EBIT - Interest}} = \frac{₹\ 27\ \text{lakh}}{₹\ 27\ \text{lakh} - ₹\ 4.05\ \text{lakh}} = 1.18$

Combined Leverage $= \frac{\text{Sales - VC}}{\text{EBIT - Interest}} = \frac{₹\ 33\ \text{lakh}}{₹\ 22,95,000} = 1.44$

Alternatively, $= \text{OL} \times \text{FL} \quad = 1.22 \times 1.18 = 1.44$

(e) EBIT at sales level of ₹ 50 lakh

Particulars	Amount (₹)
Sales revenue	50 Lakh
Less: Variable costs (₹ 50 lakh × 0.56)	28 Lakh
Less: Fixed costs	6 Lakh
EBIT	16 Lakh

(f) Zero EBT implies Break-Even Sales (BESR) = FC/CV ratio, CV ratio = ₹ 33 lakh/₹ 75 lakh = 44%.

BESR = (₹ 6 lakh + ₹ 4.05 lakh)/0.44 = ₹ 22,84,091.

Confirmation Table

Particulars	Amount (₹)
Sales revenue	22,84,091
Less: VC (0.56)	12,79,091
Less: FC (operating)	6,00,000
Less: Interest (additional fixed cost)	4,05,000
EBT	ZERO

7.2.4 Indifference Point

The indifference point refers to that level of EBIT at which EPS are the same regardless of leverage in alternative financial plans. At this level, all financial plans are equally desirable and the management is indifferent between alternative financial plans as far as the EPS is concerned.

In other words, it is that level of EBIT at which it is immaterial for the financial manager as to which capital structure or capital mix he adopts for the company. At this point, the use of debt capital or a change in this proportion in the total capital will not affect the return to equity shareholders or earning per share.

The determination of indifference points helps in ascertaining the level of operating profit (EBIT) beyond which the debt alternative is beneficial because of its favourable effect on earnings per share.

Futhermore, it is profitable to raise debt for strengthening EPS, if there is likelihood that future operating profits are going to be higher than the level of EBIT as determined. On the other hand, it is advisable to issue equity shares for raising more funds if it is expected that EBIT is going to be lower than that determined.

Illustration 13

Excel Limited is considering three financing plans. The key information are as follows:

(a) Total funds to be raised, ₹ 2,00,000.

(b) Financing plans

Plans	Equity (%)	Debt (%)	Preference (%)
A	100	-	-
B	50	50	-
C	50	-	50

(c) Cost of debt 8%; cost of preference shares 8%.

(d) Tax rate, 35%.

(e) Equity shares of the face value of ₹ 10 each will be issued at a premium of ₹ 10 per share.

(f) Expected EBIT, ₹ 80,000.

Determine for each plan:

(i) Earnings per share (EPS) and financial break-even point.

(ii) Indicate if any of the plans dominate, and compute the EBIT range among the plans for indifference.

Solution:

(i) Determination of EPS under plans A, B and C

Particulars	Amount (₹)	Amount (₹)	Amount (₹)
EBIT	80,000	80,000	80,000
Less: Interest	--	8,000	-
EBT	80,000	72,000	80,000
Less: Taxes (0.35)	28,000	25,200	28,000
EAT	52,000	46,800	52,000
Less: Dividend on preference shares	-	-	8,000
Earnings for equity-holders ÷ number of shares	52,000	46,800	44,000
	10,000	5,000	5,000
EPS	5.20	9.36	8.80

Financial BEP for plans, A, B and C	
Plan A	Zero

Financial BEP for plans, A, B and C	
Plan B	₹ 80,00 (₹ 1,00,000 × 0.08)
Plan C = $\frac{DP}{(1-t)} = \frac{₹\ 8,000}{0.65}$	₹ 12,308

(ii) Indifference point among financial plans –

(a) A and B:

$$\frac{X(1-t)}{N1} = \frac{(X-1)(1-t)}{N2}$$

$$\frac{0.65X}{₹\,10,000} = \frac{(X - ₹\,8,000)0.65}{₹\,5,000}$$

X = ₹ 10,400/0.65

= ₹ 16,000

(b) B and C:

$$\frac{(X-t)(1-t)}{N1} = \frac{X(1-t)-D_P}{N2}$$

or, 0.65X – ₹ 5,200 = 0.65X – ₹ 8,000

or, 0.65X – 0.65X = ₹ 5,200 – ₹ 8,000

Thus, indifference point between plans B and C is indeterminate.

(c) A and C:

$$\frac{X(1-t)}{N1} = \frac{X(1-t)-D_P}{N2}$$

$$\frac{0.65}{₹\,10,000} = \frac{0.65X - ₹\,8,000}{₹\,5,000}$$

or, 0.65X = 13X – ₹ 16,000

or, X = ₹ 16,000/0.65

i.e., ₹ 24,615

Domination of plan: Plan B dominates plan C as the financial BEP of plan B is lower.

7.2.5 EBIT-EPS Analysis

The EBIT-EPS analysis is carried out to assess the impact of different financial proposals on the value (EPS) of the company. Since the basic aim of financial management is to maximise the wealth of shareholders, the EBIT-EPS analysis is crucial in maximising the wealth of the company.

The financial proposal having the highest EPS is considered for the execution. The different financial proposals may be the use of, only equity, combination of equity and debt, combination of equity and preferential capital, or any combination of equity, debt and preferential capital. EBIT-EPS analysis shows the impact of financial leverage on the EPS of the company under different financial proposals.

Illustration 14

The selected financial data for A, B and C companies for the current year ended March 31, 2024 are as follows:

Particulars	A	B	C
Variable expenses as a percentage of sales	66.67	75	50
Interest expenses (₹)	200	300	1000
Degree of operating leverage (DOL)	5	6	2
Degree of financial leverage (DFL)	3	4	2
Income-tax rate	0.35	0.35	0.35

(a) Prepare income statements for A, B, and C companies.

(b) Comment on the financial position and structure of these companies.

Solution:

(a) Income statement of companies A, B and C for the current year, ended March 31, 2024

Particulars	A (₹)	B (₹)	C (₹)
Sales	4,500	9,600	24,000
Less: Variable costs	3,000	7,200	12,000
Less: Fixed costs (Sales – VC – EBIT)	1,200	2,000	10,000
EBIT	300	400	2,000
Less: Interest	200	300	1,000
Earnings before taxes (EBT)	100	100	1,000
Less: Taxes	35	35	350
EAT (Net income)	65	65	650

Working Notes

(a) The preparation of the income statement requires data for (i) sales revenue, (ii) variable costs and (iii) fixed costs.

$$DFL = 3, \qquad DFL = \frac{EBIT}{EBIT - I}$$

Company A:

$$3 = \frac{EBIT}{EBIT - ₹\,200}$$

$$\text{or, } EBIT = ₹\,300$$

$$DOL = \frac{\text{Sales} - \text{Variable Cost (V)}}{EBIT}$$

$$5 = \frac{S - 0.667\,S}{₹\,200}$$

Where,

S = Sales = ₹ 4,500

VC = 0.667 × ₹ 4,500

= ₹ 3,000

Company B:

$$4 = \frac{EBIT}{EBIT - ₹\ 300}$$

EBIT = ₹ 400

$$6 = \frac{S - 0.75\ S}{₹\ 400}$$

= ₹ 9,600

VC = 0.75 × ₹ 9,600 = ₹ 7,200

Company C:

$$2 = \frac{EBIT}{EBIT - ₹\ 1,000}$$

EBIT = ₹ 2,000

$$6 = \frac{S - 0.50\ S}{₹\ 2,000}$$

= ₹ 24,000

VC = 0.50 × ₹ 24,000

= ₹ 12,000

(b) The financial position of company C can be regarded better than other companies:

(i) It has the least financial risk as it has minimum degree of financial leverage. It is true that there will be a more magnified impact on EPS of A and B due to change in EBIT, but, their EBIT level due to low sales is very low.

(ii) From the point of view of DCL, company C is better placed. The degree of combined leverage is maximum in company B (24); for company A (15) and for company C it is 4. The total risk (business plus financial) of company C is the lowest.

(iii) The ability of the company C to meet interest liability is better.

The EBIT/interest ratios for the three companies are:

C, 2.0 (₹ 2,000 ÷ ₹ 1,000)

B, 1.5 (₹ 300 ÷ ₹ 200)

A, 1.33 (₹ 400 ÷ ₹ 300)

Illustration 15

Calculate (a) the operating leverage, (b) financial leverage and (c) combined leverage from the following data under situations I and II and financial plans, A and B.

(i) Installed capacity- 4,000 units

(ii) Actual production and sales- 75 % of the capacity.

(iii) Selling price- ₹ 300 per unit

(iv) Variable cost- ₹ 150 per unit

(v) Fixed cost:

Under situation I - ₹ 1,50,000

Under situation II - ₹ 2,00,000

Particulars	Plan A (₹)	Plan B (₹)
Equity	1,00,000	1,50,000
Debt (Interest 20%)	1,00,000	50,000
Total	2,00,000	2,00,000

Solution:

(a) Determination of operating leverage

Particulars	Situation I (₹)	Situation II (₹)
Sales	9,00,000	9,00,000
Less: Variable costs	4,50,000	4,50,000
Contribution	4,50,000	4,50,000
Less: Fixed Cost	1,50,000	2,00,000
EBIT	3,00,000	2,50,000
Operating Leverage (Contribution/EBIT)	1.5	1.8

(b) Determination of financial leverage

Particulars	Situation I (₹)		Situation II (₹)	
	Plan A	Plan B	Plan A	Plan B
EBIT	3,00,000	3,00,000	2,50,000	2,50,000
Less: Interest on debt	20,000	10,000	20,000	10,000
EBT	2,80,000	2,90,000	2,30,000	2,40,000
Financial Leverage (EBIT/EBT)	1.07	1.03	1.09	1.04

(c) Determination of combined leverage

Particulars	Plan A	Plan B
Situation -I	1.5 × 1.07 = 1.61	1.5 × 1.03 = 1.54
Situation -II	1.8 × 1.09 = 1.96	1.5 × 1.04 = 1.87

Illustration 16

Calculate operating leverage and financial leverage under situations A, B and C and financial plans 1, 2 and 3 respectively from the following information relating to the operation and capital structure of X, Y, Z Ltd. Also find out the combinations of operating and financial leverage which give the highest value and the least value.

Installed capacity (units)	1,200
Actual production and sales (units)	800
Selling price per unit (₹)	15
Variable cost per unit (₹)	10
Fixed costs (₹):	
Situation A	1,000
Situation B	2,000
Situation C	3,000

Particulars	Financial Plan		
	1 (₹)	2 (₹)	3 (₹)
Equity (₹)	5,000	7,500	2,500
Debt (₹)	5,000	2,500	7,500
Cost of debt (for all plans) (%)		12	

Solution:

Determination of operating leverage			
Particulars	Situations		
	A	B	C
Sales level (units)	800	800	800
Sales revenue	₹ 12,000	₹ 12,000	₹ 12,000
Less: Variable costs	8,000	8,000	8,000
Less: Fixed cost	1,000	2,000	3,000
Operating Profits (EBIT)	3,000	2,000	1,000
DOL =	1.33	2	4

Determination of financial leverage			
Particulars	Financial plan		
	1	2	3
Situation A:			
EBIT (₹)	3,000	3,000	3,000
Less: Interest (₹)	600	300	900
Earnings after interest (₹)	2,400	2,700	2,100

Determination of financial leverage			
Particulars	**Financial plan**		
	1	**2**	**3**
Financial leverage (EBIT/EBIT – I)	**1.25**	**1.11**	**1.43**
Situation B:			
EBIT (₹)	2,000	2,000	2,000
Less: Interest (₹)	600	300	900
Earnings after interest (₹)	1,400	1,700	1,100
Financial leverage	**1.43**	**1.18**	**1.82**
Situation C:			
EBIT (₹)	1,000	1,000	1,000
Less: Interest (₹)	600	300	900
Earnings after interest (₹)	400	700	100
Financial leverage	**2.5**	**1.43**	**10**

Determination of the highest and the lowest value of combined leverage (Combined leverage = DOL × DFL)			
Particulars	**Financial plan**		
	1	**2**	**3**
A	1.66	1.48	1.90
B	2.86	2.36	3.64
C	10.00	5.72	40.00

The above calculations suggest that the highest value is in situation C financed by plan 3 and the lowest value is in situation A financed by plan 2.

Illustration 17

The XYZ Company plans to expand assets by 50%. To finance the expansion, it is choosing between a straight 6% debt issue and equity issue. Its current balance sheet and income statement are shown below:

Balance Sheet of XYZ company as on March 31, 2024

Particulars	Amount (₹)	Particulars	Amount (₹)
5% Debt	4,00,000	Total assets	20,00,000
Equity shares (₹ 10 per share)	10,00,000		
	6,00,000		
Total	**20,00,000**	**Total**	**20,00,000**

Income Statement for the year ended March 31, 2024

Particulars	Amount (₹)
Sales	60,00,000
Total costs (excluding interest)	53,80,000
EBIT	6,20,000
Less: Interest on debt	20,000
EBT	6,00,000
Less: Taxes	2,10,000
Net income	3,90,000

If company finances the proposed expansion with debt, the rate on the incremental debt will be 6% and the price / earnings ratio of the equity shares will be 10. If expansion is financed by equity, the new shares can be sold at ₹ 33.33 and the price/earnings ratio of all the outstanding equity shares will remain 12.

(a) Assuming that net income before interest on debt and taxes (EBIT) is 10% on sales, calculate EPS at assumed sales of ₹ 20 lakh, ₹ 40 lakh, ₹ 80 lakh and ₹ 100 lakh under the alternative forms of financing the expansion programme (assume no fixed costs).

(b) Using the price/earnings ratio indicated, calculate the market value for equity share for each sales level for both debt and equity methods of financing.

(c) If the firm follows the policy of seeking to maximize the price of its shares, which form of financing should be employed?

Solution:

(a) and (b)

Determination of EPS and MPS under alternative financial plans

	Sales levels							
	₹ 20 lakh		₹ 40 lakh		₹ 80 lakh		₹ 100 lakh	
	Debt (₹)	Equity (₹)	Debt (₹)	Equity (₹)	Debt (₹)	Equity (₹)	Debt (₹)	Equity (₹)
EBIT	2,00,000	2,00,000	4,00,000	4,00,000	8,00,000	8,00,000	10,00,000	10,00,000
Less: Interest	80,000	20,000	80,000	20,000	80,000	20,000	80,000	20,000
Earnings before taxes	1,20,000	1,80,000	3,20,000	3,80,000	7,20,000	7,80,000	9,20,000	9,80,000
Less: Taxes (0.35)	42,000	63,000	1,12,000	1,33,000	2,52,000	2,73,000	3,22,000	3,43,000
EAT	78,000	1,17,000	2,08,000	2,47,000	4,68,000	5,07,000	5,98,000	6,37,000
Number of equity shares	1,00,000	1,30,000	1,00,000	1,30,000	1,00,000	1,30,000	1,00,000	1,30,000
EPS	0.78	0.90	2.08	1.90	4.68	3.90	5.98	4.90

	Sales levels							
	₹ 20 lakh		₹ 40 lakh		₹ 80 lakh		₹ 100 lakh	
	Debt (₹)	Equity (₹)	Debt (₹)	Equity (₹)	Debt (₹)	Equity (₹)	Debt (₹)	Equity (₹)
P/E ratio	10	12	10	12	10	12	10	12
Market price of a share	7.8	10.80	20.80	22.80	46.80	46.80	59.80	58.80

Working Note:

In debt financing, the number of equity shares outstanding = 1,00,000 (₹ 10,00,000 ÷ ₹ 10 per share). In the case of equity financing, the total number of outstanding shares = 30,000 additional shares (total = 1,30,000 shares).

(c) The answer will depend on the expected level of sales. If the sales level is at ₹40 lakh, equity form of financing should be employed. At the sales level of ₹ 80 lakh, the company is indifferent. If the sales level is likely to be at ₹ 100 lakh, the debt form of financing should be employed.

Dividend Decisions and Dividend Theories

7.3

Dividend decision means the decision-making mechanism of the management regarding declaration of dividends. It is crucial decision for the top management to determine the portion of earnings available for the distribution as the dividend at the end of every financial year. A company's ultimate objective is the maximization of shareholders' wealth. It must, therefore, be very vigilant about its profit-sharing policies to retain the faith of the shareholders. Dividend payout policies derive enormous importance by virtue of being a bridge between the company and shareholders for profit-sharing. Without an organized dividend policy, it would be difficult for the investors to judge the intentions of the management.

Dividend is a major cash outlay for many companies. At first glance, it would appear that a company could distribute as much as possible to please its shareholders. It might seem equally obvious that a firm could invest money for its shareholders instead of paying dividends.

A firm's decisions about dividends are often mixed up with other financing and investment decisions. Some firms pay low dividends because management is optimistic about a firm's future and wishes to retain earnings for expansion. Another firm might finance capital expenditures largely by borrowing. This releases cash for dividends.

The firm's dividend policy must be isolated from other problems of financial management. The dividend policy is a trade-off between retained earnings on the one hand and paying out cash and issuing shares on the other. There are many firms that pay dividends and also issue stock from time to time. They could avoid the stock issues (where costs are highest for the firm) by paying lower dividends. Many other firms restrict dividends so that they do not have issue shares. They on the other hand could occasionally issue stock and increase dividends. Thus, both firms face dividend policy trade-off. There are many reasons for paying dividends and there are many reasons for not paying any dividends. As a result, dividend policy is always controversial.

However, different issues of dividend and dividend policies will be discussed in the following sections.

7.3.1 Definition of Dividend

The term dividend refers to that portion of profit (after tax) or earnings or retained earnings which is distributed among the owners/shareholders of the firm. In other words, dividend is that part of the net earnings of a corporation that is distributed toits stockholders. It is a payment made to the equity shareholders for their investment in the company.

Dividend is a reward to equity shareholders for their investment in the company. It is a basic right of equity shareholders to get dividend from the earnings of a company.

7.3.2 Types of Dividends

There are different types of dividends. Classifications of dividends are based on the categary in which they are paid. Following are the different types of dividends:

Figure 7.9: Types of Dividends

(a) Cash Dividend

It is the most common form. The shareholders receive cash for each share. The board of directors announces the dividend payment on the date of declaration.

(b) Bonus Shares or Stock Dividend

Bonus share is also called the stock dividend. A company may have low operating cash but still want to keep the investors happy, issues such dividends. In other way, a stock dividend is simply the payment of additional shares of common stock to shareholders. It represents nothing more than a book-keeping shift within the shareholders' equity account on the firm's balance sheet. A shareholder's proportional ownership in the firm remains unchanged. Accounting authorities make a distinction between small-percentage stock dividends and large-percentage stock dividends.

(c) Property Dividend

The company makes the payment in the form of assets under the property dividend. The asset could be any of this equipment, inventory, vehicle, or any other asset. The asset's value has to be restated at the fair value while issuing this.

(d) Scrip Dividend

It is a promissory note to pay the shareholders later. This type is used when the company does not have sufficient funds for such issuance.

(e) Liquidating Dividend

When the company returns the original capital contributed by the equity shareholders as a dividend, it is termed a liquidating dividend. It is often seen as a sign of closing down the company.

7.3.3 Dividend Policy

Dividend policy determines the ultimate distribution of the firm's earnings between retention(i.e., reinvestment) and cash dividend payments of shareholders. It is the practice that management follows in making dividend payoutdecisions, or in other words, the size and pattern of cash distributions over the time to shareholders.

In other words, dividend policy is the firm's plan of action to be followed when dividenddecisions are made. It is the decision about how much of earnings to pay out as dividendsversus retaining and reinvesting earnings in the firm.

Dividend policy must be evaluated in light of the objective of the firm namely, to choose apolicy that will maximize the value of the firm to its shareholders. The dividend policy of acompany reflects how prudent its

financial management is. The future prospects, expansion,diversification mergers are affecting by dividing policies and for a healthy and buoyant capitalmarket, both dividends and retained earnings are important factors.

Measures of Dividend Policy

Dividend Payout: It measures the percentage of earnings the company pays in dividends = Dividends / Earnings.

Dividend Yield: It measures the return that an investor can make from dividends alone = Dividends / Stock Price.

Earnings Yield: It measures how earnings are reflected in the share price = Earnings/Stock Price.

Why a dividend policy is important?

Once a company makes a profit, it must decide on what to do with those profits. They couldcontinue to retain the profits within the company, or they could pay out the profits to the ownersof the firm in the form of dividends. The dividend policy decision involves two questions:

(i) What fraction of earnings should be paid out, on average, over time?

(ii) What type of dividend policy should the firm follow? (i.e., issues such as whether it should maintain steady dividend policy or a policy increasing dividend growth rate etc.)

However, the dividend policy of a company determines what proportion of earnings is distributed to the shareholders by way of dividends, and what proportion is ploughed back for reinvestment purposes. Since the main objective of financial management is to maximize the market value of equity shares, one key area of study is the relationship between the dividend policy and market price of equity shares. In this regard dividend policy assumes significance.

Determinants of Dividend Policy

Many factors determine the dividend policy of a company. The factors determining the dividend policy are discussed below:

(a) Dividend Payout ratio: A certain share of earnings to be distributed as dividend has to be worked out. This involves the decision to pay out or to retain. The payment of dividends results in the reduction of cash and, therefore, depletion of assets. In order to maintain the desired level of assets as well as to finance the investment opportunities, the company has to decide upon the payout ratio. D/P ratio should be determined with two bold objectives – maximising the wealth of the firms' owners and providing sufficient funds to finance growth.

(b) Stability of Dividends: Generally, investors favour a stable dividend policy. The policy should be consistent and there should be a certain minimum dividend that should be paid regularly. The liability can take any form, namely, constant dividend per share; stable D/P ratio and constant dividend per share plus something extra. Because this entails – the investor's desire for current income, it contains the information content about the profitability or efficient working of the company; creating interest for institutional investor's etc.

(c) Legal, contractual and internal constraints and restriction: Legal and Contractual requirements have to be followed. All requirements of Companies Act, SEBI guidelines, capital impairment guidelines, net profit and insolvency etc., have to be kept in mind while declaring dividend. For example, insolvent firm is prohibited from paying dividends; before paying dividend, accumulated losses have to be set off, however, the dividends can be paid out of current or previous years' profit. Also, there may be some contractual requirements which are to be honoured. Maintenance of certain debt equity ratio may be such requirements. In addition, there may be certain internal constraints which are unique to the firm concerned. There may be growth prospects, financial requirements, availability of funds, earning stability and control etc.

(d) Owner's considerations: This may include the tax status of shareholders, their opportunities for investment dilution of ownership etc.

(e) Capital market conditions and inflation: Capital market conditions and rate of inflation also play a dominant role in determining the dividend policy. The extent to which a firm has access to capital market, also affects the dividend policy. A firm having easy access to capital market will follow liberal dividend policy as compared to the firm having limited access. Sometime dividends are paid to keep the firms 'eligible' for certain things in the capital market. In inflation, rising prices eat into the value of money of investors which they are receiving as dividends. Good companies will try to compensate for rate of inflation by paying higher dividends. Replacement decision of the companies also affects the dividend policy.

7.3.4 Dividend Decision Models

The company's Board of Directors makes dividend decisions. They are faced with the decision to pay out dividends or to reinvest the cash into new projects. The dividend policy decision is a trade-off between retaining earnings v/s paying out cash dividends.

Dividend policies must always consider two basic objectives:

1. Maximizing owners' wealth
2. Providing sufficient financing

While determining a firm's dividend policy, management must find a balance between current income for stockholders (dividends) and future growth of the company (retained earnings).

1. Walter's model
2. Gordon's model
3. Modigliani and Miller's hypothesis

In further analysis, we can explain this classification as follows –

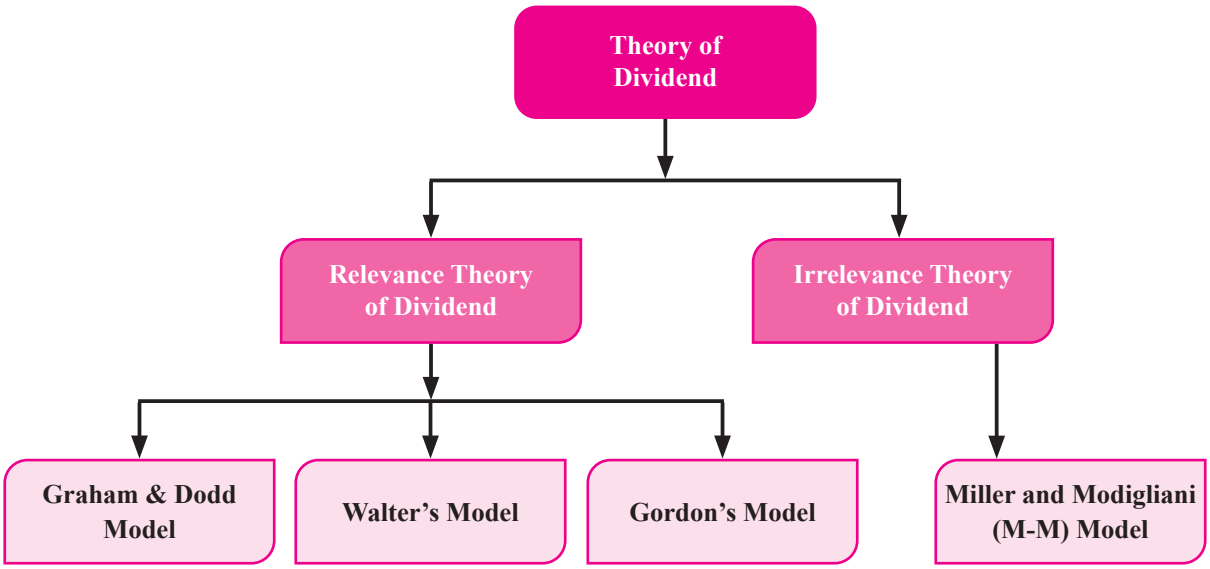

Figure 7.10: Theory of Dividend

1. Dividend Relevance Theory

The relevance theory of dividend argues that dividend decision affects the market value of the firm and therefore dividend matters. This theory suggests that investors are generally risk averse and would rather have dividends today ("bird-in-the-hand") than possible share appreciation and dividends tomorrow. The relevance theory of dividend proposes that dividend policy affect the share price.

Therefore, according to this theory, optimal dividend policy should be determined which will ensure maximization of the wealth of the shareholders. Dividend relevance theory holds the belief that dividends have effect on a company's stock price. A dividend is typically a cash payment made from a company's profit to its shareholders as a reward for investing in the company. Relating to this theory, three models are discussed below:

Graham and Dodd Model (Traditional Model)

According to this model founded by Graham and Dodd, the market price of the shares will increase when a company declares a dividend rather than when it does not. Base of their arguments was that investors are rational and under conditions of uncertainty they turn risk averse. In this model weight attached to dividends is four times of weight attached to retained earnings.

Quantitatively,

$$P = m\left(D + \frac{A}{Q}\right)$$

Where:

P is the market price per share

m is a multiplier

D is the dividend per share

E is the earnings per share

Critics argue that Graham and Dodd provided weight subjectively and did not derive them from any empirical analysis.

Walter's Model

According to this model founded by James E. Walter, the dividend policy of a company has an impact on the share valuation, i.e., dividends are relevant. The key argument is support of the relevance proposition of Walter's model is the relationship between the return on a firm's investment (its internal rate of return) 'r' and its cost of capital (i.e. the required rate of return) 'k'. If the return on investments exceeds the cost of capital, the firm should retain the earnings, whereas it should distribute the earnings to the shareholders in cash the required rate of return exceeds the expected return on the firm's investments. The rationale is that if r>k, the firm is able to earn more than what the shareholders could by reinvesting, if the earnings are paid to them. The implication of r<k is that shareholders can earn a higher return by reinvesting elsewhere.

Quantitatively,

$$P = \frac{\left(D + \frac{r}{k}(E - D)\right)}{K}$$

Where:

P = The prevailing market price of a share

D = Dividend per share

E = Earnings per share

r = The internal rate of return on the investments and

k = Cost of capital.

Assumptions of the model:

(a) All financing is done through retained earnings; external sources of funds like debt or new equity capital are not used.

(b) With addition investments undertaken, the firm's business risk does not change. It implies that 'r' and 'k' are constant.

(c) There is no charge in the key variable namely EPS and DPS. The values 'D' and E may be changed in the model to determine results, but, any given value of 'E' and 'D' are assumed to remain constant in determining a given value.

(d) The firm has a perpetual (very long) life.

The impact of dividend payment on the share price is studied by comparing the rate of return with the cost of capital.

(i) When r > k, the price per share increases as the pay-out ratio decreases (optional pay-out ratio is nil)

(ii) When r = k, the price per share does not vary with the changes in the pay-out ratio (optimal pay-out ratio does not exist)

(iii) When r<k, the price per share increases as the pay-out ratio increases (optimal pay-out ratio is 100%)

Limitations of the model:

Following are the limitations of the model:

(a) Walter's model assumes that the firm's investments are financed exclusively by retained earnings, no external financing is used. The model would be applicable to all equity firms.

(b) The model assumes that 'r' is constant. This is not a realistic assumption. When increased investments are made by the firm, 'r' also changes.

(c) As, 'k' is constant, the model ignores the effect of risk on the value of the firm.

Illustration 18

X Ltd. earns ₹ 6 per share having capitalisation rate @10% and has a return on investment at the rate of 20%. According to Walter's Model, what should be the price per share at 30% dividend payout ratio? Is this the optimum payout ratio as per Walter Model?

Solution:

As per Walter Model = $P = \frac{\left(D + \frac{r}{k}(E - D)\right)}{k}$

Where,

P = The prevailing market price of a share

D = Dividend per share = 0.3 × ₹6 = ₹1.80

E = Earnings per share = ₹ 6

r = The internal rate of return on the investments = 20%

k = Cost of capital = 10%

Putting the given value, we get P = ₹ 102

However, this is not the optimum payout as per Walter's Model, because for r > k, optimum payout should be zero. Therefore, substituting D = 0, we get P = ₹ 120

Illustration 19

From the following data calculate the value of an equity share of each of the following three companies according to Walter's Model when dividend pay-out ratio is (i) Nil, (ii) 25%, (iii) 50%, (iv) 75% and (v) 100%.

	Name of the Companies		
	X Ltd.	Y Ltd.	Z Ltd.
Internal Rate of Return (r)	15%	5%	10%
Cost of Capital (K)	10%	10%	10%
Earning per share (E)	₹10	₹10	₹10

What conclusion do you draw?

Solution:

Statement showing for valuation of each equity share according to Walter's Model

Value of each Equity share $(P) = \dfrac{D + (E - D)\,r/k}{k}$

Where, D = Dividend per share, E = Earnings per share, r = Internal rate of return, k = Cost of Capital and D/P Ratio = Dividend payout ratio.

D/P Ratio	X Ltd. [Where, r > k] E = ₹10 r = 15% or, 0.15 k = 10% or, 0.10 So, $r/k = \dfrac{0.15}{0.10}$ or, 1.5	Y Ltd. [Where, r < k] E = ₹10 r = 5% or, 0.05 k = 10% or, 0.10 So, $r/k = \dfrac{0.05}{0.10}$ or, 0.5	Z Ltd. [Where, r = k] E = ₹10 r = 10% or, 0.10 k = 10% or, 0.10 So, $r/k = \dfrac{0.10}{0.10}$ or, 1.
When D/P Ratio is Nil	D = E × D/P Ratio = 10 × Nil = Nil Thus, $P = \dfrac{Nil + (10 - Nill) \times 1.5}{0.10}$ = ₹ 150	D = E × D/P Ratio = 10 × Nil = Nil Thus, $P = \dfrac{Nil + (10 - Nill) \times 0.5}{0.10}$ = ₹ 50	D = E × D/P Ratio = 10 × Nil = Nil Thus, $P = \dfrac{Nil + (10 - Nill) \times 1}{0.10}$ = ₹ 100

When D/P Ratio is 25%	D = E × D/P Ratio = 10 × 25% = ₹2.50 Thus, $P = \frac{2.50+(10-2.50)\times 1.5}{0.10}$ = ₹ 137.5	D = E × D/P Ratio = 10 × 25% = ₹2.50 Thus, $P = \frac{2.50+(10-2.50)\times 0.5}{0.10}$ = ₹ 62.50	D = E × D/P Ratio = 10 × 25% = ₹2.50 Thus, $P = \frac{2.50+(10-2.50)\times 1}{0.10}$ = ₹ 100
When D/P Ratio is 50%	D = E × D/P Ratio = 10 × 50% = ₹5 Thus, $P = \frac{5+(10-5)\times 1.5}{0.10}$ = ₹ 125	D = E × D/P Ratio = 10 × 50% = ₹5 Thus, $P = \frac{5+(10-5)\times 0.5}{0.10}$ = ₹ 75	D = E × D/P Ratio = 10 × 50% = ₹5 Thus, $P = \frac{5+(10-5)\times 1}{0.10}$ = ₹ 100
When D/P Ratio is 75%	D = E × D/P Ratio = 10 × 75% = ₹7.5 Thus, $P = \frac{7.5+(10-7.5)\times 1.5}{0.10}$ = ₹ 112.50	D = E × D/P Ratio = 10 × 75% = ₹7.5 Thus, $P = \frac{7.5+(10-7.5)\times 0.5}{0.10}$ = ₹ 87.50	D = E × D/P Ratio = 10 × 75% = ₹7.5 Thus, $P = \frac{7.5+(10-7.5)\times 1}{0.10}$ = ₹ 100
When D/P Ratio is 100%	D = E × D/P Ratio = 10 × 100% = ₹10 Thus, $P = \frac{10+(10-10)\times 1.5}{0.10}$ = ₹ 100	D = E × D/P Ratio = 10 × 100% = ₹10 Thus, $P = \frac{10+(10-10)\times 0.5}{0.10}$ = ₹ 100	D = E × D/P Ratio = 10 × 100% = ₹10 Thus, $P = \frac{10+(10-10)\times 1}{0.10}$ = ₹ 100

Comment: In case of X Ltd., the internal rate of return (r) is more than the cost of capital (k). In this case, the value of share is increasing alongwiththe decrease in the dividend payout ratio. In this way, it is seen that when the dividend payout ratio is zero, the value of each share is maximum i.e., ₹150. So, in this case, the firm should retain the whole earnings in hand without paying dividend so that the value of share is increases. Again, as r > k, X Ltd. is a **Growth firm.**

In case of Y Ltd., the internal rate of return (r) is less than the cost of capital (k) i.e., r < k. In this case, the value of share is increasing alongwith the increase in the dividend payout ratio. In this way, it is seen that when the dividend payout ratio is maximum (100%, the value of share is maximum (₹100). So, in this case, the firm should distribute its entire earnings without retaining any earnings so that the value of the share increases. Again, as r < K, Y Ltd. is a **Declining firm.**

In case of Z Ltd., the internal rate of return (r) is equivalent to the cost of capital (K) i.e., r = K. In this case, whatever may be the dividend payout ratio, the value of share always remains constant (₹100). That is, the dividend payout ratio never affects the value of the share. Again, as r = K, Z Ltd. is a **Normal Firm.**

Gordon's Model

According to this model founded by Myron Gordon, the dividend policy of the company has an impact on share valuation i.e., dividends are relevant. Myron J Gordon (1962) said that "... investors prefer the early resolution of uncertainty and are willing to pay a higher price of the shares that offer the greater current dividends."

Gordon suggested -

(i) The higher the earnings retention rate, the greater the required future return from investments to compensate for risk.

(ii) The risk attitude of investors will ensure that r will rise for each successive year in the future to reflect growth uncertainty.

The model is based on the following assumptions:

(a) All equity firm: The firm is an all equity firm.

(b) No external financing: No external financing is used and only retained earnings would be used to finance any expansion.

(c) Constant return: The internal rate of return, 'r', of the firm is constant. This ignores the diminishing marginal efficiency of investment.

(d) Constant cost of capital: The appropriate discount rate, k for the firm remains constant.

(e) Perpetual earnings: The firm and its stream of earnings are perpetual.

(f) No taxes: Corporate taxes do not exist.

(g) Constant retention: The retention ratio, b, once decided upon is constant.

(h) Cost of capital greater than growth rate: The discount rate is greater than the growth, k>g.

Quantitatively,

$$P = \left(\frac{Y(1-b)}{k-br} \right)$$

Where,

P is the price per share

Y is the earnings per share

b is the retention ratio

1-b is the payout ratio

br is the growth rate

r is the return on investment

k is the rate of return required by shareholders (also called capitalization rate)

On comparing r and k, the relationship between market price and the pay-out ratio is exactly the same as compared to the Walter model.

The crux of Gordon's arguments is two-fold assumptions:

(a) Investors are risk averse, and

(b) They put a premium on a certain return and discount/penalize uncertain returns. In other words, the rational investors prefer current dividend.

A company which retains earnings is perceived as risky as the future payment of dividend amount and timing is uncertain. Thus, they would discount future dividends, that is, they would place less importance on it as compared to current dividend. The above argument underlying Gordon's model of dividend relevance is also described as bird-in-hand argument. i.e., what is available at present is preferable to what may be available in the future. Gordon argues the more distant the future is, the more uncertain it is likely to be.

Illustration 20

From the following data calculate the value of an Equity Share of each of the following three companies according to the Gordon's Model when dividend payout ratio is (i) 25%, (ii) 50%, and (iii) 100%.

	Name of the Companies		
	X Ltd.	Y Ltd.	Z Ltd.
Internal Rate of Return (r)	12%	8%	10%
Cost of Capital (k)	10%	10%	10%
Earnings per share (E)	₹12	₹12	₹12

What conclusion do you draw?

Solution:

Statement showing for valuation of each equity share according to Gordon's Model

Value of each Equity share $(P) = \frac{E(1-b)}{k-br}$

Where, k = Cost of Capital, r = Internal rate of return, (1-b) = Dividend payout ratio and b = Retention ratio.

	X Ltd. [Where, r > k]	Y Ltd. [Where, r < k]	Z Ltd. [Where, r = k]
Dividend Payout Ratio = (1-b)	E = ₹ 12. k = 10% or, 0.10 r = 12% or, 0.12	E = ₹ 12. k = 10% or, 0.10 r = 8% or, 0.08	E = ₹ 12. k = 10% or, 0.10 r = 10% or, 0.10
Where (1-b) = 25% or, b = 75%	b = 75% or, 0.75 br = 0.75 × 0.12 = 0.09 $P = \frac{12(1-0.75)}{0.10-0.09}$ $= \frac{12\times0.25}{0.01}$ = ₹ 300	b = 75% or, 0.75 br = 0.75 × 0.08 = 0.06 $P = \frac{12(1-0.75)}{0.10-0.06}$ $= \frac{12\times0.25}{0.04}$ = ₹ 75	b = 75% or, 0.75 br = 0.75 × 0.10 = 0.075 $P = \frac{12(1-0.75)}{0.10-0.075}$ $= \frac{12\times0.25}{0.025}$ = ₹ 120

Where (1-b) = 50% or, b = 0.50	b = 50% or, 0.50 br = 0.50 × 0.12 = 0.06 $P = \frac{12(1-0.50)}{0.10-0.06}$ $= \frac{12\times0.50}{0.04}$ = ₹ 150	b = 50% or, 0.50 br = 0.50 × 0.08 = 0.04 $P = \frac{12(1-0.50)}{0.10-0.04}$ $= \frac{12\times0.50}{0.04}$ = ₹ 100	b = 50% or, 0.50 br = 0.50 × 0.10 = 0.05 $P = \frac{12(1-0.50)}{0.10-0.05}$ $= \frac{12\times0.50}{0.05}$ = ₹ 120
Where (1-b) = 100% or, b = 0	b = 0 br = 0 × 0.12 = 0 $P = \frac{12(1-0)}{0.10-0}$ $= \frac{12}{0.10}$ = ₹ 120	b = 0 br = 0 × 0.08 = 0 $P = \frac{12(1-0)}{0.10-0}$ $= \frac{12}{0.10}$ = ₹ 120	b = 0 br = 0 × 0.10 = 0 $P = \frac{12(1-0)}{0.10-0}$ $= \frac{12}{0.10}$ = ₹ 120

Comment: In case of X Ltd., the internal rate of return is more than the cost of capital i.e. r > k. In this case, the value of share is increasing along with the decrease in the dividend payout ratio. So, the company should retain comparatively large amount of retained earnings in hand by reducing the dividend payout ratio so that the value of share increases. Again, as r > k, X Ltd. is a **Growth Firm**.

In case of Y Ltd., the internal rate of return is less than the cost of capital i.e. r < k. In this case, the value of share is increasing along with the increase in the dividend payout ratio. So, the firm should distribute its entire earnings, without keeping any retained earnings in hand so that the value of the share is maximum. Again, since r < k, Y Ltd. is a **Declining Firm.**

In case of Z Ltd., the internal rate of return (r) is equal to the cost of capital (k) i.e. r = k, in this case, whatever may be the dividend payout ratio, the value of share remains constant. That is, the dividend payout ratio does never affect the value of the share. Again, since r = k, Z Ltd. is a **Normal Firm.**

2. Dividend Irrelevance Theory

Dividend irrelevance theory holds the belief that dividends do not have any effect on a company's stock price. A dividend is typically a cash payment made from a company's profits to its shareholders as a reward for investing in the company. In this case, one school of thought argues that the dividends have no impact on the share price or market value of the firm. Here, we shall discuss mainly Miller–Modigliani (M-M) Model and some other models –

Miller and Modigliani (M-M)Model / Dividend Irrelevancy Model

This theory was proposed by Franco Modigliani and Merton Miller (M-M) in 1961 who argued that the value of the firm is determined by the basic earnings power, the firm's risk and not by the distribution of earnings.

Miller–Modigliani (M-M) provide the most comprehensive argument for the irrelevance of dividends. They assert that, given the investment decision of the firm, the dividend payout ratio is a mere detail and that it does not affect the wealth of shareholders. M-M argue that the value of the firm is determined solely by the earnings power of the firm's assets or its investment policy, and that the manner in which the earnings stream is split between dividends and retained earnings do not affect this value.

M-M hypothesis is based on the following assumptions:

(a) M-M assuming perfect capital markets in which all investors are rational; information is freely available to everyone equally; there are no transaction costs; securities are finitely divisible; no investor is large enough to influence the market price of securities; there are no floatation costs.

(b) There are no taxes and flotation costs and if the taxes are there then there is no difference between the dividends tax and capital gains tax.

(c) The firm's investment policy is independent of the dividend policy. The effect of this assumption is that the new investments out of retained earnings will not change and there will not change in the required rate of return of the firm.

(d) There are no contracting or agency costs.

According to this model, the market price of the share does not depend on the dividend payout, i.e., the dividend policy is irrelevant. This model explains the irrelevance of the dividend policy.

When profits are used to declare dividends, then the market price increases. But, at the same time there is a fall in the reserves for reinvestment. Hence for expansion, the company raises additional capital by issuing new shares. Increase in the overall number of shares, will lead to a fall in the market price per share. Hence the shareholders would be indifferent towards the dividend policy.

According to the M-M Model, the market price of a share after dividend declared is calculated by applying the following formula:

$$P_0 = \frac{(P_1 + D_1)}{1 + k}$$

Where,

P_0 is the prevailing market price

k is the cost of equity capital

D_1 is the dividend to be received at the end of period one

P_1 is the market price at the end of period one

The number of shares to be issued for new projects, in lieu of dividend payments is given by the following formula:

$$m = \frac{1 - (E + nD_1)}{P_1}$$

Where,

n – is the number of shares outstanding at the beginning of the period.

m – is number of new shares issued.

I – Total investment amount required for the new project.

E – Earnings of net income of the firm during the period.

Proof:

Let n represent the original number of outstanding shares of the company, 'D' be the dividend distributed to the 'n' shareholders, I be the total investment amount required for the new project, and 'E' be the Earnings (net

income) of the firm during the period. And let 'm' represent the number of new shares issued to meet the shortfall in investment issued at a current market price of P_1.

According to the M-M Model, the market price of a share in the beginning of the period is equal to the present value of dividends paid at the end of the period plus the market price of the share at the end of the period. It is calculated by applying the following formula:

$$P_O = \frac{(P_1 + D_1)}{1 + k}$$

Where,

P_0 is the prevailing market price.

k is the cost of equity capital.

D_1 is the dividend to be received at the end of period one.

P_1 is the market price at the end of period one.

Assuming no external financing and the current market capitalization of the firm would be calculated as follows:

$$nP_O = \frac{(nP_1 + nD_1)}{1 + k}$$

n is the number of shares.

Adding and subtracting mP_1 on numerator in the RHS of the equation, we have–

$$nP_O = \frac{(m + n)\, nD_1 - mP_1}{1 + k}$$

Now, mP_1 = Amount raised = Investment – [Earnings – Dividends distributed]

$= I – [E\text{-}nD_1]$

Substituting in the above equation, we have–

$$nP_O = \frac{(m + n)P_1 + E - I}{1 + k}$$

As no dividend term appear on the right-hand side of the equation, it is proved that dividends are irrelevant.

Criticisms:

Because of the unrealistic nature of the assumption, M-M's hypothesis lacks practical relevance in the real-world situation. Thus, it is being criticised on the following grounds.

(a) The assumption that taxes do not exist is far from reality.

(b) M-M argue that the internal and external financing are equivalent. This cannot be true if the costs of floating new issues exist.

(c) According to M-M's hypothesis the wealth of a shareholder will be same whether the firm pays dividends or not. But, because of the transactions costs and inconvenience associated with the sale of shares to realise capital gains, shareholders prefer dividends to capital gains.

(d) Even under the condition of certainty it is not correct to assume that the discount rate (k) should be same whether firm uses the external or internal financing.

(e) If investors have desire to diversify their port folios, the discount rate for external and internal financing will be different.

(f) M-M argues that, even if the assumption of perfect certainty is dropped and uncertainty is considered, dividend policy continues to be irrelevant. But according to number of writers, dividends are relevant under conditions of uncertainty.

Illustration 21

Bangabasi Ltd. belongs to a risk-class for which the appropriate capitalisation rate is 10%. It currently has outstanding 2000 equity shares of ₹100 each. The firm is contemplating the declaration of dividend of ₹8 per share at the end of the current financial year. It expects to have net earnings of ₹20,000 and has a proposal for making new investment of ₹ 24,000. Show that under the Modigliani–Miller assumption, the payment of dividend does not affect the value of the firm.

Solution:

P_0 = Opening price of each share = ₹100

P_1 = Market price of each share at the end of the year.

D_1 = Dividend per share to be paid at the end of the year = ₹ 8

k = Cost of capital = 0.10.

n = No. of Outstanding share at the beginning of the year = 2,000 shares.

Δn = No. of additional shares to be issued.

E = Earning of the company = ₹ 20,000.

I = Total amount required for investment = ₹ 24,000.

Valuation of the firm when dividends are paid:

(i) $P = \frac{(P_1 + D_1)}{1+k}$

or, $100 = \frac{8 + P_1}{1 + 0.10}$

or, $8 + P_1 = ₹100 \times 1.10$

or, $P_1 = ₹110 - 8$

or, $P_1 = ₹102$

(ii) Amount required to be raised from the issue of new share

$(\Delta nP_1) = I - (E - nD_1)$

or, $\Delta nP_1 = ₹24,000 - (₹20,000 - 8 \times ₹2,000)$

or, $\Delta nP_1 = ₹24,000 - ₹4,000$

or, $\Delta nP_1 = ₹20,000$

(iii) $\Delta nP_1 = ₹20,000$

$\Delta n(102) = 20,000$ ($P_1 = 102$)

or, $\Delta n = \frac{20,000}{102}$

(iv) Value of the firm $(nP_0) = \frac{P_1(n+\Delta n)-I+E}{1+k}$

or, $nP_0 = \frac{102\left(2,000+\frac{20,000}{102}\right)-24,000+20,000}{1+0.10}$

or, $nP_0 = \frac{2,24,000-24,000+20,000}{1+0.10}$

or, $nP_0 = \frac{2,20,000}{1.10}$

or, $nP_0 = ₹\ 2,00,000$

Hence, total value of the firm is ₹ 2,00,000.

Valuation of the firm when dividends are not paid:

(i) $P_0 = \frac{(P_1+D_1)}{1+k}$

$100 = \frac{0+P_1}{1+0.10}$

or, $P_1 = 100 \times 1.10$

or, $P_1 = ₹110.$

(ii) Amount required to be raised from the issue of new share

$(\Delta nP_1) = I-(E-nD_1)$

or, $\Delta nP_1 = ₹24,000-(20,000-2,000\times 0)$

or, $\Delta nP_1 = ₹24,000-(20,000-0)$

or, $\Delta nP_1 = 4,000$

(iii) $\Delta nP_1 = 4,000$

$\Delta n(110) = ₹4000\ (P_1 = 110)$

or, $\Delta n = \frac{4,000}{110}$

(iv) Value of the firm $(nP_0) = \frac{P_1(n+\Delta n)-I+E}{1+k}$

or, $nP_0 = \frac{110\left(2,000+\frac{4,000}{110}\right)-24,000+20,000}{1+0.10}$

or, $nP_0 = \frac{110\left(\frac{2,20,000+4,000}{110}\right)-24,000+20,000}{1+0.10}$

$$\text{or,} \quad nP_0 = \frac{2,24,000 - 24,000 + 20,000}{1 + 0.10}$$

$$\text{or,} \quad nP_0 = \frac{2,20,000}{1.10}$$

$$\text{or,} \quad nP_0 = ₹\ 2,00,000$$

Hence, total value of the firm is also ₹ 2,00,000.

Thus, it is clear that the total value of the firm remains unchanged whether dividends are paid or not i.e., the payment of dividend does not affect the value of the firm.

Residuals Theory of Dividends

The theory is based upon the assumptions that since the external financing has excessive costs and may not be available to the firm. The firm finances its investment by retained earnings or by retaining earnings. The retaining earnings are that portion of profits that is not distributed to the investors. If a firm wishes to avoid issue of shares, then it will have to rely on internally generated funds to finance new positive NPV projects. Dividends can only be paid out of what is left over. This leftover is called a residual and such a dividend policy is called residual dividend approach.

When we treat dividend policy as strictly a financing decision, the payment of cash dividends is a passive residual. The amount of dividend pay-out will fluctuate from period to period in keeping with fluctuations in the number of acceptable investment opportunities available to the firm. If these opportunities abound, the percentage of dividend payout is likely to be zero. On the other hand, if the firm is unable to find profitable investment opportunities, dividend payout will be 100%.

With a residual dividend policy, the firm's objective is to meet its investment needs and mostly to maintain its desired debt equity ratio before paying dividends.

To illustrate imagine that a firm has ₹ 1,000 in earnings and a debt equity ratio of 0.5. Thus, the firm has 0.5 of debt for every 1.5 of the total value. The firm's capital structure is 1/3 of debt and 2/3 of equity.

The first step in implementing a residual dividend policy is to determine the amount of funds that can be generated without selling new equity. If the firm reinvests the entire ₹ 1,000 and pays no dividend, then equity will increase by ₹ 1,000. To keep the debt equity ratio constant, the firm must borrow ₹ 500.

The second step is to decide whether or not the dividend will be paid. If funds needed are less than the funds generated then a dividend will be paid. The amount of dividend will be the residual after meeting investment needs. Suppose we require ₹ 900 for a project. Then 1/3 will be contributed by debt (i.e.,₹ 300) and the balance by equity/ retained earnings. Thus, the firm would borrow ₹ 300 and fund ₹ 600 from the retained earnings. The residual i.e., ₹ 1,000 – ₹ 600 = ₹ 400 would be distributed as dividend.

It can be further explained by using the table below: (₹)

New Investment	Debt portion	Retained	Additional Earnings	Dividends Equity	
1,000	3,000	1,000	1,000	1,000	0
1,000	2,000	667	1,000	333	0
1,000	1,500	500	1,000	0	0

New Investment	Debt portion	Retained	Additional Earnings	Dividends Equity	
1,000	1,000	333	667	0	333
1,000	500	167	333	0	667
1,000	0	0	0	0	1000

Dividend Discount Model

The dividend discount model is a more conservative variation of discounted cash flows that says a share of stock is worth the present value of its future dividends, rather than its earnings. This model was popularized by John Burr Williams in the theory of investment value.

Present earnings, outlook, financial condition, and capitalization should bear upon the price of a stock only as they assist buyers and sellers in estimating future dividends.

The Dividend Discount Model can be applied effectively only when a company is already distributing a significant amount of earnings as dividends. But in theory it applies to all cases, since even retained earnings should eventually turn into dividends. That's because once a company reaches its 'mature' stage it won't need to reinvest in its growth, so, management can begin distributing cash to the shareholders as Williams puts it.

If earnings not paid out as dividends are all successfully reinvested, then these earnings should produce dividends later if not, then they are money lost. In short, a stock is worth only what you can get out of it.

The dividend discount model (DDM) is a widely accepted stock valuation tool found in most introductory finance and investment textbooks. The model calculates the present value of the future dividends that a company is expected to pay to its shareholders It is particularly useful because it allows investors to determine an absolute or "intrinsic" value of a particular company that is not influenced by current stock market conditions. The DDM is also useful because the measurement of future dividends (as opposed to earnings for example) facilitates an "apples-to-apples" comparison of companies across different industries by focusing on the actual cash investors can expect to receive.

There are three alternative dividend discount models that used to determine the intrinsic value of a share of stock:

(a) the constant (or no-growth) dividend model;

(b) the constant growth dividend model; and

(c) the two-stage (or two-phase) dividend growth model.

Constant dividends:

$$P = \frac{D_1}{k_e}$$

Where,

P = Intrinsic value

D_1 = Expected dividend

k_e = Appropriate discount factor for the investment

This method is useful for analyzing preferred shares where the dividend is fixed. However, the constant dividend model is limited in that it does not allow for future growth in the dividend payments for growth industries. As a result, the constant growth dividend model may be more useful in examining a firm.

Constant dividend growth:

$$P = \frac{D_1}{(k_e - g)}$$

Where,

P = Intrinsic value

D_1 = expected dividend

k_e = appropriate discount factor for the investment

g = constant dividend growth rate

The constant dividend growth model is useful for mature industries, where the dividend growth is likely to be steady. Most mature blue-chip stocks may be analysed quickly with the constant dividend growth model. This model has its limitations when considering a firm which is in its growth phase and will move into a mature phase at some time the future. A two-stage growth dividend model may be utilized in such situations. This model allows for adjustment to the assumptions of timing and magnitude of the growth of the firm.

For initial dividend growth & then steady growth:

$$P = \sum_{t=1}^{n}\left[\frac{D_0(1+g_1)^t}{(1+k_e)^t}\right] + \frac{D_0(1+g_2)}{k_e + g_2}\left[\frac{1}{(1+k_e)^t}\right]$$

where:

P = Intrinsic value = PV of dividends + PV of price

D_t = Expected dividend

= Appropriate discount factor for the investment

= Initial dividend growth rate

= Steady dividend growth rate

Lintner Model

John Linter surveyed dividend behaviour of several corporate and showed that–

(a) Firms set long run target pay-out ratios.

(b) Managers are concerned more about change in the dividend than the absolute level.

(c) Dividends tend to follow earnings, but dividends follow a smoother path than earnings.

(d) Dividends are sticky in nature because managers have a reluctance to effect dividend changes that may have to be reversed.

Linter expressed corporate dividend behaviour in the form of a following model:

D_t = $crEPS_t + (1\text{-}c)D_{t\text{-}1}$

D_t = DPS for year t

c = Adjustment Rate or Speed or Adjustment

r = Target Payout Rate

EPS_1 = EPS for year t

$D_{t\text{-}1}$ = DPS for year t–1

The Linter model shows that the current dividend depends partly on current earnings and partly on previous year's dividend. Likewise, the dividend for the previous year depends on the earnings of that year and the dividend for the year preceding that year, so on and so forth. Thus, as per the Linter Model, dividends can be described in terms of a weighted average of past earnings.

Dividend Dates

Declaration date: The date on which board of directors declare dividend is called a declaration date.

Record date: Record date, is that date when the company closes its stock transfer books and makes up a list of the shareholders for payment of dividends.

Ex-dividend date: It is that date notified by the stock exchange, as a date which will entail a buyer of shares, the dividend, if bought before the ex-dividend date. This date sets up the convention of declaring that the right to the dividend remains with the stock until 'x' days prior to the Record date. Thus, whoever buys share on or beyond the ex-dividend date are not entitled to dividend.

Payment date: The date on which the company mails the cheques to the recorded holders.

Let us say, settlement of stocks follows 'T+3', which means that, when you buy a stock, it takes three days from the transaction date (T) for the change to be entered into the company's record books. As mentioned, if you are not in the company's recorded books on the date of record, you won't receive the dividend payment. To ensure that you are in the record books, you need to buy stock at least three days before the date of record, which also happens to be the day before the ex-dividend date.

7.3.5 Bonus Shares or Stock Dividend

Because a company's dividends are sometimes not paid regularly, a company may choose to pay dividends in the form of stock. Assume a company declares a 10% stock dividend. What happens is that for every 10 shares of stock a person owns he gets one new share as a dividend. If a corporation has 1,000,000 share of common stock outstanding and declares a 10% stock dividend, the corporation will have 1,100,000 shares of stock outstanding after the stock dividend is paid.

The individual investor maintains his proportionate share and the same total book value in the company. Book value per share will be less. However, his investment in the company remains the same.When a company issues a stock dividend, it retains its accumulated earnings. Therefore, some companies may want to issue a stock dividend to avoid paying out cash. They may want to use the cash elsewhere. Basically, the company is capitalizing their earnings. When the stock dividend is declared a transfer is made from earned capital to contributed or permanent capital.

Advantages:

(a) It preserves the company's liquidity as no cash is used.

(b) The shareholders can liquidate these shares whenever they require.

(c) It is excellent way to bring the paid Capital of the company in line with actual capital employed by the company in the business.

(d) If broadens the capital base and improves the image of the company.

(e) It is inexpensive method of raising the capital by which the cash resources of the company are conserved.

(f) It reduces the market price of the shares, rendering the shares more marketable

(g) It is perceived as an indication by the market that the company financial position is sound.

Disadvantages:

(a) Since the reserves have been used to issue bonus shares, it indicates that future dividend would decline.

(b) Issue of bonus shares involve lengthy legal procedures and approvals.

7.3.6 Dividend Decision and Tax Considerations

Traditional theories might have said that distribution of dividend being from after-tax profits, tax considerations do not matter in the hands of the payer-company. However, with the arrival of Corporate Dividend Tax on the scene in India, the position has changed. Since there is a clear levy of such tax with related surcharges, companies have a consequential cash outflow due to their dividend decisions which has to be dealt with as and when the decision is taken.

In the hands of the investors too, the position has changed with total exemption from tax being made available to the receiving-investors. In fact, it can be said that such exemption from tax has made the equity investment and the investment in Mutual Fund Schemes very attractive in the market. Broadly speaking Tax consideration has the following impacts on the dividend decision of a company:

Before introduction of dividend tax:

Earlier, the dividend was taxable in the hands of investor. In this case the shareholders of the company are corporates or individuals who are in higher tax slab, it is preferable to distribute lower dividend or no dividend. Because dividend will be taxable in the hands of the shareholder @ 30% plus surcharges while long-term capital gain is taxable @ 10%. On the other hand, if most of the shareholders are the people who are in no tax zone, then it is preferable to distribute more dividend.

After introduction of dividend tax:

Dividend tax is payable @ 12.5% - surcharge + education cess, which is effectively near to 14% and changed. Now, time to time if the company were to distribute dividend, shareholder will indirectly bear a tax burden of 14% on their income. On the other hand, if the company were to provide return to shareholder in the form of appreciation in market price – by way of Bonus shares – then shareholder will have a reduced tax burden. For securities on which STT is payable, short-term capital gain is taxable @ 10% while long-term capital gain is totally exempt from tax.

Therefore, we can conclude that if the company pays more and more dividend (while it still has reinvestment opportunities) then to get same after-tax return shareholders will expect more before tax return and this will result in lower market price per share.

Solved Case 1

Alfa Ltd. with net operating earnings of ₹3,00,000 is attempting to evaluate a number of possible capital structures, given below. Which of the capital structure will you recommend, and why?

Capital structure	Debt in capital structure (₹)	Cost of debt (K_i) (per cent)	Cost of equity (K_e) (per cent)
1	3,00,000	10	12
2	4,00,000	10	12.5
3	5,00,000	11	13.5
4	6,00,000	12	15
5	7,00,000	14	18

Solution:

Determination of capital structure

Particulars	Capital structure plans having debts of various amounts				
	1 (₹)	2 (₹)	3 (₹)	4 (₹)	5 (₹)
EBIT	3,00,000	3,00,000	3,00,000	3,00,000	3,00,000
Less interest ($K_i \times B$)	30,000	40,000	55,000	72,000	98,000
Net Income (NI) for equity holders	2,70,000	2,60,000	2,45,000	2,28,000	2,02,000
k_e (equity capitalisation rate)	0.12	0.125	0.135	0.150	0.180
S (market value of equity)	22,50,000	20,80,000	18,14,815	15,20,000	11,22,222
B (market value of debt)	3,00,000	4,00,000	5,00,000	6,00,000	7,00,000
Total market value					
(S + B) = V	25,50,000	24,80,000	23,14,815	21,20,000	18,22,222
Overall cost of capital					
(K_o) = EBIT/V (percent)	11.76	12.10	12.96	14.15	16.47

Capital structure having debts of ₹3,00,000 is recommended as the overall cost of capital at this level is the lowest.

Solved Case 2

From the following selected operating data, determine the degree of operating leverage. Which company has the greater amount of business risk? Why?

	A Ltd (₹)	B Ltd (₹)
Sales	25,00,000	30,00,000
Fixed costs	7,50,000	15,00,000

Variable expenses as a percentage of sales are 50% for firm A and 25% for firm B.

Solution:

Determination of operating leverage (DOL)		
Particulars	**A Ltd (₹)**	**B Ltd (₹)**
Sales revenue	25,00,000	30,00,000
Less: Variable costs	12,50,000	7,50,000
Fixed costs	7,50,000	15,00,000
EBIT (operating profit)	5,00,000	7,50,000
DOL = (Sales – VC) / EBIT	2.5	3

B Ltd. has greater business risk as its DOL is higher.

Solved Case 3

The operating income of Hypothetical Ltd amounts to ₹1,86,000. It pays 35% tax on its income. Its capital structure consists of the following: (₹)

14% Debentures	5,00,000
15% Preference shares	1,00,000
Equity shares (₹100 each)	4,00,000

(i) Determine the firm's EPS.

(ii) Determine the percentage change in EPS associated with 30% change (both increase and decrease) in EBIT.

(iii) Determine the degree of financial leverage at the current level of EBIT.

(iv) What additional data do you need to compute operating as well as combined leverage?

Solution:

(i) Determination of EPS

Particulars	Amount (₹)
EBIT	1,86,000
Less interest (0.14 × ₹5,00,000)	70,000
EBT	1,16,000
Less taxes (0.35)	40,600
EAT	75,400
Less: Dividend on preference shares	15,000
Earnings available for equity holders	60,400
EPS (₹60,400 ÷ 4,000)	15.1

(ii) Change in EPS

Particulars	Change in EBIT (₹)	
	(+30%)	(–30%)
EBIT	2,41,800	1,30,200
Less interest	70,000	70,000
EBT	1,71,800	60,200
Less taxes (0.35)	60,130	21,070
EAT	1,11,670	39,130
Less: Dividends payable on preference shares	15,000	15,000
Earnings available for equity holders	96,670	24,130
EPS	24.17	6.03
Change in EPS (Δ EPS ÷ EPS)	(+60.05%)	(–60.05%)

(iii) DFL = EBIT / EBIT – I – [D_p/(1 – t)]
= ₹ 1,86,000 / (₹ 1,86,000 – ₹ 70,000 – [₹ 15,000 ÷ (0.65)]
= 2 (times).

(iv) The additional data required to compute the operating and combined leverage relate to sales and variable cost.

Solved Case 4

The shareholders' funds of XYZ Ltd for the year ending March 31 are as follows: (₹)

12% Preference share capital	1,00,000
Equity share capital (Rs 100 each)	4,00,000
Share premium	40,000
Retained earnings	3,00,000
	8,40,000

The earnings available for equity shareholders from this period's operations are ₹1,50,000, which have been included as part of the ₹3,00,000 retained earnings.

(i) What is the maximum dividend per share (DPS) the firm can pay?

(ii) If the firm has ₹60,000 in cash, what is the largest DPS it can pay without borrowing?

(iii) Indicate what accounts, if any, will be affected if the firm pays the dividends indicated in (ii) above?

Solution:

(i) Maximum DPS = Total distributable profits /Number of equity shares outstanding
= ₹3,00,000 / 4,000 (₹4,00,000 ÷ 100)
= ₹75

(ii) Maximum DPS (without borrowing) = Cash available / Number of equity shares outstanding
= ₹60,000 / 4,000
= ₹15

(iii) Accounts relating to retained earnings and cash will be affected. Retained earnings balance will decline by ₹60,000, that is the amount of dividend paid. Cash will be reduced to zero.

Note: It is assumed that preference share dividends have been paid in full.

Exercise

A. Theoritical Questions

⊙ Multiple Choice Questions

1. Operating leverage helps in analysis of:
   (a) Business Risk
   (b) Financing Risk
   (c) Production Risk
   (d) Credit Risk

2. Which of the following is studied with the help of financial leverage?
   (a) Marketing Risk
   (b) Interest Rate Risk
   (c) Foreign Exchange Risk
   (d) Financing risk

3. Combined Leverage is obtained from OL and FL by their:
   (a) Addition
   (b) Subtraction
   (c) Multiplication
   (d) Any of these

4. High degree of financial leverage means:
   (a) High debt proportion
   (b) Lower debt proportion
   (c) Equal debt and equity
   (d) No debt

5. Operating leverage arises because of:
   (a) Fixed Cost of Production
   (b) Fixed Interest Cost
   (c) Variable Cost
   (d) Step Cost

6. Financial Leverage arises because of:
   (a) Fixed cost of production
   (b) Variable Cost
   (c) Interest Cost
   (d) Step Cost

7. Operating Leverage is calculated as:
   (a) Contribution ÷ EBIT
   (b) EBIT÷PBT
   (c) EBIT ÷Interest
   (d) EBIT ÷Tax

8. Financial Leverage is calculated as:
   (a) EBIT÷ Contribution
   (b) EBIT÷ PBT
   (c) EBIT÷ Sales
   (d) EBIT ÷ Variable Cost

9. Which combination is generally good for firms
   (a) High OL, High FL
   (b) Low OL, Low FL
   (c) High OL, Low FL
   (d) Moderate OL. Moderate FL

10. Combined leverage can be used to measure the relationship between:
   (a) EBIT and EPS
   (b) PAT and EPS
   (c) Sales and EPS
   (d) Sales and EBIT

11. FL is zero if:
   (a) EBIT = Interest
   (b) EBIT = Zero
   (c) EBIT = Fixed Cost
   (d) EBIT = Pref. Dividend

12. Business risk can be measured by:
   (a) Financial leverage
   (b) Operating leverage
   (c) Combined leverage
   (d) All of the above

13. Financial Leverage measures relationship between
   (a) EBIT and PBT
   (b) EBIT and EPS
   (c) Sales and PBT
   (d) Sales and EPS

14. Use of Preference Share Capital in Capital structure
    (a) Increases OL
    (b) Increases FL
    (c) Decreases OL
    (d) Decreases FL

15. Relationship between change in sales and change m is measured by:
    (a) Financial leverage
    (b) Combined leverage
    (c) Operating leverage
    (d) All of the above

16. Operating leverage works when:
    (a) Sales Increases
    (b) Sales Decreases
    (c) Both (a) and (b)
    (d) None of (a) and (b)

17. Which of the following is correct?
    (a) CL= OL + FL
    (b) CL=OL-FL
    (c) OL= OL × FL
    (d) OL=OL÷FL

18. If the fixed cost of production is zero, which one of the following is correct?
    (a) OL is zero
    (b) FL is zero
    (c) CL is zero
    (d) None of the above

19. If a firm has no debt, which one is correct?
    (a) OL is one
    (b) FL is one
    (c) OL is zero
    (d) FL is zero

20. If a company issues new share capital to redeem debentures, then:
    (a) OL will increase
    (b) FL will increase
    (c) OL will decrease
    (d) FL will decrease

21. If a firm has a DOL of 2.8, it means:
    (a) If sales increase by 2.8%, the EBIT will increase by 1%
    (b) If EBIT increase by 2.896, the EPS will increase by 1 %
    (c) If sales rise by 1%, EBIT will rise by 2.8%
    (d) None of the above

22. Higher OL is related to the use of higher:
    (a) Debt
    (b) Equity
    (c) Fixed Cost
    (d) Variable Cost

23. Higher FL is related the use of:
    (a) Higher Equity
    (b) Higher Debt
    (c) Lower Debt
    (d) Lower Equity

24. In order to calculate EPS, Profit after Tax and Preference Dividend is divided by:
    (a) MP of Equity Shares
    (b) Number of Equity Shares
    (c) Face Value of Equity Shares
    (d) All of the above.

25. Trading on Equity is:
    (a) Always beneficial
    (b) May be beneficial
    (c) Never beneficial
    (d) Sometimes beneficial.

26. Benefit of 'Trading on Equity' is available only if:
    (a) Rate of Interest < Rate of Return
    (b) Rate of Interest > Rate of Return
    (c) Both (a) and (b)
    (d) None of (d) and (b).

27. Indifference Level of EBIT is one at which:
    (a) EPS is zero
    (b) EPS is Minimum
    (c) EPS is highest
    (d) None of these.

28. Financial Break-even level of EBIT is one at which:
    (a) EPS is one
    (b) EPS is zero
    (c) EPS is Infinite
    (d) EPS is Negative.

29. Relationship between change in Sales and d Operating Profit is known as:
    (a) Financial Leverage
    (b) Operating Leverage
    (c) Net Profit Ratio
    (d) Gross Profit Ratio.

30. If a firm has no Preference share capital, Financial Breakeven level is defined as equal to –
    (a) EBIT
    (b) Interest liability
    (c) Equity Dividend
    (d) Tax Liability.

31. At Indifference level of EBIT, different capital have-
    (a) Same EBIT
    (b) Same EPS
    (c) Same PAT
    (d) Same PBT

32. Which of the following is not a relevant factor m EPS Analysis of capital structure?
    (a) Rate of Interest on Debt
    (b) Tax Rate
    (c) Amount of Preference Share Capital
    (d) Dividend paid last year.

33. For a constant EBIT, if the debt level is further increased then
    (a) EPS will always increase
    (b) EPS may increase
    (c) EPS will never increase
    (d) None of the above

34. Between two capital plans, if expected EBIT is more than indifference level of EBIT, then
    (a) Both plans be rejected
    (b) Both plans are good
    (c) One is better than other
    (d) Both plans are break-even

35. Financial break-even level of EBIT is:
    (a) Intercept at Y-axis
    (b) Intercept at X-axis
    (c) Slope of EBIT-EPS line
    (d) None of the above.

36. What is the value of a levered firm L Ltd. if it has the same EBIT as an unlevered firm U Ltd., (with value of ₹ 700 lakh), has a debt of ₹ 200 lakh, tax rate is 35 % under M-M approach?
    (a) ₹ 770 lakh
    (b) ₹ 500 lakh
    (c) ₹ 630 lakh
    (d) ₹ 900 lakh

37. The degree of operating leverage and degree of financial leverage of VINTEX LTD. are 2.00 and 1.5 respectively. What will be the percentage change in EPS, if the sale increases by 10%?
    (a) 10% increase
    (b) 15% increase
    (c) 30% increase
    (d) 35% increase

38. The Degree of Operating Leverage (DOL) and the Degree of Financial Leverage of ALANTA LTD. are 3 and 1.67 respectively. If the management of the company targets to increase the EPS by 10 %, by how much percentage should sales volume be increased? (Rounded off your answer to the nearest value.)
    (a) 5.00%
    (b) 3.40%
    (c) 3.00%
    (d) 2.00%

39. According to Gordon's Dividend Capitalisation Model, if the share price of a firm is ₹ 43, its dividend pay-out ratio is 60%, cost of equity is 9%, ROI is 12% and the number of shares are 12,000, what will be the net profit of the firm?
    (a) ₹ 15,480
    (b) ₹ 23,220
    (c) ₹ 36,120
    (d) ₹ 54,180

Answers:

1	**a**
4	**a**
7	**a**
10	**c**
13	**b**

2	**d**
5	**a**
8	**b**
11	**b**
14	**b**

3	**c**
6	**c**
9	**c**
12	**b**
15	**b**

16	c
19	b
22	c
25	b
28	b
31	b
34	c
37	c

17	c
20	d
23	b
26	a
29	b
32	d
35	b
38	d

18	d
21	c
24	b
27	d
30	b
33	b
36	a
39	c

⊙ **State True or False**

1. Operating leverage analyses the relationship between sales level and EPS.
2. Financial leverage depends upon the operating leverage.
3. Dividend on preference shares is a factor of operating leverage.
4. Operating leverage may be defined as Contribution ÷ EPS.
5. Financial leverage depends upon the fixed financial charges.
6. Favourable financial leverage and trading on equity are same.
7. Combined leverage establishes the relationship between operating leverage and financial leverage.
8. Financial leverage is always beneficial to the firm.
9. Total risk of a firm is determined by the combined effect of operating and financial leverages.
10. Combined leverage helps in analysing the effect of change in sales level on the EPS of the firm.
11. EBIT is also known as operating profits.
12. If EBIT for two firms is same, then the EPS of these firms would also always be same.
13. EPS depends upon the composition of capital structure.
14. Financial breakeven level occurs when EBIT is zero.
15. At financial breakeven level of EBIT, EPS would be zero.
16. Indifference level of EBIT is one at which EPS is zero.
17. Indifference level of EBIT is one at which EPS under two or more financial plans would be same.
18. All equity plan and Debt-equity plan have no indifference level of EBIT.
19. Preference dividend is not a factor of indifference level of EBIT.
20. EBIT-EPS Analysis is an extension of financial leverage analysis.
21. Trading on equity is resorted to with a view to decrease EPS.
22. If the cost of capital of the firm (k) is higher than the rate of return (r), the firm will retain its earnings as it would lead to the reduction of its cost of capital.
23. M-M theory of irrelevance of dividends is applicable only to firms which have a constant investment policy.

24. According to M-M theory, the market price of the share will remain unchanged even after the payment of dividends.

25. The term dividend refers to that portion of profit (after tax) or earnings or retained earnings which is distributed among the owners/shareholders of the firm.

Answers:

1	**F**	**2**	**F**	**3**	**F**
4	**F**	**5**	**T**	**6**	**T**
7	**F**	**8**	**F**	**9**	**T**
10	**T**	**11**	**T**	**12**	**F**
13	**T**	**14**	**F**	**15**	**T**
16	**F**	**17**	**T**	**18**	**F**
19	**F**	**20**	**T**	**21**	**F**
22	**F**	**23**	**T**	**24**	**T**
25	**T**				

⊙ **Fill in the Blanks**

1. Irrational investors are not an assumption of the _____ for irrelevance of dividends.
2. According to _____, the value of the share is proportion to the D/P ratio not related at all.
3. The arbitrage process implies that the market value plus current dividends of two firms which are alike in all respects except _____ ratio will be identical.
4. Under _____ condition is the Walter model similar to the MM hypothesis with regards to the payment of dividends.
5. According to the Gordon model, the discount rate used by the investors exhibits _____ relationship with the retention rate.
6. _____measures the percentage of earnings the company pays in dividends = Dividends / Earnings.
7. _____theory holds the belief that dividends have effect on a company's stock price.
8. When r >k, the price per share increases as the pay-out ratio _____ (optional pay-out ratio is nil).
9. _____ theory holds the belief that dividends do not have any effect on a company's stock price.
10. Mezzanine debt, sometimes called _____.
11. In simple terms, the capital stack represents the underlying _____.

Answers:

1	**MM theory**	**2**	**Walter's model**	**3**	**D/P Ratio**
4	**r = k**	**5**	**Directly proportional**	**6**	**Dividend Payout**

7	Dividend relevance	8	decreases	9	Dividend irrelevance
10	junior debt	11	capital structure		

Short Essay Type Questions

1. Discuss the basic concept of financing decisions of a firm.
2. Discuss the basic concept of capital structure.
3. Explain the basic concept of capital stacking.
4. Explain the basic concept of collateral.
5. Discuss the meaning and concept of covenant (financial and non-financial), negative covenants and cross default.
6. Explain the relation between capital stacking and risk analysis.
7. State the importance of senior and junior debt management.
8. Discuss the meaning, concept, importance and types of capital structure.
9. Write a short note on leverage analysis.
10. Write a short note on EBIT – EPS analysis.
11. What do you mean by DOL, DFL and DCL?
12. What do you mean by dividend decisions and dividend theories? Why it is important?

Essay Type Questions

1. Discuss different theories of capital structure with suitable examples.
2. What is meant by the term 'leverage'? What are its types? With what type of risk is each leverage generally associated? Why is increasing leverage also indicative of increasing risk? State the situation when there is neither a financial risk nor business risk.
3. A financial analyst is interested in ascertaining business risk of two similar firms. If all operating data for the two firms were the same, save the following differences, which firm would have greater amount of business risk in each instance? (a) Firm X has a higher sales level than Firm Y, (b) Firm X has a higher EBIT level, and (c) Firm Y has a lower variable cost ratio.
4. What is combined leverage? What does it measure? What would be the changes in the degree of combined leverage, assuming other things being equal, in each of the following situations?(a) The fixed costs increase, (b) The EBIT level increases, (c) The sale price decreases, and (d) The variable cost decreases.
5. Why must the finance manager keep in mind the degree of financial leverage in evaluating various financing plans? When does financial leverage become favorable?
6. What is the 'indifference point' and why is it so called? What is its usefulness?
7. What is an indifference point in the EBIT-EPS analysis? How would you compute it?
8. Explain the significance of operating and financial leverage analysis for a financial executive in corporate profit and financial structure planning.
9. Evaluate different models on dividend policy.

B. Numerical Questions:

⊙ Comprehensive Numerical Problems

1. Premier Ltd.'s capital structure consists of the following:

Particulars	Amount (in ₹lakh)
Equity shares of ₹100 each	20
Retained earnings	10
9% Preference shares	12
7% Debentures	8
TOTAL	50

The company's EBIT is at the rate of 12% on its capital employed which is likely to remain unchanged after expansion. The expansion involves additional finances aggregating ₹25 lakh for which the following alternatives are available to it:

(i) Issue of 20,000 equity shares at a premium of ₹25 per share.

(ii) Issue of 10% Preference shares.

(iii) Issue of 8% Debentures.

It is estimated that the P/E ratio in case of equity shares, preference shares and debentures financing would be 15, 12, and 10 respectively.

Which of the financing alternatives would you recommend and why? The corporate tax rate is 35%.

2. Key information pertaining to the proposed new financing plans of Hypothetical Ltd. is given below:

Sources of funds	Financing plans	
	1	2
Equity	15,000 shares of ₹100 each	30,000 shares of ₹100 each
Preference shares	12%, 25,000 shares of ₹100 each	--
Debentures	₹5,00,000 at a coupon rate of 0.10	15,00,000, coupon rate of 0.11

Assuming 35% tax rate,

(i) Determine the two EBIT - EPS coordinates for each financial plan.

(ii) Determine the (a) indifference point, and (b) financial break-even point for each financing plan.

(iii) Which plan has more financial risk and why?

(iv) Indicate over what EBIT range, if any, one plan is better than the other.

(v) If the firm is fairly certain that its EBIT will be ₹12,50,000, which plan would you recommend, and why?

3. Hypothetical Ltd. is in need of ₹1,00,000 to finance its increased net working capital requirements. The finance manager of the company believes that its various financial costs and share price will be unaffected by the selection of a particular plan, since a small sum is involved. Debentures will cost 10%, preference shares 11%, and equity shares can be sold for ₹25 per share. The tax rate is 35%.

Sources of funds	Financing plans (per cent)		
	1	2	3
Equity	100	30	50
Preference shares	0	10	20
Debentures	0	60	30

Determine the financial breakeven point.

(i) Which plan has greater risk? Assume EBIT level of ₹50,000.

4. The operating and cost data of ABC Ltd are:

Sales	₹20,00,000
Variable costs	14,00,000
Fixed costs	4,00,000 (including 15% interest on ₹10,00,000)

Calculate its operating, financial and combined leverage.

Answers:

1	Issuing equity shares is the best alternative as it maximizes the MPS (₹165.30).
2	(i) (a) EBIT : ₹5,11,538 ; ₹1,65,000 (b) EPS : ₹32 ; ₹23.51 (ii) (a) ₹8,58,077 (b) ₹5,11,538 (Plan 1); ₹1,65,000 (Plan 2) (iii) Financial risk is measured by DFL. Plan 1 has more financial risk as its DFL is likely to be higher. (iv) Financial Plan 2 is better for EBIT level of less than ₹8,58,077 ; Plan 1 is better for EBIT ranges beyond that level. (v) Plan 1, as EPS will be higher.
3	(i) ₹ 6,385 (ii) DFL of Financial Plan 1 : 1 Plan 2 : 1.18 Plan 3 : 1.15 Financial Plan 2 has higher financial risk.
4	DOL - 1.71 DFL - 1.75 DCL - 2.99

Unsolved Case(s)

1. The two companies, X Ltd. and Y Ltd., belong to an equivalent risk class. These two firms are identical in every respect except that X Ltd. is unlevered while Company Y Ltd. has 10 % debentures of ₹ 30 lakh. The other relevant information regarding their valuation and capitalisation rates are as follows:

Particulars	X Ltd.	Y Ltd.
Net operating income (EBIT) (₹)	7,50,000	7,50,000
Interest on debt (I) (₹)		3,00,000
Earnings to equity holders (NI) (₹)	7,50,000	4,50,000
Equity-capitalisation rate (ke)	0.15	0.20
Market value of equity (S) (₹)	50,00,000	22,50,000
Market value of debt (B) (₹)		30,00,000
Total value of fi rm (S + B) = V (₹)	50,00,000	52,50,000
Implied overall capitalisation rate (ko)	0.15	0.143
Debt-equity ratio (B/S)	0	1.33

   (a) An investor owns 10 % equity shares of company Y Ltd. Show the arbitrage process and the amount by which he could reduce his outlay through the use of leverage.

   (b) According to Modigliani and Miller, when will this arbitrage process come to an end?

2. VE Ltd. has EBIT of ₹ 2 million and tax rate is 40%. The return on equity without debt is 14%. Determine the value of the company according to M-M hypothesis when,

   A. Debt is absent

   B. Debt is ₹ 2 million

   C. Debt is ₹ 6 million

3. GC Ltd. follows a current dividend policy of distributing 40% of its earnings. The shares of the company trade at ₹ 200. The management is of the opinion that an increase in the dividend payout from current 40% to either 50% or 60% would increase the value of the firm and provide better returns to the investors.

   Assuming that the firm continues to remain in the same business and expected earnings of ₹ 40 per share in the coming year, examine the shareholders' return if GC Ltd. changes its payout to (a) 50%, and (60%).

4. From the following data, calculate DOL and DFL, and DTL (degree of total leverage). Given the selling price is ₹ 2 per unit, fixed cost is ₹ 1,00,000 and variable cost is ₹ 7 per unit and the number of units is 1,00,000.

5. From the following data, calculate percentage change in EPS if sales are expected to increase by 5%:

EBIT	₹ 10,00,000
PBT	₹ 4,00,000
Fixed Cost	₹ 6,00,000

6. From the following data of four firms, calculate the EPS, the DOL and the DFL:

	Firm - P	Firm - Q	Firm - R	Firm – S
Sales (in units)	20,000	25,000	30,000	40,000
Selling price per unit (₹)	15	20	25	30
Variable cost per unit (₹)	10	15	20	25
Fixed cost (₹)	30,000	40,000	50,000	60,000
Interest (₹)	15,000	25,000	35,000	40,000
Tax (%)	40	40	40	40
Number of equity shares	5,000	9,000	10,000	12,000

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SECTION-B

Business Data Analytics

Introduction to Data Science for Business Decision-Making

8

This Module Includes

8.1 Meaning, Nature, Properties, Scope of Data

8.2 Types of Data in Finance and Costing

8.3 Digitization of Data and Information

8.4 Transformation of Data to Decision Relevant Information

8.5 Communication of Information for Quality Decision-making

8.6 Professional Skepticism regarding Data

8.7 Ethical Use of Data and Information

Introduction to Data Science for Business Decision-Making

SLOB Mapped against the Module:

To develop a detailed understanding of the fundamental concepts of data science and its expected role in business decisions.

Module Learning Objectives:

After studying this module, the students will be able to –

- Understand the basic meaning, Nature, Properties, Scope of Data
- Understand the use of data for business relevant decision making process
- Understand the ethical use of data

Meaning, Nature, Properties, Scope of Data

8.1

8.1.1 What is data and how it is linked to information and knowledge?

Data refers to the raw facts and figures, often in the form of numbers, text strings. Data is a source of information and information needs to be processed for gathering knowledge. Any 'data' on its own does not confer any meaning. The relationship between data, information, and knowledge may be depicted from figure 8.1 below:

Figure 8.1: Relationship between data, information & Knowledge

8.1.2 What is information?

As we discussed, data needs to processed for gathering information. Most commonly, we take the help of computers and software packages for processing data. An exponential growth in availability of computing powers, and software packages lead to growth of data science in recent years.

8.1.3 What is knowledge?

When these 'information' is used for solving a problem, we say it's the use of knowledge. By having the information, about highest temperatures in Kolkata for a month, we may try to estimate the sale of air conditioners. If our intention is to analyse the profitability of listed FMCG companies in India, first information we should have been the names of FMCG companies.

8.1.4 Nature of Data

Over the time the magnitude and availability of data has exponentially grown over the years. However, the data sets may be classified into different groups as below:

(i) Numerical data: Any data expressed as a number is a numerical data. In finance, a prominent example is stock price data.

(ii) Descriptive data: Some times information may be deciphered in the form of qualitative information. The user may use this data to make a judicious investment decision.

(iii) Graphic data: A picture or graphic may tell thousand stories. Data may also be presented in the form of a picture or graphics.

(v) Structured data: It is well organized and easily searchable. It is often found in database and spreadsheets.

(v) Unstructured data: Information that doesn't have a predefined data model or is not organized in a specific manner such as text documents, images, videos, social media posts etc.

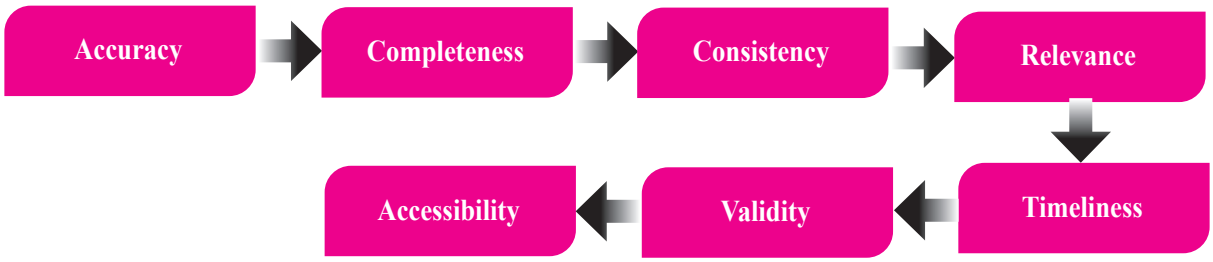
(vi) Quantitative data: Numerical data that can be measured and expressed using numbers.

(vii)Qualitative data: Descriptive data typically based on qualities or characteristics. It is often captured through observations, interviews or open ended responses.

(viii)Continuous data: It can take any value within a range like height or weight.

(ix) Categorical data: It falls into specific categories or groups like types of cars or colours.

8.1.5 Properties of data



8.1.6 Scope of data

It refers to the range and extent of information. It is available for analysis or comsideration within a particular context. It encompasses the depth and width of the data, including its sources, variety (structured or unstructured), volume (amount of data) and the time frame covered.

The scope determines what insights or conclusions can be drawn from the data and how comprehensive the analysis can be.

Types of Data in Finance and Costing

8.2

Data plays a very important role in the study of finance and cost accounting. From the inception of the study of finance, accounting and cost accounting, data always played an important role. Be it in the form of financial statements, or cost statements etc the finance and accounting professionals played a significant role in helping the management to make prudent decisions.

The kinds of data used in finance and costing may be quantitative as well as qualitative in nature.

- **Quantitative financial data:** By the term 'quantitative data', we mean the data expressed in numbers. The quantitative data availability in finance is significant. The stock price data, financial statements etc are examples of quantitative data. As most of the financial records are maintained in the form of organised numerical data.

- **Qualitative financial data:** However, some data in financial studies may appear in a qualitative format e.g. text, videos, audio etc. These types of data may be very useful for financial analysis. For example, the 'management discussion and analysis' presented as part of annual report of a company is mostly presented in the form of text. This information is useful for getting an insight into the performance of the business. Similarly, key executives often appear for an interview in business channels. These interactions are often goldmines for data and information.

Types of data

1) Financial data:

   (i) Balance Sheet

   (ii) Income Statements

   (iii) Cash flow Statements

2) Market Data:

   (i) Stock prices

   (ii) Interest rates

   (iii) Economic indicators

3) Cost Data:

   (i) Production Costs

   (ii) Labour costs

   (iii) Overheads

4) Budgetary Data:

   (i) Planned expenditures

   (ii) Actual financial performance

5) Customer and sales data:

   (i) Sales figures

   (ii) Customer Behaviour

   (iii) Demographics

Digitization of Data and Information

8.3

In plain terms, digitization implies the process of converting the data and information from analogue to digital format. The data in the original form may be stored in as an object, a document or an image. The objective of digitization is to create a digital surrogate of the data and information in the form of binary numbers that facilitate processing using computers. There are primarily two basic objectives of digitization. First is to provide a widespread access of data and information to a very large group of users simultaneously. Secondly, digitization helps in preservation of data for a longer period. One of largest digitization project taken up in India is 'Unique Identification number' (UID) or 'Aadhar'.

Digitization brings in some great advantages, which are mentioned below.

Why we digitize?

There are many arguments that favour digitization of records. Some of them are mentioned below:

- Improves classification and indexing for documents, this helps in retrieval of the records.
- Digitized records may be accessed by more than one person simultaneously.
- It becomes easier to reuse the data, which are difficult to reuse in present format e.g. very large maps, data recorded in microfilms etc.
- Helps in work processing
- Higher integration with business information systems
- Easier to keep back-up files and retrieval during any unexpected disaster
- Can be accessed from multiple locations through networked systems
- Increased scope for rise in organizational productivity
- Requires less physical storage space

How do we digitize?

Large institution takes up digitization projects with meticulous planning and execution. The entire process of digitization may be segregated into six phases:

Phase 1: Justification of the proposed digitization project

At the very initiation of the digitization project, the accrual benefit of the project needs to be identified. Also need to compute the cost aspect of the project and the assessment of availability of resources. Risk assessment is an important part project assessment. For the resources that may be facing quick destruction may be required an early digitization.

Most importantly, the expected value generation through digitization should be expressed in clear terms.

Phase 2: Assessment

In any institutions, all records are never digitized. The data that requires digitization is to be decided on the basis of content and context. Some data may be digitized in a consolidated format, and some in detailed format. The files, tables, documents, expected future use etc are to be accessed and evaluated for the assessment.

The hardware and software requirements for digitization is also assessed at this stage. The human resource requirement for executing the digitization project is also planned. The risk assessment at this level e.g. possibilities of natural disasters, and/or cyber attacks etc also need to be completed.

Phase 3: Planning

Successful execution of digitization project needs meticulous planning. There are several stages for planning e.g. selection of digitization approach, Project documentation, Resources management, Technical specifications, and Risk management.

The institution may decide to complete the digitization in-house or alternatively by an outsourced agency. It may also be done on-demand or in batches.

Phase 4: Digitization activities

Upon the completion of assessment and planning phase, the digitization activities start. The Wisconsin Historical Society developed a six-phase process viz. Planning, Capture, Primary quality control, Editing, Secondary quality control, and storage and management.

The planning schedule is prepared at the fist stage, calibration of hardware/software and scanning etc is done next. A primary quality check is done on the output to check the reliability. Cropping, colour correction, assigning Metadata etc is done at the editing stage. A final check of quality is done on randomly selected samples. And finally, user copies are created, and uploaded to dedicated storage space, after doing file validation. The digitization process may be viewed at figure 8.9 below.

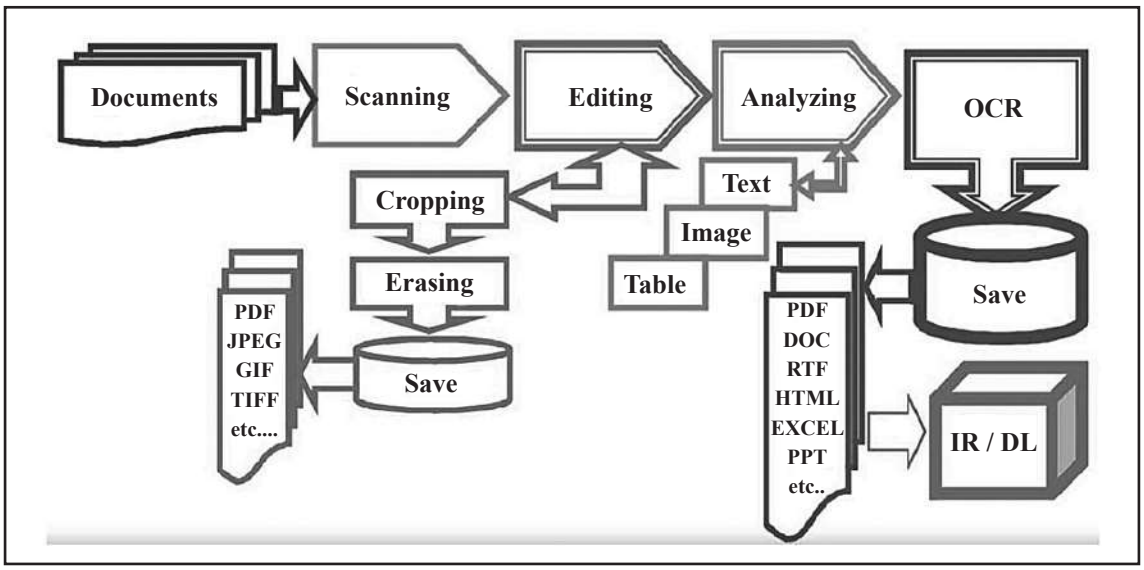


Figure 8.9: The complete digitization process. Source: Bandi, S., Angadi, M. and Shivarama, J. Best practices in digitization: Planning and workflow processes. In Proceedings of the Emerging Technologies and Future of Libraries: Issues and Challenges (Gulbarga University, Karnataka, India, 30-31 January), 2015

Phase 5: Processes in the care of records

Once the digitization of records is complete, there are few additional requirements arise which may be linked to administration of records. The permission for accession of data, intellectual control (over data), classification (if necessary), and upkeeping and maintenance of data are few additional requirements for data management.

Phase 6: Evaluation

Once the digitization project is updated and implemented, the final phase should be a systematic determination of the project's merit, worth and significant using objective criteria. The primary purpose is to enable reflection and assist identify changes that would improve future digitization processes.

Transformation of Data to Decision Relevant Information

8.4

The emergence of big data has changed the world of business like never before. The most important shift has happened in the information generation and the decision-making process. There is a strong emergence of analytics that supports a more intensive data-centric and data-driven information generation and decision-making process. The data that encompasses the organization is being harnessed into information that apprises, cares and prudent decision making in a judicious and repeatable manner.

The pertinent question here is, What an enterprise needs to do for transforming data into relevant information? As noted earlier, all types of data may not lead to relevant information for decision making. The biannual KPMG global CFO report says, for today's finance function leaders, "biggest challenges lie in creating the efficiencies needed to gather and process basic financial data and continue to deliver traditional finance outputs while at the same time redeploying their limited resources to enable higher-value business decision support activities."

To make the data turn into user friendly information, it should go through six core steps:

1. **Collection of data:** The collection of data may be done with standardized systems in place. Appropriate software and hardware may be used for this purpose. Appointment of trained staff also plays an important role in collecting accurate and relevant data.
2. **Organising the data:** The raw data needs to be organized in an appropriate manner to generate relevant information. The data may be grouped, arranged in a manner that create useful information for the target user groups.
3. **Data processing:** At this step, data needs to be cleaned to remove the unnecessary elements. If any data point is missing or not available, that also need to be addressed. The options available for presentation format for the data also need to be decided.
4. **Integration of data:** Data integration is the process of combining data from various sources into a single, unified form. This step include creation of data network sources, a master server and users accessing the data from master server. Data integration eventually enables the analytics tools to produce effective, actionable business intelligence.
5. **Data reporting:** Data reporting stage involves translating the data into a consumable format to make it accessible by the users. For example, for a business firm, they should be able to provide summarized financial information e.g. revenue, net profit etc. The objective is, a user, who wants to understand the financial position of the company should get the relevant and accurate information.
6. **Data utilization:** At this ultimate step, data is being utilized to back corporate activities and enhance operational efficiencies and productivity for the growth of business. This makes the corporate decision making really 'data driven'.

Communication of Information for Quality Decision-making

8.5

The quality information should lead to quality decisions. With the help of well curated and reported data, the decision makers should be able to add higher-value business insights leading to better strategic decision making.

In a sense, a judicious use of data analytics is essential for implementation of 'lean finance', which implies optimized finance processes with reduced cost and increased speed, flexibility and quality. By transforming the information into a process for quality decision making, the firm should achieve the following abilities:

(i) Logical understanding of a wide-ranging structured and unstructured data and put on that information to corporate planning, budgeting and forecasting and decision support

(ii) Predict outcomes more effectively compared to conventional forecasting techniques based on historical financial reports

(iii) Real time spotting of emerging opportunities and also capability gaps.

(iv) Making strategies for responding to uncertain events like market volatility and 'black swan' events through simulation.

(v) Diagnose, filter and excerpt value from financial and operational information for making better business decisions

(vi) Recognize viable advantages to service customers in a better manner

(vii) Identifying possible fraud possibilities on the basis of data analytics.

(viii) Building impressive and useful dashboards to measure and demonstrate success leading to effective strategies.

Professional Scepticism Regarding Data

8.6

While data analytics is an important tool for decision making, managers should never take an important analysis at face value. A deeper understanding of hidden insights that lie underneath the surface of the data set need to be explored, and what appears on the surface should be looked with some scepticism.

The emergence of new data analytics tools and techniques in financial environment allows the accounting and finance professionals to gain unique insights into the data, but at the same time creating very unique challenges while exercising scepticism. As the availability of data is bigger now, analysts and auditors not only getting more information, but also is facing challenges about managing and investigating red flags.

One major concern about the use of data analytics is the likelihood of false positives, i.e. the data may identify few potential anomalies that could be later identified as reasonable and explained variation of data.

Studies show that the frequency of false positives increase proportionately with the size and complexity of data. Few studies also show that analysts face problems while determining outliers using data analytics tools.

Professional scepticism is an important focus area for practitioners, researchers, regulators and standard setters. At the same time, professional scepticism may result into additional costs e.g. strained client relationships, and budget coverages.

Under such circumstances, it is important to identify and understand conditions in which the finance and audit professionals should apply professional scepticism. There is a requirement to keep a fine balance between costly scepticism and underutilizing data analytics to keep the cost under control.

Ethical Use of Data and Information

8.7

Data analytics can help in decision making process and make an impact. However, this empowerment for business also comes with challenges. The question is how the business organizations can ethically collect, store and use data? And what rights need to be upheld? Below we will discuss five guiding principles in this regard. Data ethics addresses the moral obligations of gathering, protecting and using personally identifiable information. In present days, it is a major concern for analysts, managers and data professionals.

The five basic principles of data ethics that a business organization should follow are:

(i) **Regarding ownership:** The first principle is that ownership of any personal information belongs to the person. It is unlawful and unethical to collect someone's personal data without their consent. The consent may be obtained through digital privacy policies or signed agreements or by asking the users to agree with terms and conditions. It is always advisable to ask for permission beforehand to avoid future legal and ethical complications. In case of financial data, some data may be sensitive in nature. Prior permission must be obtained before using the financial data for further analysis.

(ii) **Regarding transparency:** Maintaining transparency is important while gathering data. The objective with which the company is collecting user's data should be known to the user. For example is the company is using cookies to track the online behaviour of the user, it should be mentioned to the user through a written policy that cookies would be used for tracking user's online behaviour and the collected data will be stored in a secure database to train an algorithm to enhance user experience. After reading the policy, the user may decide to accept or not to accept the policy. Similarly, while collecting the financial data from clients, it should be clearly mentioned that for which purpose the data should be used.

(iii) **Regarding privacy:** As the user may allow to collect, store and analyze the personally identifiable information (PII), that does not imply it should be made publicly available. For companies, it is mandatory to publish some financial information to public e.g. through annual reports. However, there may be many confidential information, which if falls on a wrong hand may create problems and financial loss. To protect privacy of data, a data security process should be in place. This may include file encryption and dual authentication password etc. The possibility of breach of data privacy may also be done through de-identifying a dataset.

(iv) **Regarding intention:** The intension of data analysis should never be making profits out of others weaknesses or for hurting others. Collecting data which is unnecessary for analysis should be avoided and it's unethical.

(v) **Regarding outcomes:** In some cases, even if the intentions are good, the result of data analysis may inadvertently hurt the clients and data providers. This is called disparate impact, which is unethical.

Exercise

A. Theoretical Questions:

⊙ Multiple Choice Questions:

1. Numerical data may be expressed as
   (a) In the form of text
   (b) In the form of numbers
   (c) In the form of images
   (d) All of the above
2. The descriptive data may be deciphered as
   (a) May be deciphered in the form of qualitative information
   (b) May be deciphered in the form of quantitative information
   (c) May be deciphered in the form of information from informal sources
   (d) All of the above
3. Data represented in the form of picture is termed as
   (a) Graphic data
   (b) Qualitative data
   (c) Quantitative data
   (d) All of the above
4. Which of the following is/are the reason for digitization
   (a) Helps in work processing
   (b) Requires less physical storage space
   (c) Digitized records may be accessed by more than one person simultaneously
   (d) All of the above
5. To make the data turn into user friendly information, it should go one/more of following core steps
   (a) Collection of data
   (b) Organising the data
   (c) Data processing
   (d) All of the above

Answer:

1	**b**	**2**	**a**	**3**	**a**	**4**	**b**	**5**	**d**

⊙ State True or False

1. Improves classification and indexing for documents, this helps in retrieval of the records.
2. Data is not a source of information
3. One of largest digitization project taken up in India is 'Unique Identification number' (UID) or 'Aadhar'

4. When these 'information' is used for solving a problem, we may it's the use of knowledge
5. Any data expressed as a number is a numerical data

Answer:

1	T	2	F	3	T	4	T	5	T

⊙ Fill in the blanks

1. There are primarily _____ basic objectives of digitization.
2. By the term _____, we mean the data expressed in numbers.
3. Daily stock price of Tata Steel Ltd is an example of _____ data.
4. Data is a _____ of information.
5. When these 'information' is used for solving a problem, we may it's the use of _____.

Answer:

1	Two	2	Quantitative data
3	numerical	4	Source
5	knowledge		

⊙ Short essay type questions

1. Define the term 'descriptive data' with examples.
2. Discuss the difference between ordinal scale and ratio scale.
3. Discuss the relationship between data, information and knowledge
4. 'One major concern about the use of data analytics is the likelihood of false positives' – briefly discuss

⊙ Essay type questions

1. Discuss the five basic principles of data ethics that a business organization should follow
2. 'The quality information should lead to quality decisions' – Discuss
3. Discuss the six core steps that may turn the data into user friendly information.
4. Discuss the six phases that comprise the entire process of digitization.
5. Why we digitize the data?

Unsolved Case

1. Ram Kumar is the head data scientist of Anjana Ltd. For the last few weeks, he is working along with his team for extracting information from a huge pile of data collected over time. His team members are working day and night for collecting and cleaning the data. He has to make a presentation before the senior management of the company to explain the findings. Discuss the important steps, he need to take care of to transform raw data into useful knowledge.

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Data Processing, Organisation, Cleaning and Validation

9

This Module Includes

9.1 Development of Data Processing

9.2 Functions of Data Processing

9.3 Data Organisation and Distribution

9.4 Data Cleaning and Validation

Data Processing, Organisation, Cleaning and Validation

SLOB Mapped against the Module:

To equip oneself with application-oriented knowledge in data preparation, data presentation and finally data analysis and modelling to facilitate quality business decisions.

Module Learning Objectives:

After studying this module, the students will be able to –

- Understand the basic concepts of developments of data processing
- Understand the basic concepts of functions of data processing
- Understand the basic concepts of data organisation and distribution
- Understand the basic concepts of data cleaning and validation

Development of Data Processing

9.1

Data processing (DP) is the process of organising, categorising, and manipulating data in order to extract information. Information in this context refers to valuable connections and trends that may be used to address pressing issues. In recent years, the capacity and effectiveness of DP have increased manifold with the development of technology.

Data processing that used to require a lot of human labour progressively superseded by modern tools and technology. The techniques and procedures used in DP information extraction algorithms for data are well developed in recent years, for instance, the treatment of facial data classification is necessary for recognition, and time series analysis is necessary for processing stock market data.

The information extracted as a result of DP is also heavily reliant on the quality of the data. Data quality may get affected due to several issues like missing data and duplications. There may be other fundamental problems, such as incorrect equipment design and biased data collecting, which are more difficult to address.

The history of DP can be divided into three phases as a result of technological advancements (figure 9.1):

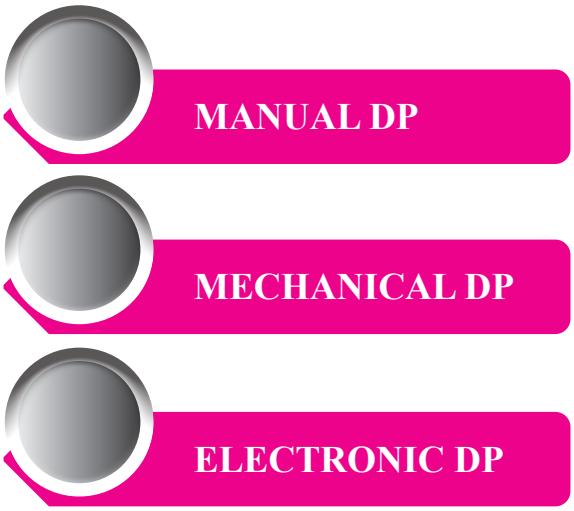

Figure 9.1: History of data processing

(i) Manual DP: Manual DP involves processing data without much assistance from machines. Prior to the phase of mechanical DP only small-scale data processing was possible using manual efforts. However, in some special cases Manual DP is still in use today, and it is typically due to the data's difficulty in digitization or inability to be read by machines, like in the case of retrieving data from outdated texts or documents.

(ii) Mechanical DP: Mechanical DP processes data using mechanical (not modern computers) tools and technologies. This phase began in 1890 (Bohme et al., 1991) when a system made up of intricate punch card machines was installed by the US Bureau of the Census in order to assist in compiling the findings of a recent national population census. Use of mechanical DP made it quicker and easier to search and compute the data than manual process.

(iii) Electronic DP: And finally, the electronic DP replaced the other two that resulted fall in mistakes and rising productivity. Data processing is being done electronically using computers and other cutting-edge electronics. It is now widely used in industry, research institutions and academia.

How data processing and data science is relevant for finance?

The relevance of data processing and data science in the area of finance is increasing every day. The eleven significant areas where data science play important role are:

(i) Risk analytics: Business inevitably involves risk, particularly in the financial industry. It is crucial to determine the risk factor before making any decisions. For example, a better method for defending the business against potential cybersecurity risks is risk analytics, which is determined through data science. Given that a large portion of a company's risk-related data is "unstructured," its analysis without data science methods can be challenging and prone to human mistake.

The importance of the loss and the regularity of its recurrence can aid in highlighting the precise regions that represent the maximum threat, allowing for the future avoidance of similar circumstances. Once a danger has been recognised, it may be prioritised and its recurrence closely watched.

Machine learning algorithms can look through historical transactions and general information to help banks analyse each customer's reliability and trustworthiness and determine the relative risk of accepting or lending to them.

Similar to this, transaction data may be used to create a dynamic, real-time risk assessment model that responds immediately to any new transactions or modifications to client data.

(ii) Real time analytics: Prior to significant advances in Data Engineering (Airflow, Spark, and Cloud solutions), all data was historical in nature. Data engineers would

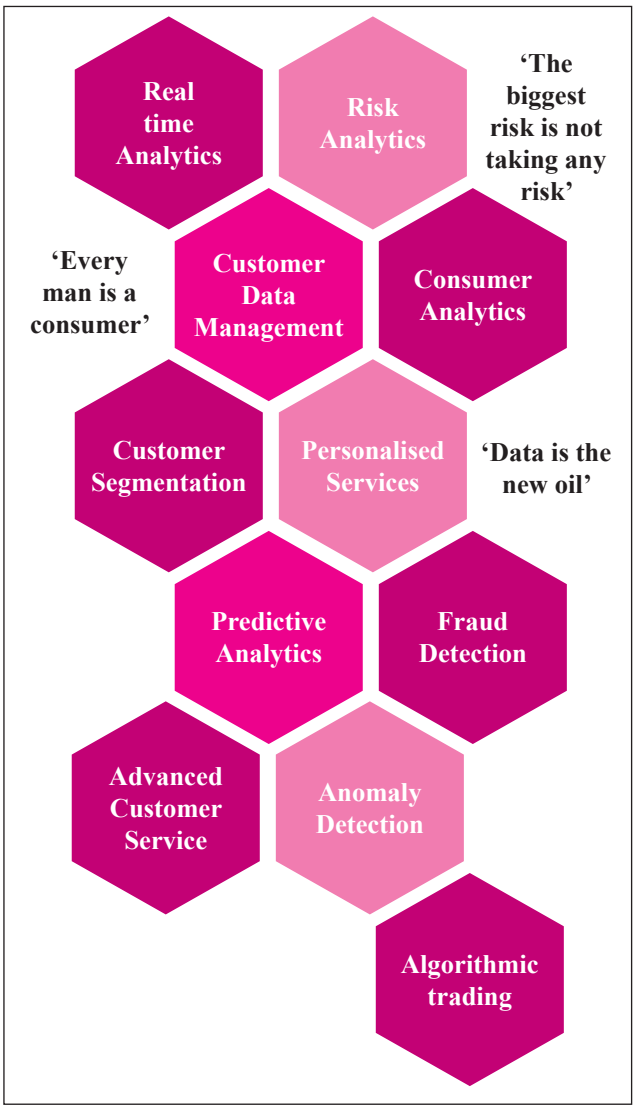

Figure 9.2: Data processing and data science in finance

discover significance in numbers that were days, weeks, months, or even years old since that was the only accessible information.

It was processed in batches, which meant that no analysis could be performed until a batch of data had been gathered within a predetermined timescale. Consequently, any conclusions drawn from this data were possibly invalid.

With technological advancement and improved hardware, real-time analytics are now available, as Data Engineering, Data Science, Machine Learning, and Business Intelligence work together to provide the optimal user experience. Thanks to dynamic data pipelines, data streams, and a speedier data transmission between source and analyzer, businesses can now respond quickly to consumer interactions. With real-time analysis, there are no delays in establishing a customer's worth to an organisation, and credit ratings and transactions are far more precise.

(iii) **Customer data management:** Data science enables effective management of client data. In recent years, many financial institutions may have processed their data solely through the machine learning capabilities of Business Intelligence (BI). However, the proliferation of big data and unstructured data has rendered this method significantly less effective for predicting risk and future trends.

There are currently more transactions occurring every minute than ever before, thus there is better data accessibility for analysis. Due to the arrival of social media and new Internet of Things (IoT) devices, a significant portion of this data does not conform to the structure of organised data previously employed.

Using methods such as text analytics, data mining, and natural language processing, data science is well-equipped to deal with massive volumes of unstructured new data. Consequently, despite the fact that data availability has been enhanced, data science implies that a company's analytical capabilities may also be upgraded, leading to a greater understanding of market patterns and client behaviour.

(iv) **Consumer Analytics:** In a world where choice has never been more crucial, it has become evident that each customer is unique; nonetheless, there have never been more consumers. This contradiction cannot be sustained without the intelligence and automation of machine learning.

It is as important to ensure that each client receives a customised service as it is to process their data swiftly and efficiently, without time-intensive individualised analysis.

As a consequence, insurance firms are using real-time analytics in conjunction with prior data patterns and quick analysis of each customer's transaction history to eliminate sub-zero consumers, enhance cross-sales, and calculate a consumer's lifetime worth. This allows each financial institution to keep their own degree of security while still reviewing each application individually.

(v) **Customer segmentation:** Despite the fact that each consumer is unique, it is only possible to comprehend their behaviour after they have been categorised or divided. Customers are frequently segmented based on socioeconomic factors, such as geography, age, and buying patterns.

By examining these clusters collectively, organisations in the financial industry and beyond may assess a customer's current and long-term worth. With this information, organisations may eliminate clients who provide little value and focus on those with promise.

To do this, data scientists can use automated machine learning algorithms to categorise their clients based on specified attributes that have been assigned relative relevance scores. Comparing these groupings to former customers reveals the expected value of time invested with each client.

(vi) **Personalized services:** The requirement to customise each customer's experience extends beyond gauging risk assessment. Even major organisations strive to provide customised service to their consumers as a

method of enhancing their reputation and increasing customer lifetime value. This is also true for businesses in the finance sector.

From customer evaluations to telephone interactions, everything can be studied in a way that benefits both the business and the consumer. By delivering the consumer a product that precisely meets their needs, cross-selling may be facilitated by a thorough comprehension of these interactions.

Natural language processing (NLP) and voice recognition technologies dissect these encounters into a series of important points that can identify chances to increase revenue, enhance the customer service experience, and steer the company's future. Due to the rapid progress of NLP research, the potential is yet to be fully realised.

(vii) Advanced customer service: Data science's capacity to give superior customer service goes hand in hand with its ability to provide customised services. As client interactions may be evaluated in real-time, more effective recommendations can be offered to the customer care agent managing the customer's case throughout the conversation.

Natural language processing can offer chances for practical financial advise based on what the consumer is saying, even if the customer is unsure of the product they are seeking.

The customer support agent can then cross-sell or up-sell while efficiently addressing the client's inquiry. The knowledge from each encounter may then be utilised to inform subsequent interactions of a similar nature, hence enhancing the system's efficacy over time.

(viii) Predictive Analytics: Predictive analytics enables organisations in the financial sector to extrapolate from existing data and anticipate what may occur in the future, including how patterns may evolve. When prediction is necessary, machine learning is utilised. Using machine learning techniques, pre-processed data may be input into the system in order for it to learn how to anticipate future occurrences accurately.

More information improves the prediction model. Typically, for an algorithm to function in shallow learning, the data must be cleansed and altered. Deep learning, on the other hand, changes the data without the need for human preparation to establish the initial rules, and so achieves superior performance.

In the case of stock market pricing, machine learning algorithms learn trends from past data in a certain interval (may be a week, month, or quarter) and then forecast future stock market trends based on this historical information. This allows data scientists to depict expected patterns for end-users in order to assist them in making investment decisions and developing trading strategies.

(ix) Fraud detection: With a rise in financial transactions, the risk for fraud also increases. Tracking incidents of fraud, such as identity theft and credit card scams, and limiting the resulting harm is a primary responsibility for financial institutions. As the technologies used to analyse big data become more sophisticated, so do their capacity to detect fraud early on.

Artificial intelligence and machine learning algorithms can now detect credit card fraud significantly more precisely, owing to the vast amount of data accessible from which to draw trends and the capacity to respond in real time to suspect behaviour.

If a major purchase is made on a credit card belonging to a consumer who has traditionally been very frugal, the card can be immediately terminated, and a notification sent to the card owner.

This protects not just the client, but also the bank and the client's insurance carrier. When it comes to trading, machine learning techniques discover irregularities and notify the relevant financial institution, enabling speedy inquiry.

(x) **Anomaly detection:** Financial services have long placed a premium on detecting abnormalities in a customer's bank account activities, partly because anomalies are only proved to be anomalous after the event happens. Although data science can provide real-time insights, it cannot anticipate singular incidents of credit card fraud or identity theft.

However, data analytics can discover instances of unlawful insider trading before they cause considerable harm. The methods for anomaly identification consist of Recurrent Neural Networks and Long Short-Term Memory models.

These algorithms can analyse the behaviour of traders before and after information about the stock market becomes public in order to determine if they illegally monopolised stock market forecasts and took advantage of investors. Transformers, which are next-generation designs for a variety of applications, including Anomaly Detection, are the foundation of more modern solutions.

(xi) **Algorithmic trading:** Algorithmic trading is one of the key uses of data science in finance. Algorithmic trading happens when an unsupervised computer utilising the intelligence supplied by an algorithm trade suggestion on the stock market. As a consequence, it eliminates the risk of loss caused by indecision and human error.

The trading algorithm used to be developed according to a set of stringent rules that decide whether it will trade on a specific market at a specific moment (there is no restriction for which markets algorithmic trading can work on).

This method is known as Reinforcement Learning, in which the model is taught using penalties and rewards associated with the rules. Each time a transaction proves to be a poor option, a model of reinforcement learning ensures that the algorithm learns and adapts its rules accordingly.

One of the primary advantages of algorithmic trading is the increased frequency of deals. Based on facts and taught behaviour, the computer can operate in a fraction of a second without human indecision or thought. Similarly, the machine will only trade when it perceives a profit opportunity according to its rule set, regardless of how rare these chances may be.

Functions of Data Processing 9.2

Data processing generally involves the following processes:

(i) Validation:

As per the UNECE glossary on statistical data editing (UNECE 2013), data validation may be defined as 'An activity aimed at verifying whether the value of a data item comes from the given (finite or infinite) set of acceptable values.'

Simon (2013) defined data validation as "**Data validation could be operationally defined as a process which ensures the correspondence of the final (published) data with a number of quality characteristics**."

(ii) Sorting:

Data sorting is any procedure that organises data into a meaningful order to make it simpler to comprehend, analyse, and visualise. Sorting is a typical strategy for presenting research data in a manner that facilitates comprehension of the story being told by the data. Sorting can be performed on raw data (across all records) or aggregated information (in a table, chart, or some other aggregated or summarised output).Summarization(statistical) or (automatic) involves reducing detailed data to its main points.

Typically, data is sorted in ascending or decreasing order based on actual numbers, counts, or percentages, but it may also be sorted based on variable value labels. Value labels are metadata present in certain applications that let the researcher to save labels for each value alternative in a categorical question. The vast majority of software programmes permit sorting by many factors. A data collection including region and nation fields, for instance, can be sorted by region as the main sort and subsequently by country. In each sorted region, the county sort will be implemented.

(iii) Aggregation:

Data aggregation refers to any process in which data is collected and summarised. When data is aggregated, individual data rows, which are often compiled from several sources, are replaced with summaries or totals. Groups of observed aggregates are replaced with statistical summaries based on these observations. A data warehouse often contains aggregate data since it may offer answers to analytical inquiries and drastically cut the time required to query massive data sets.

(iv) Analysis:

Data analysis is described as the process of cleaning, converting, and modelling data to obtain actionable business intelligence. The objective of data analysis is to extract relevant information from data and make decisions based on this knowledge.

Every time we make a decision in our day-to-day lives, we consider what occurred previously or what would occur if we choose a specific option. This is a simple example of data analysis. This is nothing more than studying the past or the future and basing judgments on that analysis. We do so by recalling our history or by imagining our future. That consists solely of data analysis. Now, the same task that an analyst does for commercial goals is known as Data Analysis.

(v) Reporting:

Data reporting is the act of gathering and structuring raw data and turning it into a consumable format in order to evaluate the organisation's continuous performance.

The data reports can provide answers to fundamental inquiries regarding the status of the firm. They can display the status of certain data within an Excel document or a simple data visualisation tool. Static data reports often employ the same structure throughout time and collect data from a single source.

A data report is nothing more than a set of documented facts and numbers. Consider the population count as an illustration. This is a technical paper conveying basic facts on the population and demographics of a country. It may be presented in text or in a graphical manner, such as a graph or chart. However, static information may be utilised to evaluate present situations.

(vi) Classification:

Data classification is the process of classifying data according to important categories so that it may be utilised and safeguarded more effectively. The categorization process makes data easier to identify and access on a fundamental level. Regarding risk management, compliance, and data security, the classification of data is of special relevance.

Classifying data entails labelling it to make it searchable and trackable. Additionally, it avoids many duplications of data, which can minimise storage and backup expenses and accelerate the search procedure. The categorization process may sound very technical, yet it is a topic that your organisation's leadership must comprehend.

Three primary methods of data classification are recognised as industry standards:

- Classification based on content, examines and interprets files for sensitive data.
- Context-based classification considers, among other characteristics, application, location, and creator as indirect markers of sensitive information.
- User-based classification relies on the human selection of each document by the end user. To indicate sensitive documents, user-based classification depends on human expertise and judgement during document creation, editing, review, or distribution.

In addition to the classification kinds, it is prudent for an organisation to identify the relative risk associated with the data types, how the data is handled, and where it is stored/sent (endpoints). It is standard practise to divide data and systems into three risk categories.

- **Low risk:** If data is accessible to the public and recovery is simple, then this data collection and the mechanisms around it pose a smaller risk than others.
- **Moderate risk:** Essentially, they are non-public or internal (to a business or its partners) data. However, it is unlikely to be too mission-critical or sensitive to be considered "high risk." The intermediate category may include proprietary operating processes, cost of products, and certain corporate paperwork.
- **High risk:** Anything even vaguely sensitive or critical to operational security falls under the category of high risk. Additionally, data that is incredibly difficult to retrieve (if lost). All secret, sensitive, and essential data falls under the category of high risk.

Data classification matrix

Data creation and labelling may be simple for certain companies. If there are not a significant number of data kinds or if your firm has fewer transactions, it will likely be easier to determine the risk of your data and systems. However, many businesses working with large volumes or numerous types of data will certainly require a thorough method for assessing their risk. Many utilise a "data categorization matrix" for this purpose.

Creating a matrix that rates data and/or systems based on how likely they are to be hacked and how sensitive the data is enables you to rapidly identify how to classify and safeguard all sensitive information (figure 9.3).

Risk	Confidential Data	Sensitive Data	Public
	High	Medium	Low
General			
Institution Impact	The negative impact on the institution should this data be incorrect, improperly disclosed, or not available when needed is typically very high.	The risk for negative impact on the institution should this information not be available when needed is typically moderate.	The impact on the institution should Public data not be available is Typically low, (inconvenient but not deliberating).
Description	Access to Confidential institutional data must be controlled fromcreation to destruction and vail be grained only to those persons affiliated with, the University who require such access in order to perform their job, or to those individuals permitted by law. Access to confidential data must be individually requested and then authorized by the Functional Security Module Representative-who is responsible for the data. Confidential data is highly sensitive and may have personal	Access to Sensitive institutional data must be requested from, and authorized by, the Functional Security Module Representative who is responsible for the data. Access to internal data may be authorized to groups of persons by their job classification or responsibilities ("role-based" access), and may also be limited by one's employing unit or affiliation. Non-Public or Internal data is moderately sensitive in nature.	Access to Public institutional data may be granted to any requester, or it is published with no restrictions. Public data is not considered sensitive. The integrity of "Public' data should be protected, and the appropriate Functional Security Module Representative must authorise replication or copying of the data in order to ensure it remains accurate overtime.
	privacy consideration, ormay be restricted by federal or state law. Information which provides access to resources, physical or virtual.	Often, Sensitive data is used for making decisions, and therefore it's important this information remain timely and accurate.	
Access	Only those individuals designated with approved access. -	EMU employees and non-employees who have a business need to know	EMU affiliates and general public with a need to know

Figure 9.3: Sample risk classification matrix

Data classification process

Steps for effective data classification

- **Understanding the current setup:** Taking a comprehensive look at the location of the organisation's current data and any applicable legislation is likely the best beginning point for successfully classifying data. Before one classifies data, one must know what data he is having.
- **Creation of a data classification policy:** Without adequate policy, maintaining compliance with data protection standards in an organisation is practically difficult. Priority number one should be the creation of a policy.
- **Prioritize and organize data:** Now that a data classification policy is in place, it is time to categorise the data. Based on the sensitivity and privacy of the data, the optimal method to be chosen for tagging it.

Data Organisation and Distribution

9.3

Data Organisation

Data organisation is the classification of unstructured data into distinct groups. This raw data comprises variables' observations. As an illustration of data organisation, the arrangement of students' grades in different topics is one example.

As time passes and the data volume grows, the time required to look for any information from the data source would rise if it has not previously been structured.

Data organisation is the process of arranging unstructured data in a meaningful manner. Classification, frequency distribution tables, image representations, graphical representations, etc. are examples of data organisation techniques.

Data organisation allows us to arrange data in a manner that is easy to understand and manipulate. It is challenging to deal with or analyse raw data.

IT workers utilise the notion of data organisation in several ways. Many of these are included under the umbrella term "data management." For instance, data organisation includes reordering or assessing the arrangement of data components in a physical record.

The analysis of somewhat organised and unstructured data is another crucial component of business data organisation. Structured data consists of tabular information that may be readily imported into a database and then utilised by analytics software or other applications. Unstructured data are raw and unformatted data, such as a basic text document with names, dates, and other information spread among random paragraphs. The integration of somewhat unstructured data into a holistic data environment has been facilitated by the development of technical tools and resources.

In a world where data sets are among the most valuable assets possessed by firms across several industries, businesses employ data organisation methods in order to make better use of their data assets. Executives and other professionals may prioritise data organisation as part of a complete plan to expedite business operations, boost business intelligence, and enhance the business model as a whole.

The examination of both relatively organised and unstructured data is a crucial component of business data organisation. Structured data consists of tabular information that can be readily incorporated into a database and supplied to analytics software or other specific applications. Unstructured data is regarded raw and unformatted, similar to a plain text document in which information is dispersed across random paragraphs. Few specialists have built technological tools and resources to manage substantially unstructured data. These data are incorporated into a comprehensive data ecosystem. Businesses implement data organisation techniques to make better use of their data assets. Data assets have a very significant position in the world, since they are owned by businesses in a variety of industries. Data organisation is seen as a component of a holistic strategy that facilitates the streamlining of business operations, whether via the acquisition of superior business information or the overall improvement of a business model.

Data distribution

Data distribution is a function that identifies and quantifies all potential values for a variable, as well as their relative frequency (probability of how often they occur). Any population with dispersed data is categorised as a distribution. It is necessary to establish the population's distribution type in order to analyse it using the appropriate statistical procedures.

Statistics makes extensive use of data distributions. If an analyst gathers 500 data points on the shop floor, they are of little use to management unless they are categorised or organised in an usable manner. The data distribution approach arranges the raw data into graphical representations (such as histograms, box plots, and pie charts, etc.) and gives relevant information.

The primary benefit of data distribution is the estimation of the probability of any certain observation within a sample space. Probability distribution is a mathematical model that determines the probabilities of the occurrence of certain test or experiment outcomes. These models are used to specify distinct sorts of random variables (often discrete or continuous) in order to make a choice. One can employ mean, mode, range, probability, and other statistical approaches based on the category of the random variable.

Types of distribution

Distributions are basically classified based on the type of data:

(i) Discrete distributions: A discrete distribution that results from countable data and has a finite number of potential values. In addition, discrete distributions may be displayed in tables, and the values of the random variable can be counted. Example: rolling dice, selecting a specific amount of heads, etc.

Following are the discrete distributions of various types:

(a) Binomial distributions: The binomial distribution quantifies the chance of obtaining a specific number of successes or failures each experiment.

Binomial distribution applies to attributes that are categorised into two mutually exclusive and exhaustive classes, such as number of successes/failures and number of acceptances/rejections.

Example: When tossing a coin: The likelihood of a coin falling on its head is one-half and the probability of a coin landing on its tail is one-half.

(b) Poisson distribution: The Poisson distribution is the discrete probability distribution that quantifies the chance of a certain number of events occurring in a given time period, where the events occur in a well-defined order.

Poisson distribution applies to attributes that can potentially take on huge values, but in practise take on tiny ones.

Example: Number of flaws, mistakes, accidents, absentees etc.

(c) Hypergeometric distribution: The hypergeometric distribution is a discrete distribution that assesses the chance of a certain number of successes in (n) trials, without replacement, from a sufficiently large population (N). Specifically, sampling without replacement.

The hypergeometric distribution is comparable to the binomial distribution; the primary distinction between the two is that the chance of success is not the same for all trials in the binomial distribution but it is in the hypergeometric distribution.

(d) Geometric distribution: The geometric distribution is a discrete distribution that assesses the probability of the occurrence of the first success. A possible extension is the negative binomial distribution.

Example: A marketing representative from an advertising firm chooses hockey players from several institutions at random till he discovers an Olympic participant.

(ii) **Continuous distributions:** A distribution with an unlimited number of (variable) data points that may be represented on a continuous measuring scale. A continuous random variable is a random variable with an unlimited and uncountable set of potential values. It is more than a simple count and is often described using probability density functions (pdf). The probability density function describes the characteristics of a random variable. Normally clustered frequency distribution is seen. Therefore, the probability density function views it as the distribution's "shape."

Following are the continuous distributions of various types:

(i) **Normal distribution:** Gaussian distribution is another name for normal distribution. It is a bell-shaped curve with a greater frequency (probability density) around the core point. As values go away from the centre value on each side, the frequency drops dramatically.

In other words, features whose dimensions are expected to fall on either side of the target value with equal likelihood adhere to normal distribution.

(ii) **Lognormal distribution:** A continuous random variable x follows a lognormal distribution if the distribution of its natural logarithm, ln(x), is normal.

As the sample size rises, the distribution of the sum of random variables approaches a normal distribution, independent of the distribution of the individuals.

(iii) **F distribution:** The F distribution is often employed to examine the equality of variances between two normal populations.

The F distribution is an asymmetric distribution with no maximum value and a minimum value of 0. The curve approaches 0 but never reaches the horizontal axis.

(iv) **Chi square distributions:** When independent variables with standard normal distribution are squared and added, the chi square distribution occurs.

Example: y = Z12+ Z22 +Z32 +Z42+....+ Zn2 if Z is a typical normal random variable.

The distribution of chi square values is symmetrical and constrained below zero. And approaches the form of the normal distribution as the number of degrees of freedom grows.

(v) **Exponential distribution:** The exponential distribution is a probability distribution and one of the most often employed continuous distributions. Used frequently to represent products with a consistent failure rate.

The exponential distribution and the Poisson distribution are closely connected.

Has a constant failure rate since its form characteristics remain constant.

(vi) **T student distribution:** The t distribution or student's t distribution is a probability distribution with a bell shape that is symmetrical about its mean.

Used frequently for testing hypotheses and building confidence intervals for means. Substituted for the normal distribution when the standard deviation cannot be determined.

When random variables are averages, the distribution of the average tends to be normal, similar to the normal distribution, independent of the distribution of the individuals.

Data Cleaning and Validation 9.4

Data Cleaning

Data cleaning is the process of correcting or deleting inaccurate, corrupted, improperly formatted, duplicate, or insufficient data from a dataset. When several data sources are combined, there are numerous chances for data duplication and mis-labelling. Incorrect data renders outcomes and algorithms untrustworthy, despite their apparent accuracy. There is no, one definitive method for prescribing the precise phases of the data cleaning procedure, as the methods differ from dataset to dataset. However, it is essential to build a template for your data cleaning process so that you can be certain you are always doing the steps correctly.

Data cleaning is different from data transformation. Data cleaning is the process of removing irrelevant data from a dataset. The process of changing data from one format or structure to another is known as data transformation. Transformation procedures are sometimes known as data wrangling or data munging, since they map and change "raw" data into another format for warehousing and analysis.

Steps for data cleaning:

(i) Step 1: Removal of duplicate and irrelevant information

Eliminate unnecessary observations from your dataset, such as duplicate or irrelevant observations. Most duplicate observations will occur during data collecting. When you merge data sets from numerous sites, scrape data, or get data from customers or several departments, there are potential to produce duplicate data. De-duplication is one of the most important considerations for this procedure. Observations are deemed irrelevant when they do not pertain to the specific topic you are attempting to study. For instance, if you wish to study data pertaining to millennial clients but your dataset contains observations pertaining to earlier generations, you might exclude these useless observations. This may make analysis more effective and reduce distractions from your core objective, in addition to producing a more manageable and effective dataset.

(ii) Step 2: Fix structural errors:

When measuring or transferring data, you may detect unusual naming standards, typos, or wrong capitalization. These contradictions may lead to mislabeled classes or groups. For instance, "N/A" and "Not Applicable" may both be present, but they should be examined as a single category.

(iii) Step 3: Filter unwanted outliers:

Occasionally, you will encounter observations that, at first look, do not appear to fit inside the data you are evaluating. If you have a valid cause to eliminate an outlier, such as erroneous data input, doing so will improve the performance of the data you are analysing. Occasionally, though, the arrival of an outlier will prove a notion you're working on. Remember that the existence of an outlier does not imply that it is erroneous. This step is required to validate the number. Consider deleting an outlier if it appears to be unrelated to the analysis or an error.

(iv) Step 4: Handle missing data

Many algorithms do not accept missing values, hence missing data cannot be ignored. There are several approaches to handle missing data. Although neither is desirable, both should be explored.

As a first alternative, the observations with missing values may be dropped, but doing so may result in the loss of information. This should be kept in mind before doing so.

As a second alternative, the missing numbers may be entered based on other observations. Again, there is a chance that the data's integrity may be compromised, as action may be based on assumptions rather than real observations.

(v) Step 5: Validation and QA

As part of basic validation, one should be able to answer the following questions at the conclusion of the data cleaning process:

(a) Does the data make sense?

(b) Does the data adhere to the regulations applicable to its field?

(c) Does it verify or contradict your working hypothesis, or does it shed any light on it?

(d) Can data patterns assist you in formulating your next theory?

(e) If not, is this due to an issue with data quality?

False assumptions based on inaccurate or "dirty" data can lead to ineffective company strategies and decisions. False conclusions might result in an uncomfortable moment at a reporting meeting when it is shown that the data does not withstand inspection. Before reaching that point, it is essential to establish a culture of data quality inside the firm. To do this, one should specify the methods that may be employed to establish this culture and also the definition of data quality.

⊙ **Benefits of quality data**

Determining the quality of data needs an analysis of its properties and a weighting of those attributes based on what is most essential to the company and the application(s) for which the data will be utilised.

Main characteristics of quality data are:

(i) Validity

(ii) Accuracy

(iii) Completeness

(iv) Consistency

⊙ **Benefits of data cleaning**

Ultimately, having clean data would boost overall productivity and provide with the greatest quality information for decision-making. Benefits include:

(i) Error correction when numerous data sources are involved.

(ii) Fewer mistakes result in happier customers and less irritated workers.

(iii) Capability to map the many functions and planned uses of your data.

(iv) Monitoring mistakes and improving reporting to determine where errors are originating can make it easier to repair inaccurate or damaged data in future applications.

(v) Using data cleaning technologies will result in more effective corporate procedures and speedier decision-making.

- **Data validation**

  Data validation is a crucial component of any data management process, whether it is about collecting information in the field, evaluating data, or preparing to deliver data to stakeholders. If the initial data is not valid, the outcomes will not be accurate either. It is therefore vital to check and validate data before using it.

  Although data validation is an essential stage in every data pipeline, it is frequently ignored. It may appear like data validation is an unnecessary step that slows down the work, but it is vital for producing the finest possible outcomes. Today, data validation may be accomplished considerably more quickly than may have imagined earlier. With data integration systems that can include and automate validation procedures, validation may be considered as an integral part of the workflow, as opposed to an additional step.

  Validating the precision, clarity, and specificity of data is essential for mitigating project failures. Without data validation, one may into run the danger of basing judgments on faulty data that is not indicative of the current situation.

  In addition to validating data inputs and values, it is vital to validate the data model itself. If the data model is not appropriately constructed or developed, one may encounter problems while attempting to use data files in various programmes and software.

  The format and content of data files will determine what can be done with the data. Using validation criteria to purify data before to usage mitigates "garbage in, garbage out" problems. Ensuring data integrity contributes to the validity of the conclusions.

Types of data validation

- **Data type check:** A data type check verifies that the entered data has the appropriate data type. For instance, a field may only take numeric values. If this is the case, the system should reject any data containing other characters, such as letters or special symbols.
- **Code check:** A code check verifies that a field's value is picked from a legitimate set of options or that it adheres to specific formatting requirements. For instance, it is easy to verify the validity of a postal code by comparing it to a list of valid codes. The same principle may be extended to other things, including nation codes and NIC industry codes.
- **Range check:** A range check determines whether or not input data falls inside a specified range. Latitude and longitude, for instance, are frequently employed in geographic data. A latitude value must fall between -90 and 90 degrees, whereas a longitude value must fall between -180 and 180 degrees. Outside of this range, values are invalid.
- **Format check:** Numerous data kinds adhere to a set format. Date columns that are kept in a fixed format, such as "YYYY-MM-DD" or "DD-MM-YYYY," are a popular use case. A data validation technique that ensures dates are in the correct format contributes to data and temporal consistency.
- **Consistency check:** A consistency check is a form of logical check that verifies that the data has been input in a consistent manner. Checking whether a package's delivery date is later than its shipment date is one example.
- **Uniqueness check:** Some data like PAN or e-mail ids are unique by nature. These fields should typically contain unique items in a database. A uniqueness check guarantees that an item is not put into a database numerous times.

Consider the case of a business that collects data on its outlets but neglects to do an appropriate postal code verification. The error might make it more challenging to utilise the data for information and business analytics. Several issues may arise if the postal code is not supplied or is typed incorrectly.

In certain mapping tools, defining the location of the shop might be challenging. A store's postal code will also facilitate the generation of neighborhood-specific data. Without a postal code data verification, it is more probable that data may lose its value. If the data needs to be recollected or the postal code needs to be manually input, further expenses will also be incurred.

A straightforward solution to the issue would be to provide a check that guarantees a valid postal code is entered. The solution may be a drop-down menu or an auto-complete form that enables the user to select a valid postal code from a list. This kind of data validation is referred to as a code validation or code check.

Solved Case 1

Maitreyee is working as a data analyst with a financial organisation. She is supplied with a large amount of data, and she plans to use statistical techniques for inferring some useful information and knowledge from it. But, before starting the process of data analysis, she found that the provided data is not cleaned. She knows that before applying the data analysis tools, cleaning the data is essential.

In your opinion, what steps Maitreyee should follow to clean the data, and what are the benefits of clean data.

Teaching note - outline for solution:

The instructor may initiate the discussions with explaining the concept of data cleaning and about the importance of data cleaning.

The instructor may also elaborate the consequences of using an uncleaned dataset on the final analysis. She may discuss the steps five steps of data cleaning in detail, such as,

(i) Removal of duplicate and irrelevant information

(ii) Fix structural errors

(iii) Filter unwanted outliers

(iv) Handle missing data

(v) Validation and QA

At the outset, Maitreyee should focus on answering the following questions:

(a) Does the data make sense?

(b) Does the data adhere to the regulations applicable to its field?

(c) Does it verify or contradict your working hypothesis, or does it shed any light on it?

(d) Can data patterns assist you in formulating your next theory?

(e) If not, is this due to an issue with data quality?

The instructor may close the discussions with explaining the benefits of using clean data, such as:

(i) Validity

(ii) Accuracy

(iii) Completeness

(iv) Consistency

Exercise

A. Theoretical Questions:

⊙ Multiple Choice Questions

1. Data science plays an important role in
   (a) Risk analytics
   (b) Customer data management
   (c) Consumer analytics
   (d) All of the above
2. The primary benefit of data distribution is
   (a) the estimation of the probability of any certain observation within a sample space
   (b) the estimation of the probability of any certain observation within a non-sample space
   (c) the estimation of the probability of any certain observation within a population
   (d) the estimation of the probability of any certain observation without a non-sample space
3. Binomial distribution applies to attributes
   (a) that are categorised into two mutually exclusive and exhaustive classes
   (b) that are categorised into three mutually exclusive and exhaustive classes
   (c) that are categorised into less than two mutually exclusive and exhaustive classes
   (d) that are categorised into four mutually exclusive and exhaustive classes
4. The geometric distribution is a discrete distribution that assesses
   (a) the probability of the occurrence of the first success
   (b) the probability of the occurrence of the second success
   (c) the probability of the occurrence of the third success
   (d) the probability of the occurrence of the less success
5. The probability density function describes
   (a) the characteristics of a random variable
   (b) the characteristics of a non-random variable
   (c) the characteristics of a random constant
   (d) the characteristics of a non-random constant

Answer:

1	d	2	a	3	a	4	a	5	a

State True or False

1. Data validation could be operationally defined as a process which ensures the correspondence of the final (published) data with a number of quality characteristics.
2. Data analysis is described as the process of cleaning, converting, and modelling data to obtain actionable business intelligence.
3. Financial data such as revenues, accounts receivable, and net profits are often summarised in a company's data reporting.
4. Structured data consists of tabular information that may be readily imported into a database and then utilised by analytics software or other applications.
5. Data distribution is a function that identifies and quantifies all potential values for a variable, as well as their relative frequency (probability of how often they occur).

Answer:

1	**T**	**2**	**T**	**3**	**T**	**4**	**T**	**5**	**T**

Fill in the blanks

1. Data may be classified as Restricted, _____ or Public by an entity.
2. Data organisation is the _____ of unstructured data into distinct groups.
3. Classification, frequency distribution tables, _____, graphical representations, etc. are examples of data organisation techniques.
4. The distribution or student's distribution is a probability distribution with a bell shape that is symmetrical about it's _____.
5. _____ is the process of correcting or deleting inaccurate, corrupted, improperly formatted, duplicate, or insufficient data from a dataset.

Answer:

1	**Private**	**2**	**Classification**
3	**Image representation**	**4**	**mean**
5	**Data cleaning**		

Short essay type questions

1. Briefly discuss about the role of data analysis in fraud detection
2. Discuss the difference between discrete distribution and continuous distribution.
3. Write a short note on binomial distribution
4. What is the significance of data cleaning?
5. Write a short note on 'predictive analytics'.

⊙ **Essay type questions**

1. Elaborately discuss the functions of data analysis.
2. Elaborately discuss the various steps involved in data cleaning.
3. Discuss the benefits of 'data cleaning'.
4. How data processing and data science is relevant for finance?
5. Discuss the steps for effective data classification.

Unsolved Case(s)

1. Arjun is a data analyst working with Akansha Limited. The company deals in retailing of FMCG products. The company follows both online mode as well as the offline mode for delivering the services. Over the years, the company accumulated a huge amount of data.

   The management is little puzzled about the ways in which this data may be brought into usable format.

   Arjun is entrusted with the responsibility of bringing the data into usable format. Make your suggestions, how this is to be done.

References:

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- Barbara S Hawkins, and Stephen W Singer. Design, development and implementation of data processing system for multiple control trials and epidemiologic studies. Controlled clinical trials (1986)

Data Presentation: Visualisation and Graphical Presentation

10

This Module Includes

10.1 Data Visualisation of Financial and Non-Financial Data

10.2 Objective and Function of Data Presentation

10.3 Data Presentation Architecture

10.4 Dashboard, Graphs, Diagrams, Tables, Report Design

10.5 Tools and Techniques of Visualisation and Graphical Presentation

Data Presentation: Visualisation and Graphical Presentation

SLOB Mapped against the Module:

To equip oneself with application-oriented knowledge in data preparation, data presentation and finally data analysis and modelling to facilitate quality business decisions.

Module Learning Objectives:

After studying this module, the students will be able to –

- Understand the basic concepts of developments of data presentation
- Understand the basic objectives and functions of data Visualisation
- Understand the basic concepts of data presentation architecture (DPA)
- Understand the basic tools available for data Visualisation and presentation

Data Visualisation of Financial and Non-Financial Data

10.1

There is a saying '**A picture speaks a thousand words**'. Numerous sources of in-depth data are now available to management teams, allowing them to better track and anticipate organisational performance. However, obtaining data and presenting it are two distinct and equally essential activities.

Data visualisation comes into play at this point. Recent studies reveal that top-performing finance directors are more likely than their peers to emphasise data visualisation abilities.

Why data Visualisation is important?

Scott Berinato, senior editor and data visualisation specialist for Harvard Business Review, writes in a recent post that data visualisation was once a talent largely reserved for design- and data-minded managers. Today, he deems it indispensable for managers who wish to comprehend and communicate the significance of the data flood we are all experiencing.

This is particularly true for finance, which is becoming the data hub of the majority of progressive enterprises. David A.J. Axson of Accenture highlights in his paper "Finance 2020: Death by Digital" that finance is transitioning from "an expenditure control, spreadsheet-driven accounting and reporting centre" to "a predictive analytics powerhouse that generates business value."

Finance is able to communicate these analytic findings to the entire business through the use of data visualisation. Several studies indicate that sixty five percent of individuals are visual learners. Giving decision makers an opportunity to have visual representations of facts improves comprehension and can eventually lead to better judgments.

In addition, the technique of developing data visualisations may aid finance in identifying more patterns and gaining deeper insights, particularly when many data sources or interactive elements are utilised. For example, contemporary finance professionals frequently monitor both financial and non-financial KPIs. Data visualisation may assist in correlating these variables, revealing relationships, and elucidating the actions required to enhance performance.

Doing data Visualisation in the right way

All data visualisation isn't created equally engaging. When properly executed, it simplifies difficult topics. However, if data visualisations are executed improperly, they might mislead the audience or misrepresent the data.

Finance professionals who are investigating how data visualisation might help their analytics efforts and communication should keep the following in mind:

- **Know the objective:** Before the development of great images, one must first grasp the objectives. HBR's Berinato suggests, first establishment of the information if it's conceptual or data-driven (i.e. does it rely on qualitative or quantitative data) is required. Then specify if the objective is exploratory or declarative. For

instance, if the objective is to display the income from the prior quarter, the goal is declarative. If, on the other hand, one is curious as to whether the income increase correlates with the social media spending, the objective is exploratory. According to Berinato, determining the answers would assist in determining the tools and formats required.

- **Always keep the audience in mind:** Who views the data visualisations will determine the degree of detail required. For instance, finance data presentations for the C-suite require high-level, highly relevant information to aid in strategic decision-making. However, if one is delivering a presentation to 'line of business' executives, delving into the deeper details might offer them with knowledge that influences their daily operations.
- **Invest in the best technology:** There are a multitude of technological tools that make it simple to produce engaging visualisations in the current digital age. The firm should first implement an ERP that removes data silos and develops a centralised information repository. Then, look for tools that allows to instantly display data by dragging and dropping assets, charts, and graphs; offer search options and guided navigation to assist in answering queries; and enable any member of the financial team to generate graphics.
- **Improve the team's ability to visualise data:** Most of the agile finance directors rank their team's data visualisation abilities as good, compared to only twenty four percent of their counterparts, according to an AICPA survey. While everyone on the finance team can understand the fundamentals of data visualisation, training and a shift in hiring priorities may advance the team's data visualisation skills. Find ways to incorporate user training on data visualisation tools, so that the staff is aware of the options that the technology affords. Additionally, when making new recruits, look out individuals with proficiency in data analytics and extensive data visualisation experience.

The amount of data analysed by financial teams has grown dramatically. Data visualisations may help the team convey its strategic findings more effectively throughout the enterprise.

Objective and Function of Data Presentation

10.2

The absence of data visualisation would make it difficult for organisations to immediately recognise data patterns. The graphical depiction of data sets enables analysts to visualise new concepts and patterns. With the daily increase in data volume, it is hard to make sense of the quintillion bytes of data without data proliferation, which includes data visualisation.

Every company may benefit from a better knowledge of their data, hence data visualisation is expanding into all industries where data exists. Information is the most crucial asset for every organisation. Through the use of visuals, one may effectively communicate their ideas and make use of the information.

Dashboards, graphs, infographics, maps, charts, videos, and slides may all be used to visualise and comprehend data. Visualizing the data enables decision-makers to interrelate the data to gain better insights and capitalises on the following objectives of data visualisation:

- **Making a better data analysis:**

  Analysing reports assists company stakeholders' in focusing their attention on the areas that require it. The visual mediums aid analysts in comprehending the essential business issues. Whether it is a sales report or a marketing plan, a visual representation of data assists businesses in increasing their profits through improved analysis and business choices.

- **Faster decision making:**

  Visuals are easier for humans to process than tiresome tabular forms or reports. If the data is effectively communicated, decision-makers may move swiftly on the basis of fresh data insights, increasing both decision-making and corporate growth.

- **Analysing complicated data:**

  Data visualisation enables business users to obtain comprehension of their large quantities of data. It is advantageous for them to identify new data trends and faults. Understanding these patterns enables users to focus on regions that suggest red flags or progress. In turn, this process propels the firm forward.

The objective of data visualisation is rather obvious. It is to interpret the data and apply the information for the advantage of the organisation. Its value increases as it is displayed. Without visualisation, it is difficult to rapidly explain data discoveries, recognise trends to extract insights, and engage with data fluidly.

Without visualisation, data scientists won't be able to see trends or flaws. Nonetheless, it is essential to effectively explain data discoveries and extract vital information from them. And interactive data visualisation tools make all the difference in this regard.

The continuing epidemic is a current example that is both topical and recent. However, data visualisation assists specialists in remaining informed and composed despite the volume of data.

(i) Data visualisation enhances the effect of communications for the audiences and delivers the most convincing data analysis outcomes. It unites the organisation's communications systems across all organisations and fields.

(ii) Visualisation allows to interpret large volumes of data more quickly and effectively at a glance. It facilitates a better understanding of the data for measuring its impact on the business and graphically communicates the knowledge to internal and external audiences.

(iii) One cannot make decisions in a vacuum. Data and insights available to decision-makers facilitate decision analysis. Unbiased data devoid of mistakes enables access to the appropriate information and visualisation to convey and maintain the relevance of that information.

Objectives of data presentation

1. **Decision making:** By providing relevant information and supporting evidence.
2. **Communication:** By allowing the recipient to grasp key message without any difficulty.
3. **Influence:** By influencing stakeholders or decision makers to take specific actions or adapt certain view points.
4. **Story telling:** By presenting data in a narrative format, audience can understand the context, the problem and the solution or outcomes.
5. **Clarity and completeness:** By presenting data in a clear concise and visually appealing manner, easily understood by the audience.

Data Presentation Architecture

10.3

Data presentation architecture (DPA) is a set of skills that aims to identify, find, modify, format, and present data in a manner that ideally conveys meaning and provides insight. According to Kelly Lautt, "data Presentation Architecture (DPA) is a rarely applied skill set critical for the success and value of Business Intelligence. Data presentation architecture weds the science of numbers, data and statistics in discovering valuable information from data and making it usable, relevant and actionable with the arts of data Visualisation, communications, organisational psychology and change management in order to provide business intelligence solutions with the data scope, delivery timing, format and Visualisations that will most effectively support and drive operational, tactical and strategic behaviour toward understood business (or organisational) goals. DPA is neither an IT nor a business skill set but exists as a separate field of expertise. Often confused with data Visualisation, data presentation architecture is a much broader skill set that includes determining what data on what schedule and in what exact format is to be presented, not just the best way to present data that has already been chosen (which is data Visualisation). Data Visualisation skills are one element of DPA."

Objectives

There are following objectives of DPA:

(i) Utilize data to impart information in the most efficient method feasible (provide pertinent, timely and comprehensive data to each audience participant in a clear and reasonable manner that conveys important meaning, is actionable and can affect understanding, behaviour and decisions).

(ii) To utilise data to deliver information as effectively as feasible (minimise noise, complexity, and unneeded data or detail based on the demands and tasks of each audience).

Scope of DPA

In the light of abovementioned objectives, the scope of DPA may be defined as:

(i) Defining significant meaning (relevant information) required by each audience member in every scenario.

(ii) Obtaining the proper data (focus area, historic reach, extensiveness, level of detail, etc.)

(iii) Determining the needed frequency of data refreshes (the currency of the data)

(iv) determining the optimal presentation moment (the frequency of the user needs to view the data)

(v) Using suitable analysis, categorization, visualisation, and other display styles

(vi) Developing appropriate delivery techniques for each audience member based on their job, duties, locations, and technological access

It involves several steps. They are

1. Identify requirements: Understand the purpose, audience and types of data to be presented.
2. Data collection and processing: Gather necessary data from various sources and clean, transform and aggregate it as needed.
3. Choose visualization technique: Select appropriate charts, graphs or visual elements that best represents the data and its insights.
4. Select tools and platforms: Pick suitable software or platform based on the data and visualization needs.
5. Create the architecture: Develop the framework for data presentation, including data storage, processing and visualization layers.
6. Implement and test: Build and integrate the architecture ensuring it meets the requirements and functions accurately.
7. Optimize and maintain: Continuously maintain the architecture, optimize performance and update it to adapt to changing data and user needs.

Dashboard, Graphs, Diagrams, Tables, Report Design

10.4

Data visualisation is the visual depiction of data and information. Through the use of visual elements like dashboards, charts, graphs, and maps etc, data visualisation tools facilitate the identification and comprehension of trends, outliers, and patterns in data.

10.4.1 Dashboard

A data visualisation dashboard (Figure 10.3) is an interactive dashboard that enables to manage important metrics across numerous financial channels, visualise the data points, and generate reports for customers that summarise the results.

Creating reports for your audience is one of the most effective means of establishing a strong working relationship with them. Using an interactive data dashboard, the audience would be able to view the performance of their company at a glance.

On addition to having all the data in a single dashboard, a data visualisation dashboard helps to explain what the company is doing and why, also fosters client relationships, and gives a data set to guide decision-making.

There are numerous levels of dashboards, ranging from those that represent metrics vital to the firm as a whole to those that measure values vital to teams inside an organisation. For a dashboard to be helpful, it must be automatically or routinely updated to reflect the present condition of affairs.

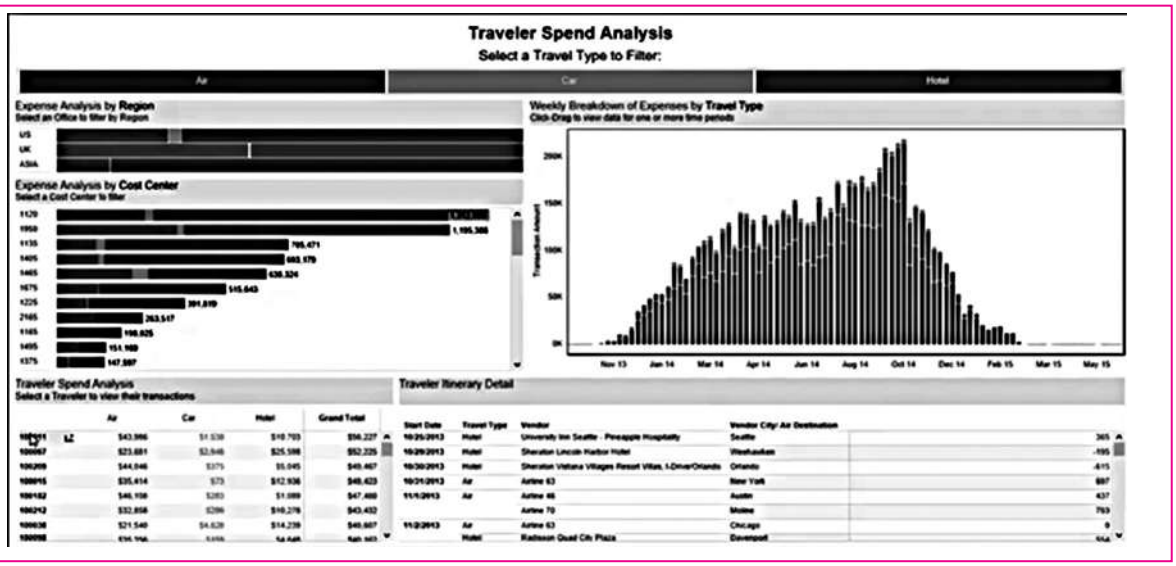


Figure 10.3: A sample dashboard showing traveller spend analysis using Tableau (Source: https://www.tableau.com/)

10.4.2 Graph, Diagram and Charts

Henry D. Hubbard, Creator of the Periodic Table of Elements once said, "There is magic in graphs. The profile of a curve reveals in a flash a whole situation — the life history of an epidemic, a panic, or an era of prosperity. The curve informs the mind, awakens the imagination, convinces." Few important and widely used graphs are mentioned below:

(i) Bar Chart:

Bar graphs are one of the most used types of data visualisation. It may be used to easily compare data across categories, highlight discrepancies, demonstrate trends and outliers, and illustrate historical highs and lows. Bar graphs are very useful when the data can be divided into distinct categories. For instance, the revenue earned in different years, the number of car model produced in a year by an automobile company, change in economic value added over the years (Figure 10.4) etc.

To add a zing, the bars can be made colourful. Using stacked and side-by-side bar charts, one may further dissect the data for a more in-depth examination.

Economic Value Added

	IGAAP			INDAS						
	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Cost of Capital Employed (COCE)										
1. Average Debt	0	0	0	0	0	0	0	0	0	0
2. Average Equity	4,018	3,715	4,338	5,664	5,831	6,181	6,668	7,227	46,890	47,156
3. Average Capital Employed: (1)+(2)	4,018	3,715	4,338	5,664	5,831	6,181	6,668	7,227	46,890	47,156
4. Cost of Debt, post tax x%	6.02	6.36	5.56	5.43	4.90	5.21	5.77	5.25	4.70	4.81
5. Cost of Equity %	10.07	11.62	10.91	11.98	12.25	14.19	11.84	9.11	8.86	9.09
6. Weighted Average Cost of Capital % (WACC)	10.07	11.62	10.91	11.98	12.25	14.19	11.84	9.11	8.86	9.09
7. COCE (3)x(6)	405	432	474	679	714	877	789	658	4,153	4,289
Economic Value Added (EVA)										
8 Profit after tax, before exceptional items	3,314	3,555	3,843	4,116	4,247	5,135	6,080	6,743	7,963	8,724
9. Add: Interest, after taxes	17	24	11	0	0	0	0	0	0	0
10. Net Operating Profits After Taxes (NOPAT)	3,331	3,579	3,854	4,117	4,247	5,135	6,080	6,743	7,963	8,724
11. COCE, as per (7) above	405	432	474	679	714	877	789	658	4,153	4,289
12. EVA: (10)-(11)	2,926	3,147	3,380	3,438	3,533	4,258	5,291	6,085	3,810	4,435

*Opening balance adjusted for GSK CH merger

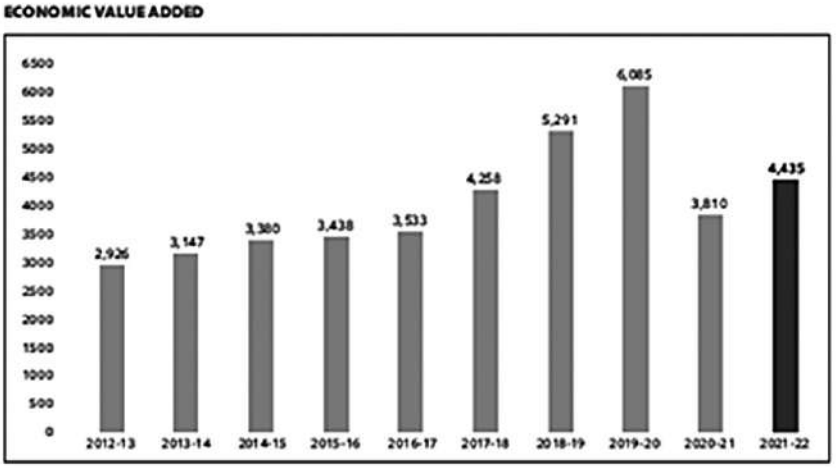


Figure 10.4: Bar chart showing the change in EVA for Hindustan Unilever Ltd. (Source: HUL annual report for the year 2021-22)

(ii) Line chart:

The line chart or line graph joins various data points, displaying them as a continuous progression. Utilize line charts to observe trends in data, often over time (such as stock price fluctuations over five years or monthly website page visits). The outcome is a basic, simple method for representing changes in one value relative to another.

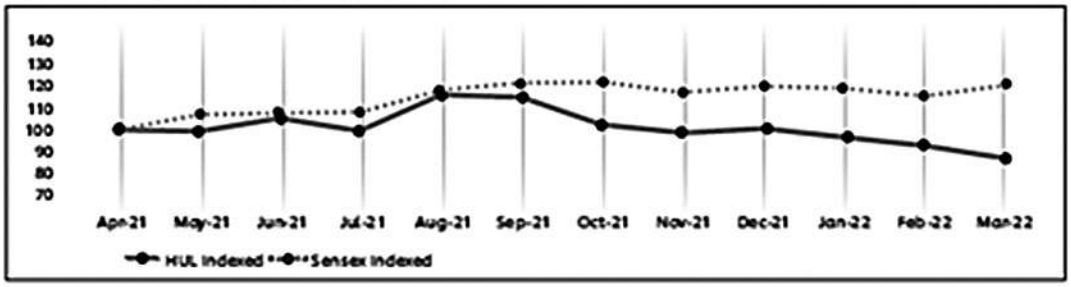
For a better visual impact, the area under the line may be shaded. Also if feasible, the line graph may be presented combining with bar chart.

Share Price Data

The monthly high and low prices and volumes of shares of the Company at BSE Limited (BSE) and the National Stock Exchange of India Limited (NSE) for the year ended 31st March, 2022 are as under:

Month	BSE			NSE		
	High	Low	Volume	High	Low	Volume
Apr-21	2,504.30	2,300.00	19,43,851	2,505.90	2,300.00	4,22,81,914
May-21	2,446.00	2,320.00	11,23,105	2,446.95	2,319.35	2,65,69,848
Jun-21	2,531.50	2,329.95	26,05,898	2,533.95	2,330.60	3,22,68,417
Jul-21	2,512.00	2,318.15	15,81,958	2,513.40	2,318.00	2,24,40,490
Aug-21	2,736.90	2,325.00	27,00,819	2,737.45	2,324.60	3,52,33,493
Sep-21	2,859.10	2,677.45	22,39,867	2,859.30	2,677.00	3,34,75,102
Oct-21	2,733.25	2,368.30	32,16,963	2,734.00	2,368.00	4,00,11,262
Nov-21	2,445.95	2,286.00	13,51,606	2,449.00	2,284.70	3,25,87,886
Dec-21	2,388.55	2,200.00	17,54,638	2,389.90	2,201.15	2,88,39,519
Jan-22	2,424.90	2,240.60	18,46,514	2,425.00	2,240.90	3,51,55,340
Feb-22	2,333.50	2,120.00	16,93,674	2,333.00	2,120.00	2,81,62,744
Mar-22	2,164.00	1,901.80	26,68,847	2,167.95	1,901.55	5,96,75,399

BSE SENSEX Vs HUL share price (Indexed)



NSE NIFTY Vs HUL share price (Indexed)

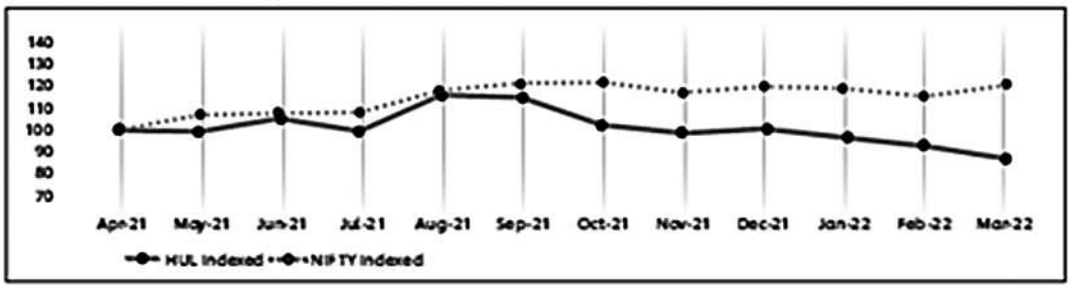


Figure 10.5: Line graph: The movement of HUL share price over time (Source: HUL annual report for the year 2021-22)

(iii) Pie Chart

A pie chart (or circle chart) is a circular graphical representation of statistical data that is segmented to demonstrate numerical proportion. In a pie chart, the arc length of each slice (and, by extension, its centre angle and area) is proportionate to the value it depicts. Although it is called for its similarity to a sliced pie, it can be served in a number of other ways. The corporate world and the mass media make extensive use of pie charts. For a better representation, the number of wedges in pie chart should be kept in limit. The categories of HUL shareholders are shown in Figure 10.6 below.

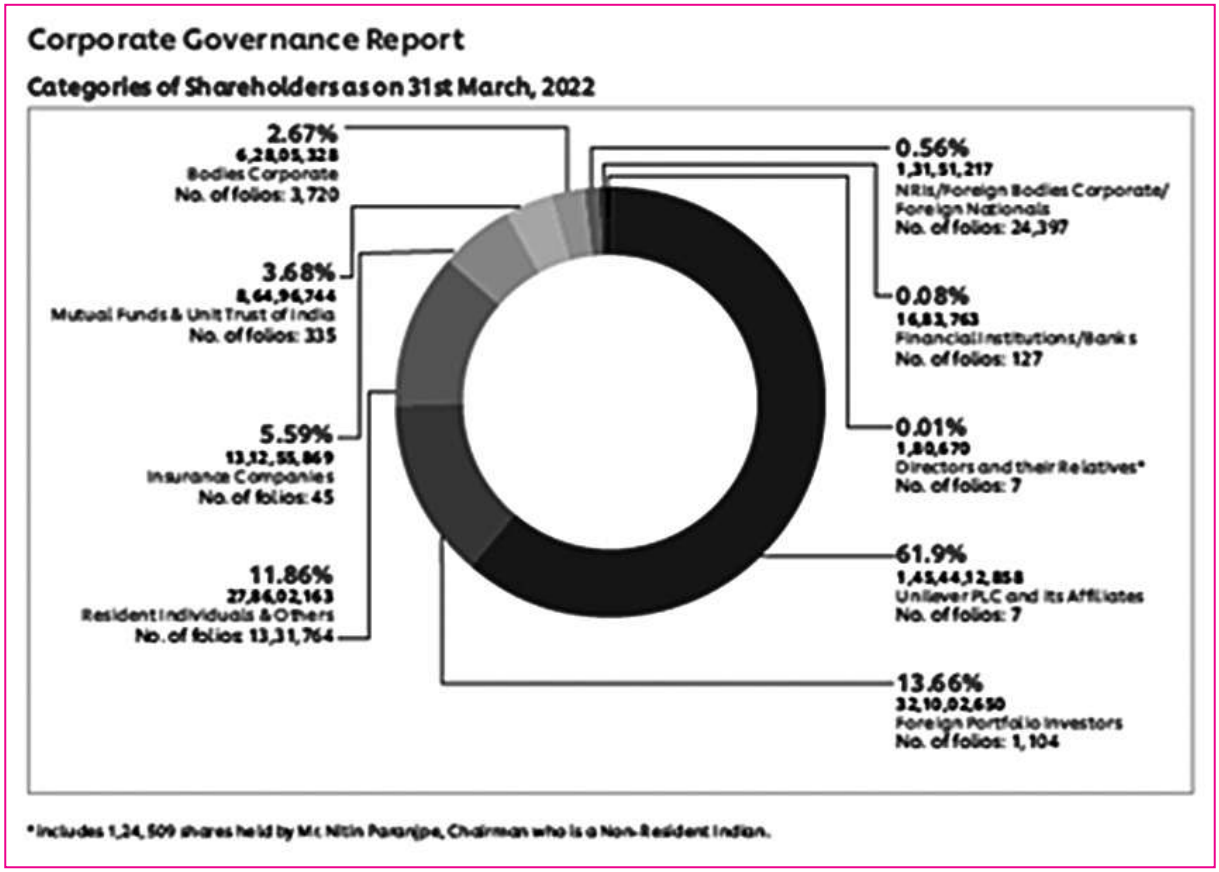


Figure 10.6: Pie Chart - Categories of HUL shareholders as on 31st March 2022 (Source: HUL annual report for the year 2021-22)

(iv) Map:

For displaying any type of location data, including postal codes, state abbreviations, country names, and custom geocoding, maps are a no-brainer. If the data is related with geographic information, maps are a simple and effective approach to illustrate the relationship.

There should be a correlation between location and the patterns in the data. Such as insurance claims by state and product export destinations by country, automobile accidents by postal code, and custom sales areas etc.

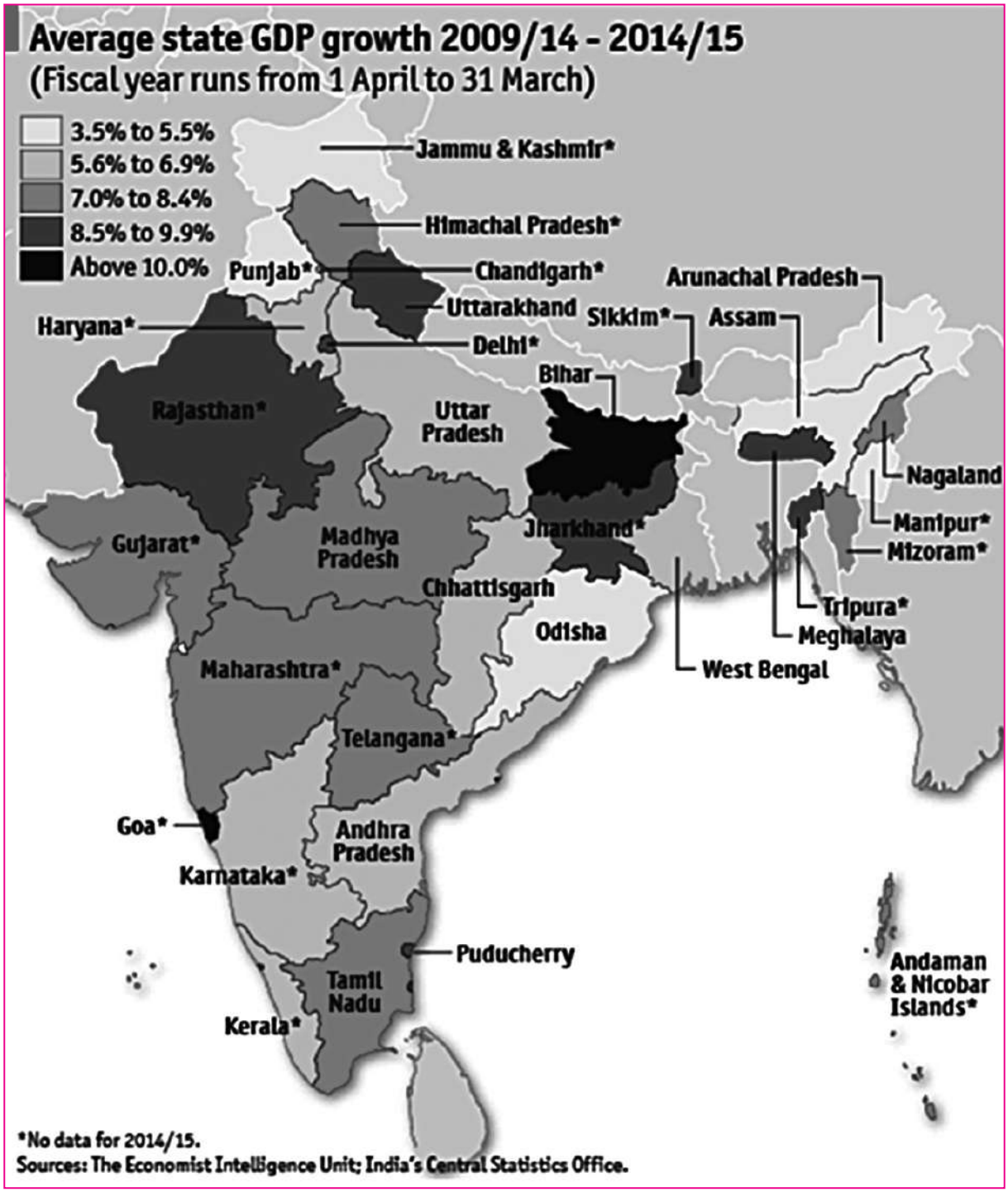


Figure 10.7: Map: Average state GDP growth (Source: Economist intelligence unit)

(v) Density map:

Density maps indicate patterns or relative concentrations that might otherwise be obscured by overlapping marks on a map, allowing to identify areas with a larger or lesser number of data points. Density maps are particularly useful when dealing with large data sets including several data points in a limited geographic region. Figure 10.8 shows the Cyclone hazard prone districts of India through a density map.

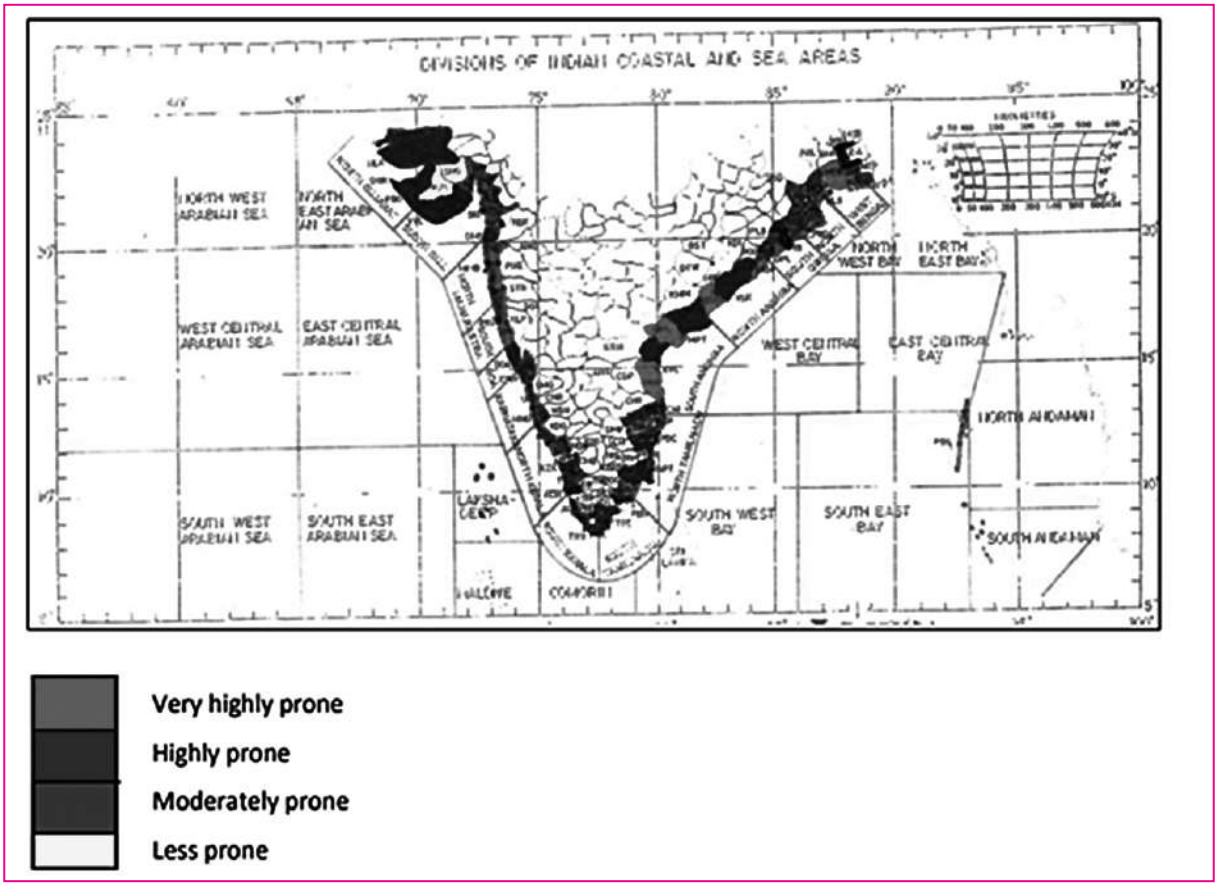


Figure 10.8: Cyclone hazard prone districts of India considering all the parameters and wind based on BMTPC Atlas (Source: www.ndma.gov.in)

(vi) Scatter plots

Scatter plots are a useful tool for examining the connection between many variables, revealing whether one variable is a good predictor of another or whether they tend to vary independently. A scatter plot displays several unique data points on a single graph.

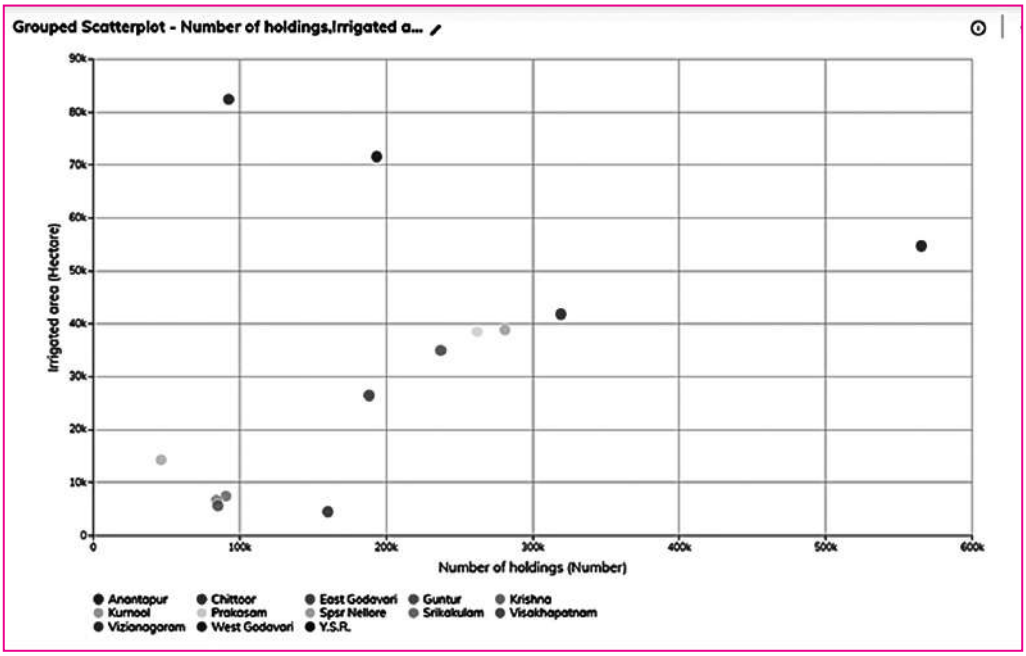


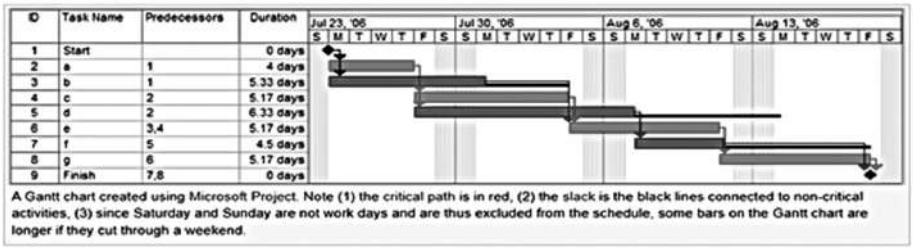
Figure 10.9: Grouped Scatterplot - Number of holdings and Irrigated area in Andhra Pradesh. (Source: indiadataportal.com)

(vii) Gantt Chart

Gantt charts represent a project's timeline or activity changes across time. A Gantt chart depicts tasks that must be accomplished before others may begin, as well as the allocation of resources. However, Gantt charts are not restricted to projects. This graphic can depict any data connected to a time series. Figure 10.10 depicts the Gnatt chart of a project.

Activity	Predecessor	Time estimates (in days)			Expected time (T_E)
		Opt. (O)	Normal (M)	Pess. (P)	
a	—	2	4	6	4.00
b	—	3	5	9	5.33
c	*a*	4	5	7	5.17
d	*a*	4	6	10	6.33
e	*b*, *c*	4	5	7	5.17
f	*d*	3	4	8	4.50
g	*e*	3	5	8	5.17

Once this step is complete, one can draw a Gantt chart or a network diagram.



A Gantt chart created using Microsoft Project. Note (1) the critical path is in red, (2) the slack is the black lines connected to non-critical activities, (3) since Saturday and Sunday are not work days and are thus excluded from the schedule, some bars on the Gantt chart are longer if they cut through a weekend.

Figure 10.10: Gnatt Chart for a project (Source: Wikipedia)

(viii) Bubble chart

Although bubbles are not exactly their own sort of visualisation, utilising them as a method enhances scatter plots and maps that illustrate the link between three or more variables. By varying the size and colour of circles, charts display enormous amounts of data in an aesthetically engaging manner. Figure 10.11 shows the bubble chart showing the proportions of professions of people who generate programming languages

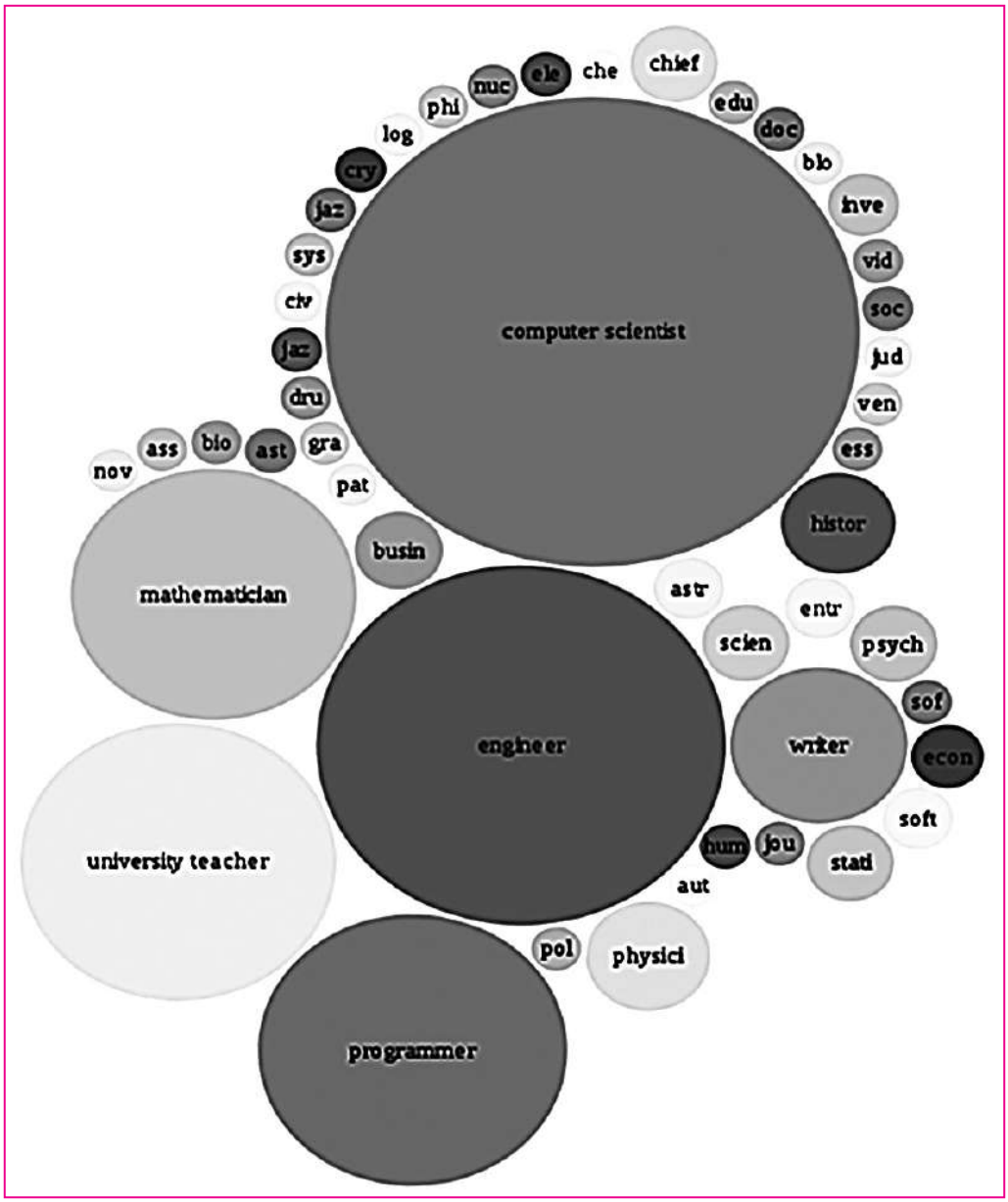


Figure 10.11: Bubble chart: the proportions of professions of people who generate programming languages (Source: Wikipedia)

(ix) Histogram

Histograms illustrate the distribution of the data among various groups. Histograms divide data into discrete categories (sometimes known as "bins") and provide a bar proportionate to the number of entries inside each category. This chart type might be used to show data such as number of items. Figure 10.12 is showing the sample histogram chart showing the frequency of something in terms of age.

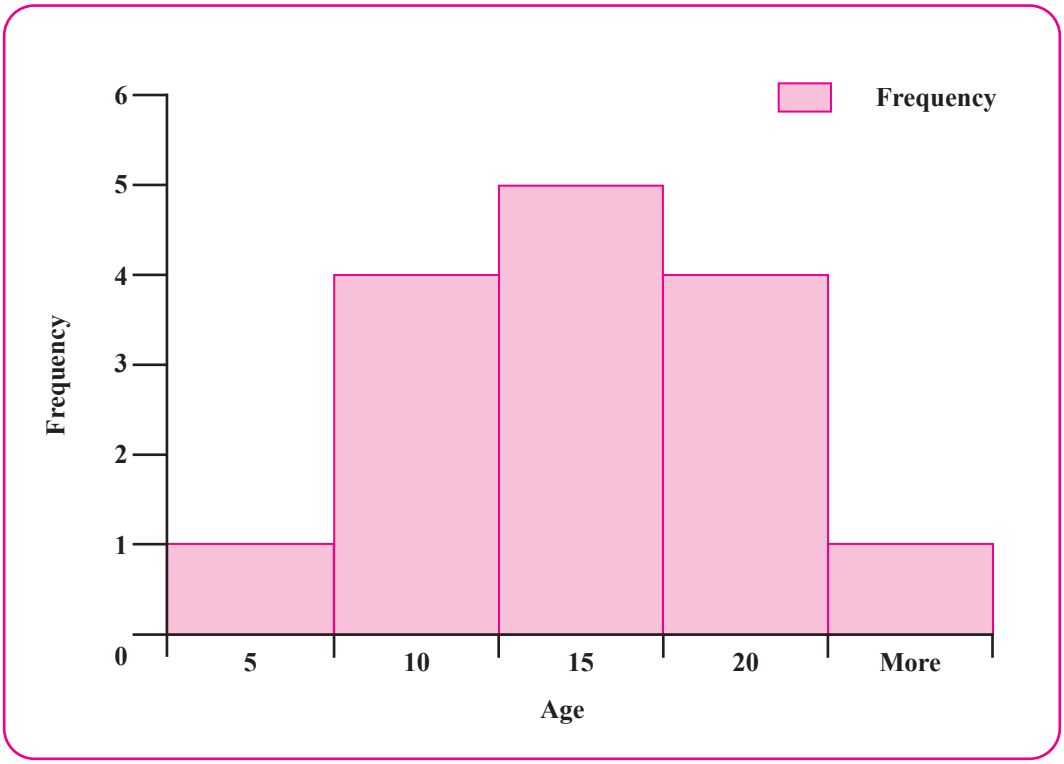


Figure 10.12: Histogram

10.4.3 Tables

Tables, often known as "crosstabs" or "matrices," emphasise individual values above aesthetic formatting. They are one of the most prevalent methods for showing data and, thus, one of the most essential methods for analysing data. While their focus is not intrinsically visual, as reading numbers is a linguistic exercise, visual features may be added to tables to make them more effective and simpler to assimilate.

Tables are most frequently encountered on websites, as part of restaurant menus, and within Microsoft Excel. It is crucial to know how to interpret tables and make the most of the information they provide since they are ubiquitous. It is also crucial for analysts and knowledge workers to learn how to make information easier for their audience to comprehend.

How to use a table?

Similar to most graphs, a table arranges data along one axis. The x-axis is the rows, while the y-axis is the columns. Because tables are read, it is customary to display categories along the x-axis. The y-axis depicts the values within each metric, with clearly labelled columns indicating their significance. In contrast to the majority of charts, tables may arrange qualitative data and show their linkages.

Analysts typically utilise tables to view specific values. They facilitate the identification of measurements or dimensions across a set of intervals (e.g., what was the company's profit in November 2018) (Ex. How many sales did each person close in 2019). A summary table may also efficiently summarise a huge data collection by providing subtotals and grand totals for each interval or dimension. The problem with tables is that they scale poorly. More than ten to fifteen rows and five columns make the table difficult to read, comprehend, and get insight from. This is because a table engages the brain's linguistic systems whereas data visualisation excites the brain's visual systems.

Adding visual features to the table will allow users to obtain understanding from the data more quickly than with a simple table. Gradients of colour and size aid in identifying trends and outliers. Icons assist the observer in recognising a shift in proportions. Using different markings will highlight relationships more effectively than a table of raw data.

Tables and crosstabs are handy for doing comparative analysis between certain data points. They are simple to construct and may effectively convey a single essential message. Before including a crosstab into a data visualisation, one should assess whether it serves the project's aims. Figure 10.13 shows a sample Visualisation of tabular data.

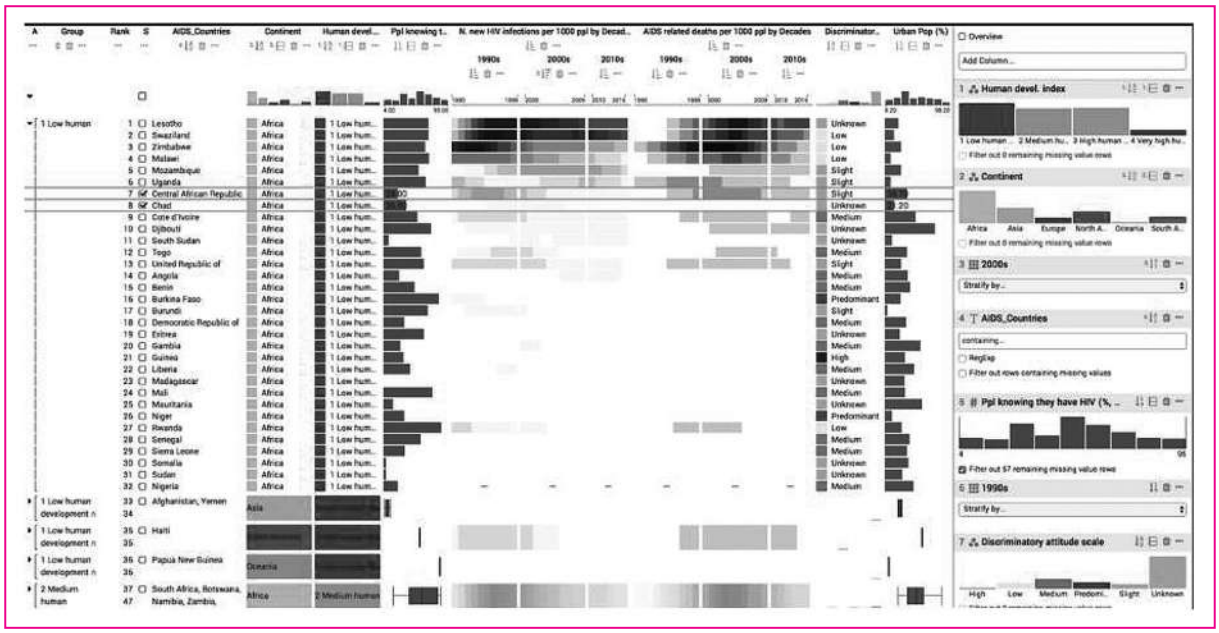


Figure 10.13: Visualisation of a tabular data (Source: https://vdl.sci.utah.edu)

10.4.4 Report design using data Visualisation

After producing a report, the last thing one anticipates is for someone to actually read it. Whether conveying ideas or seeking help, the information must leave an impression. To do this, one must present the report in a style that is both attractive and simple to comprehend. This is especially accurate if your report layout includes numbers.

How to use data Visualisation in report design?

There are few strategic steps to include data Visualisation in report design, as mentioned below:

- **Find a story in the data**

  Data-driven storytelling is a powerful tool. Finding a story that connects with the reader can help to create an effective report. It's also not that hard as it looks. In order to locate the story, one must arrange the data, identify any missing numbers, and then check for outliers. One may then view the data and examine the link between factors.

- **Create a narrative**

  When some individuals hear the term "data storytelling," they believe that it consists of a few statistics and that the task is complete. This is a frequent misconception that is false. Strong data storytelling comprises an engaging narrative that takes the audience through the facts and aids in their comprehension. Moreover, an explanation of the significance of these ideas is essential. To compose an excellent story, one must:

  (i) Engage the viewer with a catchy title and subheadings.

  (ii) Incorporate context into the data.

  (iii) Create a consistent and logical flow.

  (iv) Highlight significant discoveries and insights from the data.

- **Choose the most suitable data Visualisation**

  Data Visualisation is not limited to the creation of charts and graphs. It involves presenting the facts in the most comprehensible chart possible. Applying basic design principles and utilising features like as form, size, colour, and labelling may have a significant impact on how people comprehend the data. For instance, deciding the optimal number of slices for a pie chart or the space between bars in a bar graph. Knowing these tips may greatly improve the data visualisations.

- **Follow the visual language**

  The report design may be for internal or external consumption. Despite this, one should develop material consistent with the company's style guide. It is essential to adhere to data visualisation principles in order to achieve both uniformity and comprehension. A strategic methodology assists in implementation.

- **Publicize the report**

  Some reports are not intended for public consumption. However, since they include so much essential information, they may contain knowledge that is of interest to individuals or media outside of the business.

Tools and Techniques of Visualisation and Graphical Presentation

10.5

We will now examine some of the most successful data visualisation tools for data scientists and how they may boost their productivity. Here are four popular data visualisation tools that may assist data scientists in making more compelling presentations.

(i) Tableau

Tableau is a data visualisation application for creating interactive graphs, charts, and maps. It enables one to connect to many data sources and generate visualisations in minutes.

Tableau Desktop is the first product of its kind. It is designed to produce static visualisations that may be published on one or more web pages, but it is incapable of producing interactive maps.

Tableau Public is a free version of Tableau Desktop with some restrictions.

It takes time and effort to understand Tableau, but there are several tools available to assist doing it. As a data scientist, Tableau must be the most important tool one should understand and employ on a daily basis.

The application may be accessed through https://www.tableau.com/ (Figure 10.14)

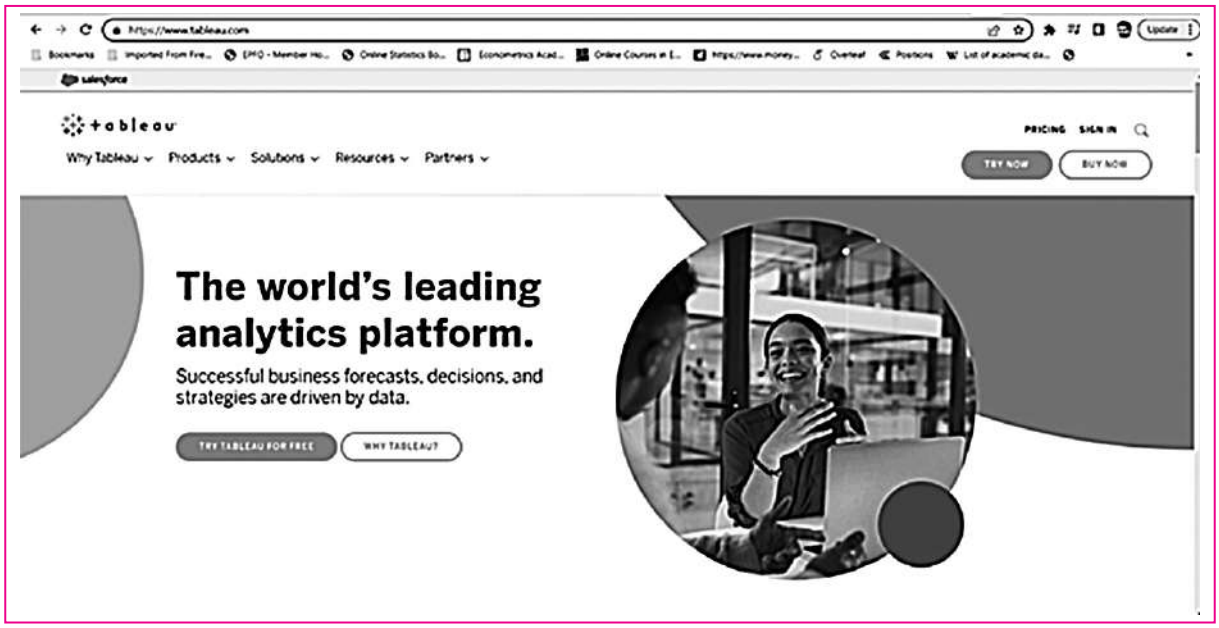
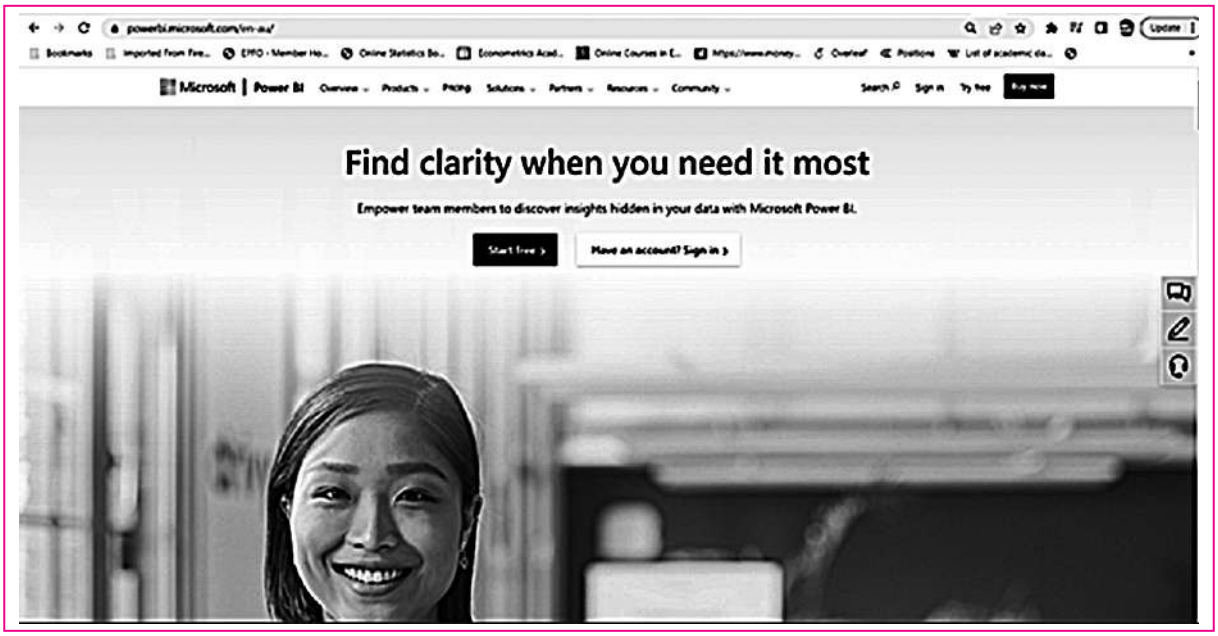


Tableau website - https://www.tableau.com/

Figure 10.14

(ii) Microsoft Power BI

Microsoft Power BI is a data visualisation tool for business intelligence data. Reporting, self-service analytics, and predictive analytics are supported. In addition, it provides a platform for end users to generate reports and share insights with others inside their business. It serves as a centralized repository for all of the business data, which all of the business users can access. Through such linkages, the prepared reports may be shared inside the organisation, making it a crucial tool for businesses seeking a consolidated data reporting system. The application may be accessed through https://powerbi.microsoft.com/en-au/ (Figure 10.15)



Microsoft Power BI website - https://powerbi.microsoft.com/en-au/

Figure 10.15

(iii) Microsoft Excel

Microsoft Excel is a data Visualisation tool with an intuitive interface, so it is not necessarily difficult to use.

Excel provides several options for viewing data, such as, scatter plot, bar chart, histogram, pie chart, line chart, and treemap etc. Using these techniques, one may illustrate the relationship between two or more datasets that is wished to compare. Also one may examine the relationships between variables to discover if they are connected or not.

Numerous data analysts utilize techniques in MS Excel to examine statistical, scientific, medical, and economic data for market research and financial planning, among other applications.

The application may be accessed through https://www.microsoft.com/en-in/microsoft-365/excel (Figure 10.16)

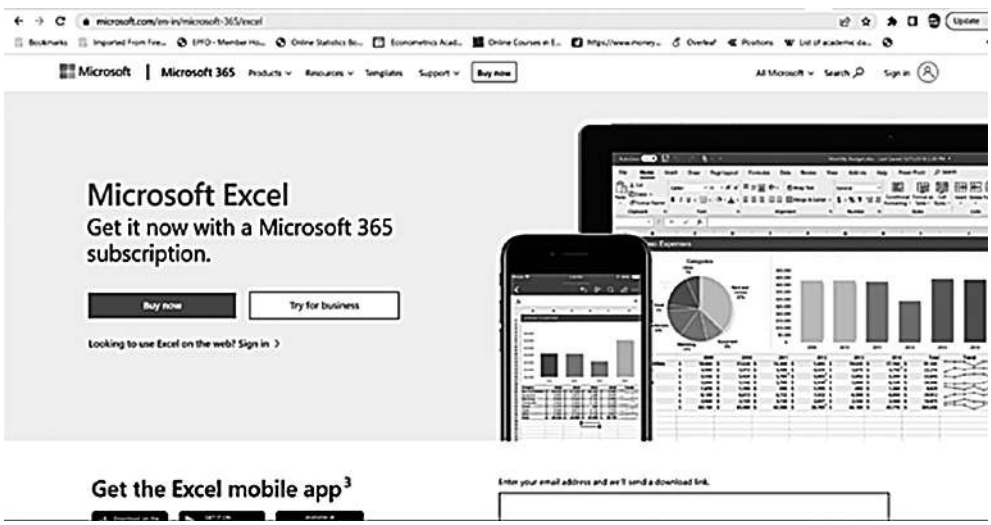


Figure 10.16: Microsoft Excel website - https://www.microsoft.com/en-in/microsoft-365/excel

(iv) QlikView

QlikView is a data discovery platform that enables users to make quicker, more informed choices by speeding analytics, uncovering new business insights, and enhancing the precision of outcomes.

An easy software development kit that has been utilized by enterprises worldwide for many years. It may mix diverse data sources with color-coded tables, bar graphs, line graphs, pie charts, and sliders.

It has been designed using a "drag and drop" Visualisation interface, allowing users to input data from a variety of sources, including databases and spreadsheets, without having to write code. These properties also make it a reasonably easy-to-learn and -understand instrument. The application may be accessed through https://www.qlik.com/us/products/qlikview (Figure 10.17)

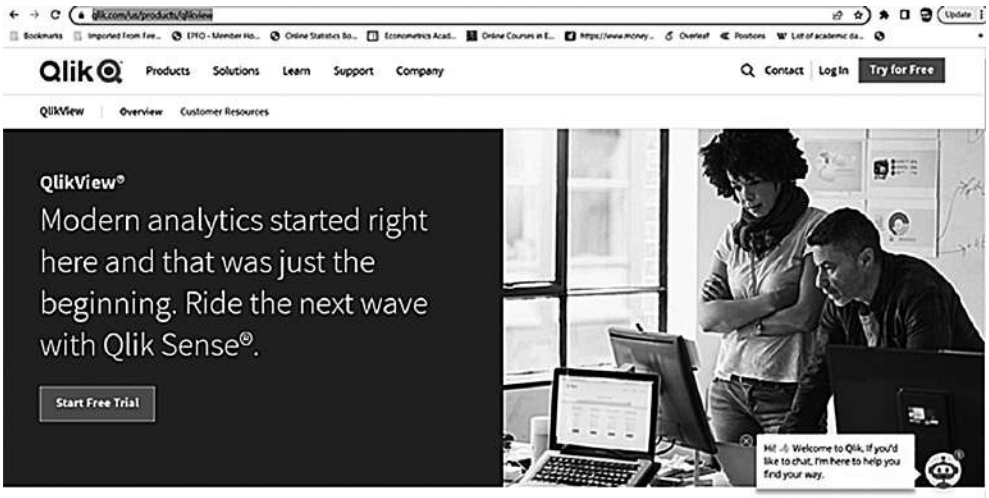


Figure 10.17: QlikView - https://www.qlik.com/us/products/qlikview

Solved Case 1

Sutapa is working as an analyst with SN Company Limited. She is entrusted with the responsibility of making a presentation before the senior management. She knows that data Visualisation is an important tool for presentation, and a good data Visualisation can make her presentation more effective. However, she is not very sure about the data visualisation tools, that are available.

What are the important data Visualisation tools available that Sutapa may use for an effective and impressive presentation.

Teaching note - outline for solution:

The instructor may initiate the discussions with explaining the importance of data Visualisation. She may also discuss the objectives of data Visualisation:

(i) Making a better data analysis:

(ii) Faster decision making

(iii) Analysing complicated data

For an effective data Visualisation, the presenter should keep certain important issues in mind:

(i) Know the objective

(ii) Always keep the audience in mind

(iii) Invest in the best technology

(iv) Improve the team's ability to visualise data

There are various tools available for data Visualisation. The instructor may extend the discussion with mentioning the following tools. He should also explain the suitability of each tool for visualising and presenting the data:

(i) Dashboards

(ii) Bar charts

(iii) Histogram

(iv) Pie chart

(v) Line chart

(vi) Maps

(vii) Gantt chart

(viii) Bubble Chart etc.

One of the major comforting factor is development of recent software that makes the process of data Visualisation less painful. The instructor may conclude the discussions with mention of few popular softwares, viz:

(i) Microsoft Power Bi

(ii) Tableau

(iii) Microsoft Excel etc

Exercise

A. Theoretical Questions:

⊙ Multiple Choice Questions

1. Following is a widely used graph for data Visualisation
   (a) Bar chart
   (b) Pie chart
   (c) Histogram
   (d) All of the above
2. Following are the objectives of data visualisation:
   (a) Making a better data analysis
   (b) Faster decision making
   (c) Analysing complicated data
   (d) All of the above
3. Following are the scope of DPA
   (a) Defining significant meaning (relevant information) required by each audience member in every scenario.
   (b) Obtaining the proper data (focus area, historic reach, extensiveness, level of detail, etc.)
   (c) Determining the needed frequency of data refreshes (the currency of the data)
   (d) All of the above
4. Maps may be used for displaying
   (a) Pincode
   (b) Country name
   (c) State abbreviation
   (d) All of the above
5. A scatter plot displays several unique data points:
   (a) on a single graph.
   (b) On two different graphs
   (c) On four different graphs
   (d) None of the above

Answer:

1	**d**	**2**	**d**	**3**	**d**	**4**	**d**	**5**	**a**

⊙ State True or False

1. Data visualisation enhances the effect of communications for the audiences and delivers the most convincing data analysis outcomes.
2. Visualisation allows to interpret large volumes of data more quickly and effectively at a glance.

3. Data presentation architecture (DPA) is a set of skills that aims to identify, find, modify, format, and present data in a manner that ideally conveys meaning and provides insight.
4. Scatter plots are a useful tool for examining the connection between many variables, revealing whether one variable is a good predictor of another or whether they tend to vary independently.
5. Gantt charts represent a project's timeline or activity changes across time.

Answer:

1	**T**	**2**	**T**	**3**	**T**	**4**	**T**	**5**	**T**

⊙ Fill in the blanks

1. Data and insights available to decision-makers facilitate _____ analysis.
2. Often confused with data Visualisation, data presentation architecture is a much _____ skill set.
3. A _____is a circular graphical representation of statistical data that is segmented to demonstrate numerical proportion.
4. If the data is related with geographic information, _____ are a simple and effective approach to illustrate the relationship.
5. _____ indicate patterns or relative concentrations that might otherwise be obscured by overlapping marks on a map, allowing to identify areas with a larger or lesser number of data points.

Answer:

1	**decision**	**2**	**broader**
3	**pie chart (or circle chart)**	**4**	**maps**
5	**Density maps**		

⊙ Short essay type questions

1. State the objectives of Data presentation architecture (DPA).
2. What are the scopes of Data presentation architecture (DPA).
3. Define the concept of data Visualisation dashboard.
4. Write a short note on bar chart
5. Write a short note on density map.

⊙ Essay type questions

1. Discuss the ways in which the finance professionals may be helped by data Visualisation in analysing and reporting information.
2. Discuss the objectives of data Visualisation.
3. How to use data Visualisation in report design?

4. Discuss the different tools for Visualisation and Graphical Presentation
5. Discuss the objectives and scope of data presentation architecture.

Unsolved Case(s)

1. Maitreyee works as a financial analyst with a bank. The departmental meeting with her managing director is going to happen very soon. Maitreyee is entrusted with the task of preparing a dashboard that will cover the performance of his department during the past quarter. She wants to prepare the dashboard in such a way, that it should not look cluttered, but at the same time, it covers all the available information in a visually pleasing manner.

   Discuss the different approaches Maitreyee may adopt to meet her objective.

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Data Analysis and Modelling 11

This Module Includes

11.1 Process, Benefits and Types of Data Analysis

11.2 Data Mining and Implementation of Data Mining

11.3 Analytics and Model Building (Descriptive, Diagnostic, Predictive, Prescriptive)

11.4 Standards for Data Tagging and Reporting (XML, XBRL)

11.5 Cloud Computing, Business Intelligence, Artificial Intelligence, Robotic Process Automation and Machine Learning

11.6 Model vs. Data-driven Decision-making

Data Analysis and Modelling

SLOB Mapped against the Module:

To equip oneself with application-oriented knowledge in data preparation, data presentation and finally data analysis and modelling to facilitate quality business decisions.

Module Learning Objectives:

After studying this module, the students will be able to –

- Understand the Process, Development and Types of Data Analysis
- Understand the concepts of Data Mining and Implementation of Data Analysis
- Understand the concepts of Analytics and Model Building
- Understand the Standards for Data Tagging and Reporting
- Understand the concepts of Cloud Computing, Business Intelligence, Artificial Intelligence, Robotic Process Automation and Machine Learning
- Understand the relationship between model and data driven decision making.

Process, Benefits and Types of Data Analysis

11.1

Data analytics is the science of evaluating unprocessed datasets to draw conclusions about the information they contain. It helps us to identify patterns in the raw data and extract useful information from them.

Applications containing machine learning algorithms, simulation, and automated systems may be utilised by data analytics procedures and methodologies. For human usage, the systems and algorithms process unstructured data.

These data are evaluated and used to assist firms in gaining a deeper understanding of their customers, analysing their promotional activities, customising their content, developing content strategies, and creating new products. Data analytics enables businesses to boost market efficiency and increase profits.

11.1.1 Process of data analytics

Following are the steps for data analytics:

- **Step 1:** Criteria for grouping data

  Data may be segmented by a variety of parameters, including age, population, income, and sex. The data values might be either numeric or category.

- **Step 2:** Collecting the data

  Data may be gathered from several sources, including internet sources, computers, personnel, and community sources.

- **Step 3:** Organizing the data

  After collecting the data, it must be arranged so that it can be analysed. Statistical data can be organised on a spreadsheet or other programme capable of handling statistical data.

- **Step 4:** Cleaning the data

  The data is initially cleansed to verify that there are no duplicates or errors. The document is then examined to ensure that it is comprehensive. Before data is sent to a data analyst for analysis, it is beneficial to rectify or eliminate any errors by cleaning the data.

- **Step 5:** Adopt the right type of data analytics process:

  There are four types of data analytics process:

  (i) Descriptive analytics
  (ii) Diagnostics analytics
  (iii) Predictive analytics
  (iv) Prescriptive analytics

We will discuss more on these types of analytics types in section 11.3.

11.1.2 Benefits of data analytics

Following are the benefits of data analytics:

(i) Improves decision making process

Companies can use the information gained from data analytics to base their decisions, resulting in enhanced outcomes. Using data analytics significantly reduces the amount of guesswork involved in preparing marketing plans, deciding what materials to produce, and more. Using advanced data analytics technologies, you can continuously collect and analyse new data to gain a deeper understanding of changing circumstances.

(ii) Increase in efficiency of operations

Data analytics assists firms in streamlining their processes, conserving resources, and increasing their profitability. When firms have a better understanding of their audience's demands, they spend less time creating advertising that do not fulfil those needs.

(iii) Improved service to stakeholders

Data analytics gives organisations with a more in-depth understanding of their customers, employees and other stake holders. This enables the company to tailor stakeholders' experiences to their needs, provide more personalization, and build stronger relationships with them.

Data Mining and Implementation of Data Mining

11.2

Data mining, also known as knowledge discovery in data (KDD), is the extraction of patterns and other useful information from massive data sets. Given the advancement of data warehousing technologies and the expansion of big data, the use of data mining techniques has advanced dramatically over the past two decades, supporting businesses in translating their raw data into meaningful information. Nevertheless, despite the fact that technology is always evolving to manage massive amounts of data, leaders continue to struggle with scalability and automation.

Through smart data analytics, data mining has enhanced corporate decision making. The data mining techniques behind these investigations may be categorised into two primary purposes: describing the target dataset or predicting results using machine learning algorithms. These strategies are used to organise and filter data, bringing to the surface the most relevant information, including fraud detection, user habits, bottlenecks, and even security breaches.

When paired with data analytics and visualisation technologies like as Apache Spark, data mining has never been more accessible and the extraction of valuable insights has never been quicker. Artificial intelligence advancements continue to accelerate adoption across sectors.

11.2.1 Process of data mining

The process of data mining comprises a series of procedures, from data collecting through visualisation, in order to extract useful information from massive data sets. As stated previously, data mining techniques are utilised to develop descriptions and hypotheses on a specific data set. Through their observations of patterns, relationships, and correlations, data scientists characterise data. In addition to classifying and clustering data using classification and regression techniques, they discover outliers for use cases such as spam identification.

Data mining typically involves four steps: establishing objectives, acquiring and preparing data, implementing data mining techniques, and assessing outcomes.

(i) Setting the business objective:

This might be the most difficult element in the data mining process, yet many organisations spend inadequate effort on it. Together, data scientists and business stakeholders must identify the business challenge, which informs the data queries and parameters for a specific project. Analysts may also need to conduct further study to adequately comprehend the company environment.

(ii) Preparation of data:

Once the scale of the problem has been established, it is simpler for data scientists to determine which collection of data will assist the company in answering crucial questions. Once the pertinent data has been collected, it will be cleansed by eliminating any noise, such as repetitions, missing numbers, and outliers.

Based on the dataset, an extra step may be done to minimise the number of dimensions, as an excessive amount of features might slow down any further calculation. Data scientists seek to maintain the most essential predictors to guarantee optimal model accuracy.

(iii) Model building and pattern mining:

Data scientists may study any intriguing relationship between the data, such as frequent patterns, clustering algorithms, or correlations, depending on the sort of research. While high frequency patterns have larger applicability, data variations can often be more fascinating, exposing possible fraud areas.

Depending on the available data, deep learning algorithms may also be utilised to categorise or cluster a data collection. If the input data is marked (i.e. supervised learning), a classification model may be used to categorise data, or a regression may be employed to forecast the probability of a specific assignment. If the dataset is unlabeled (i.e. unsupervised learning), the particular data points in the training set are compared to uncover underlying commonalities, then clustered based on those features.

(iv) Result evaluation and implementation of knowledge:

After aggregating the data, the findings must be analysed and understood. When completing results, they must be valid, original, practical, and comprehensible. When this criterion is satisfied, companies can execute new strategies based on this understanding, therefore attaining their intended goals.

11.2.2 Techniques of data mining

Using various methods and approaches, data mining transforms vast quantities of data into valuable information. Here are a few of the most prevalent:

(i) Association rules:

An association rule is a rule-based technique for discovering associations between variables inside a given dataset. These methodologies are commonly employed for market basket analysis, enabling businesses to better comprehend the linkages between various items. Understanding client consumption patterns helps organisations to create more effective cross-selling tactics and recommendation engines.

(ii) Neural Networks:

Primarily utilised for deep learning algorithms, neural networks replicate the interconnection of the human brain through layers of nodes to process training data. Every node has inputs, weights, a bias (or threshold), as well as an output. If the output value exceeds a predetermined threshold, the node "fires" and passes data to the subsequent network layer. Neural networks acquire this mapping function by supervised learning and gradient descent, changing based on the loss function. When the cost function is zero or close to it, we may have confidence in the model's ability to produce the correct answer.

(iii) Decision tree:

Using classification or regression algorithms, this data mining methodology classifies or predicts likely outcomes based on a collection of decisions. As its name implies, it employs a tree-like representation to depict the potential results of these actions.

(iv) K-nearest neighbour:

K-nearest neighbour, often known as the KNN algorithm, classifies data points depending on their closeness to and correlation with other accessible data. This technique assumes that comparable data points exist in close proximity to one another. Consequently, it attempts to measure the distance between data points, often by Euclidean distance, and then assigns some on the most common category or average.

11.2.3 Implementation of data mining in Finance and management

The widespread use of data mining techniques by business intelligence and data analytics teams enables them to harvest insights for their organisations and industries.

Utilizing data mining techniques, hidden patterns and future trends and behaviours in financial markets may be predicted. Typically, sophisticated statistical, mathematical, and artificial intelligence approaches are necessary for data mining, particularly for high-frequency financial data. Among the data mining applications are:

(i) Detecting money laundering and other financial crimes:

Money laundering is the illegal conversion of black money to white money. In today's society, data mining techniques have advanced to the point where they are deemed suitable for detecting money laundering. The data mining methodology provides a mechanism for bank customers to detect or verify the detection of the anti-money laundering impact.

(ii) Prediction of loan repayment and customer credit policy analysis:

Loan Distribution is the core business function of every bank. The loan Prediction system automatically computes the size of the characteristics it employs and examines data pertaining to its size. Consequently, data mining aids in the management of all critical data and massive databases by utilising its models.

(iii) Target marketing:

Together, data mining and marketing work to target a certain market, and they also assist and determine market decisions. With data mining, it is possible to keep earnings, margins, etc. and determine which product is optimal for various types of customers.

(iv) Design and construction of data warehouses:

The business is able to retrieve or move the data into several huge data warehouses, allowing a vast volume of data to be correctly and reliably evaluated with the aid of various data mining methodologies and techniques. It also examines a vast number of transactions.

Analytics and Model Building (Descriptive, Diagnostic, Predictive, Prescriptive)

11.3

Businesses utilise analytics to study and evaluate their data, and then translate their discoveries into insights that eventually aid executives, managers, and operational personnel in making more educated and prudent business choices. Descriptive analytics, which examines what has occurred in a firm, diagnostic analytics, which explores why did it occur, predictive analytics, which examines what could occur, and prescriptive analytics, which examines what should occur, are the four most important forms of analytics used by enterprises. While each of these approaches has its own distinct insights, benefits, and drawbacks in their use, when combined, these analytics tools may be an exceptionally valuable asset for a corporation.

It is also essential to examine the privacy principles while utilising data. Public entities and the business sector should consider individual privacy when using data analytics. As more and more firms seek to big data (huge, complex data sets) to raise revenue and enhance corporate efficiency and effectiveness, regulations are becoming increasingly required.

11.3.1 What are descriptive analytics?

Descriptive analytics is a frequently employed style of data analysis in which historical data is collected, organised, and presented in a readily digestible format. Descriptive analytics focuses exclusively on what has already occurred in an organisation and, unlike other types of analysis, does not utilise its results to draw inferences or make forecasts. Rather, descriptive analytics serves as a basic starting point to inform or prepare data for subsequent analysis.

In general, descriptive analytics is the simplest kind of data analytics, since it employs simple mathematical and statistical methods, such as arithmetic, averages, and percentage changes, rather of the complicated computations required for predictive and prescriptive analytics. With the use of visual tools such as line graphs, pie charts, and bar charts to communicate data, descriptive analytics can and should be readily understood by a broad corporate audience.

11.3.2 How does descriptive analytics work?

To identify historical data, descriptive analytics employs two fundamental techniques: data aggregation and data mining (also known as data discovery). The process of gathering and organising data into digestible data sets called data aggregation. The extracted patterns, trends, and significance are then presented in an intelligible format.

According to Dan Vesset, the process of descriptive analytics may be broken into five broad steps:

Step 1: Decide the business metrics: First, measurements are developed to evaluate performance against corporate objectives, such as increasing operational efficiency or revenue. According to Vesset, the effectiveness of descriptive analytics is strongly dependent on KPI governance. 'Without governance,' he says, 'there may be no consensus on the meaning of the data, assuring analytics a minor role in decision-making.'

Step 2: Identification of data requirement: The data is gathered from sources such as reports and databases.

Vesset states that in order to correctly measure against KPIs, businesses must catalogue and arrange the appropriate data sources in order to extract the necessary data and generate metrics depending on the present status of the business.

Step 3: Preparation and collection of data: Data preparation, which includes publication, transformation, and cleaning, occurs prior to analysis and is a crucial step for ensuring correctness; it is also one of the most time-consuming tasks for the analyst.

Step 4: Analysis of data: Utilizing summary statistics, clustering, pattern tracking, and regression analysis, we discover data trends and evaluate performance.

Step 5: Presentation of data: Lastly, charts and graphs are utilised to portray findings in a manner that non-experts in analytics may comprehend.

11.3.3 Information revealed by descriptive analytics:

An organisation uses descriptive analytics regularly in its day-to-day operations. Examples of descriptive analytics that give a historical overview of an organization's activities include company reports on inventory, workflow, sales, and revenue. These types of reports collect data that can be readily aggregated and utilised to provide snapshots of an organization's activities.

Social analytics are virtually always a type of descriptive analytics. The number of followers, likes, and posts may be utilised to calculate, for example, the average number of replies per post, page visits, and response time. Facebook and Instagram comments are additional instances of descriptive analytics that may be utilised to better comprehend user sentiments.

However, descriptive analytics does not seek to go beyond the surface data and analysis; extra inquiry falls outside the scope of descriptive analytics, and conclusions and predictions are not derived from descriptive analysis. Nevertheless, this research can show patterns and significance by comparing historical data. An annual income report, for instance, may look financially encouraging until it is compared against the same report from past years, which reveals a declining trend.

11.3.4 Advantages and disadvantages of descriptive analytics

Due to the fact that descriptive analytics depends just on historical data and basic computations, this technique is easily applicable to day-to-day operations and does not need an in-depth understanding of analytics. This implies that firms may report on performance very quickly and simply and acquire insights that can be utilised to make changes.

11.3.5 Examples of descriptive analytics

Descriptive analytics assists organisations in measuring performance to ensure that objectives and goals are reached. And if they are not reached, descriptive analytics can indicate improvement or change areas.

Several applications of descriptive analytics include the following:

- Past events, such as sales and operational data or marketing campaigns, are summarised.
- Social media usage and engagement data, such as Instagram or Facebook likes, are examples of such information.
- Reporting general trends
- Compiling survey data

11.3.6 What is diagnostic analytics?

Diagnostic analytics highlights the tools are employed to question the data, "Why did this occur?" It involves a thorough examination of the data to discover important insights. Descriptive analytics, the first phase in the data analysis process for the majority of businesses, is a straightforward method that records what has already occurred. Diagnostic analytics goes a step further by revealing the rationale behind particular outcomes.

Typical strategies for diagnostic analytics include data discovery, drill-down, data mining, and correlations. Analysts identify the data sources that assists them in interpreting the outcomes during the discovery phase. Drilling down entails concentrating on a specific aspect of the data or widget. Data mining is the automated extraction of information from vast quantities of unstructured data. And identifying consistent connections in the data might assist to pinpoint the investigation's parameters.

Analysts are responsible for identifying the data sources that would be utilised. Frequently, this requires them to search for trends outside of the organization's own databases. It may be necessary to include data from external sources in order to find connections and establish causality.

11.3.7 Advantages of diagnostic analytics

Data plays an increasingly important role in every organisation. Using diagnostic tools helps to make the most of the data by turning it into visuals and insights that can be utilised by everyone. Diagnostic analytics develops solutions that may be used to discover answers to data-related problems and to communicate insights within the organisation.

Diagnostic analytics enables to derive value from the data by asking the relevant questions and doing in-depth analyses of the responses. And this demands a platform for BI and analytics that is adaptable, nimble, and configurable.

11.3.8 Examples of diagnostic analytics

Here are some steps that may be taken to run diagnostic analytics on the internal data, and it may be required to add external information, in order to determine "why" something occurred. Set up the data study by determining what questions are to be answered. This might be an inquiry into the cause of a problem, such as a decreased click-through rate, or a positive development, such as a significant increase in sales during a specific period or season.

After identifying the problem, the analysis may be set up. You may be able to identify a single root cause, or you may require numerous data sets to identify a pattern and establish a link. By fitting a collection of variables to a linear equation, linear regression can assist identify relationships. Remember that the longer you let your data model to collect data, the more precise your results will be. A data model matures like a superb wine does. Next, apply a filter to your findings so that just the most significant factor or two potential factors are included in your report. For example, using the correlative correlations, you should next draw your findings and create a convincing argument for them.

Consider an HR department that wishes to examine the performance of its employees based on quarterly performance levels, absenteeism, and weekly overtime hours. You might establish your data models, utilise Python or R for in-depth examination, and search for correlations in your data.

Cybersecurity is another example of a problem that every organisation should devote resources to. The Cyber Security Team may determine the relationship between the security rating and the number of incidents, as well as assess other objectives, such as the reaction teamwork vs the average time to resolution. The company might utilise these data to design preventative measures for potentially vulnerable regions.

11.3.9 What is Predictive Analytics?

Predictive analytics, as implied by its name, focuses on forecasting and understanding what might occur in the future, whereas descriptive analytics focuses on previous data. By analysing past data patterns and trends by examining historical data and customer insights, it is possible to predict what may occur in the future and, as a result, many aspects of a business can be informed, such as setting realistic goals, executing effective planning, managing performance goals, and avoiding risks.

11.3.10 How does Predictive Analytics work?

The foundation of predictive analytics is probability. Using techniques such as data mining, statistical modelling (mathematical relationships between variables to predict outcomes), and machine learning algorithms (classification, regression, and clustering techniques), predictive analytics attempts to predict possible future outcomes and the probability of those events. To create predictions, machine learning algorithms, for instance, utilise current data and make the best feasible assumptions to fill in missing data.

Deep learning is a more recent subfield of machine learning that imitates the building of "human brain networks as layers of nodes that understand a specific process area but are networked together to provide an overall forecast." Credit scoring utilising social and environmental data and the sorting of digital medical pictures such as X-rays to automated predictions for doctors to use in diagnosing patients are instances of deep learning.

This methodology enables executives and managers to take a more proactive, data-driven approach to corporate planning and decision-making, given that predictive analytics may provide insight into what may occur in the future. Utilizing predictive analytics, businesses may foresee customer behaviour and purchase patterns, as well as discover sales trends. Predictions can also assist in forecasting supply chain, operations, and inventory demand.

11.3.11 Advantages and disadvantages of Predictive Analytics

Given that predictive analysis is based on probabilities, it can never be absolutely precise, but it may serve as a crucial tool for forecasting probable future occurrences and informing future corporate strategy. Additionally, predictive analytics may enhance several corporate functions, including:

- Effectiveness, including inventory forecasting
- Customer service, which may aid a business in gaining a deeper knowledge of who its clients are and what they want so that it can personalise its suggestions, is essential.
- Detection and prevention of fraud, which can assist businesses in identifying trends and alterations.
- Risk mitigation, which in the financial sector might entail enhanced applicant screening

This kind of analysis requires the availability of historical data, typically in enormous quantities.

11.3.12 Example of Predictive Analytics

There are a multitude of ways predictive analytics may be used to foresee probable occurrences and trends across sectors and enterprises. The healthcare business is a major benefactor of predictive analytics, for instance. RMIT University partnered with the Digital Health Cooperative Research Centre in 2019 to develop clinical decision support software for aged care that will reduce emergency hospitalizations and predict patient deterioration by analysing historical data and developing new predictive analytics techniques. The purpose of predictive analytics is to enable senior care professionals, residents, and their families to better prepare for death.

Following industries as some in which predictive analysis might be utilised:

- E-commerce – anticipating client preferences and proposing items based on previous purchases and search histories
- Sales – estimating the possibility that a buyer will buy another item or depart the shop.
- Human resources – identifying employees who are contemplating resigning and urging them to remain.
- IT security – detecting potential security vulnerabilities requiring more investigation
- Healthcare – anticipating staffing and resource requirements

11.3.13 What is prescriptive analytics?

Descriptive analytics describes what has occurred, diagnostic analytics explore why it occurred, predictive analytics describes what could occur, and prescriptive analytics describes what should be done. This approach is the fourth, final, and most sophisticated step of the business analysis process, and it is the one that urges firms to action by assisting executives, managers, and operational personnel in making the most informed decisions possible based on the available data.

11.3.14 How does the prescriptive analytics work?

Prescriptive analytics goes one step farther than descriptive and predictive analysis by advising the best potential business actions. This is the most sophisticated step of the business analytics process, needing significantly more specialised analytics expertise to execute; as a result, it is rarely utilised in daily company operations.

A multitude of approaches and tools – such as rules, statistics, and machine learning algorithms – may be used to accessible data, including internal data (from within the business) and external data, in order to produce predictions and recommendations (such as data derived from social media). The capabilities of machine learning dwarf those of a human attempting to attain the same outcomes.

The widespread misconception is that predictive analytics and machine learning are same. While predictive analytics uses historical data and statistical techniques to make predictions about the future, machine learning, a subset of artificial intelligence, refers to a computer system's ability to understand large and often enormous amounts of data without explicit instructions, and to adapt and become increasingly intelligent as a result.

Predictive analytics predicts what, when, and, most importantly, why something may occur. After analysing the potential repercussions of each choice alternative, suggestions may be made regarding which options would best capitalise on future opportunities or reduce future hazards. Prescriptive analytics predicts future outcomes and, by doing so, enables decision-makers to assess the potential consequences for each future outcome before making a choice.

Effectively conducted prescriptive analytics may have a significant impact on corporate strategy and decision making to enhance production, customer experience, and business success.

11.3.15 Advantages and disadvantages of prescriptive analytics

When utilised correctly, prescriptive analytics gives important insights for making the most optimal data-driven decisions to optimise corporate performance. Nonetheless, similar to predictive analytics, this technique requires enormous volumes of data to deliver effective findings, which is not always the case. In addition, the machine learning techniques frequently used in this study cannot consistently account for all external variables. On the other hand, machine learning significantly minimises the likelihood of human mistake.

11.3.16 Examples of prescriptive analytics

GPS technology is a frequent prescriptive analytics tool since it gives recommended routes to the user's intended destination based on factors such as travel time and road closures. In this scenario, prescriptive analysis "optimises a goal that analyses the distances between your origin and destination and prescribes the ideal path with the least distance."

Further prescriptive analysis applications include the following:

- Oil and manufacturing – monitoring price fluctuations
- Manufacturing – enhancing equipment administration, maintenance, cost modelling, production, and storage
- Healthcare – enhancing patient care and healthcare administration by analysing readmission rates and the cost-effectiveness of operations.
- Insurance – evaluating customer risk in terms of price and premium information
- Pharmaceutical research – determining the optimal testing methods and patient populations for clinical trials.

Standards for Data Tagging and Reporting (XML, XBRL)

11.4

11.4.1 Extensible Markup Language (XML)

XML is a file format and markup language for storing, transferring, and recreating arbitrary data. It specifies a set of standards for encoding texts in a format that is understandable by both humans and machines. XML is defined by the 1998 XML 1.0 Specification of the World Wide Web Consortium and numerous other related specifications, which are all free open standards.

XML's design objectives stress Internet usability, universality, and simplicity. It is a textual data format with significant support for many human languages via Unicode. Although XML's architecture is centred on texts, the language is commonly used to express arbitrary data structures, such as those employed by web services.

Several schema systems exist to help in the design of XML-based languages, and numerous application programming interfaces (APIs) have been developed by programmers to facilitate the processing of XML data.

Serialization, or storing, sending, and rebuilding arbitrary data, is the primary function of XML. In order for two dissimilar systems to share data, they must agree on a file format. XML normalises this procedure. XML is comparable to a universal language for describing information.

As a markup language, XML labels, categorises, and arranges information systematically.

The data structure is represented by XML tags, which also contain information. The information included within the tags is encoded according to the XML standard. A supplementary XML schema (XSD) defines the required metadata for reading and verifying XML. This is likewise known as the canonical schema. A "well-formed" XML document complies to fundamental XML principles, whereas a "valid" document adheres to its schema.

IETF RFC 7303 (which supersedes the previous RFC 3023) specifies the criteria for constructing media types for use in XML messages. It specifies the application/xml and text/xml media types. They are utilised for transferring unmodified XML files without revealing their intrinsic meanings. RFC 7303 also suggests that media types for XML-based languages end in +xml, such as image/svg+xml for SVG.

RFC 3470, commonly known as IETF BCP 70, provides further recommendations for the use of XML in a networked setting. This document covers many elements of building and implementing an XML-based language.

11.4.2 Application of XML

XML is now widely utilised for the exchange of data via the Internet. There have been hundreds of document formats created using XML syntax, including RSS, Atom, Office Open XML, OpenDocument, SVG, and XHTML. XML is also the foundational language for communication protocols like SOAP and XMPP. It is the message interchange format for the programming approach Asynchronous JavaScript and XML (AJAX).

Numerous industrial data standards, including Health Level 7, OpenTravel Alliance, FpML, MISMO, and National Information Exchange Model, are founded on XML and the extensive capabilities of the XML schema definition. Darwin Information Typing Architecture is an XML industry data standard in publishing. Numerous publication formats rely heavily on XML as their basis.

11.4.3 Extensible Business Reporting Language (XBRL)

XBRL is a data description language that facilitates the interchange of standard, comprehensible corporate data. It is based on XML and enables the automated interchange and trustworthy extraction of financial data across all software types and advanced technology, including Internet.

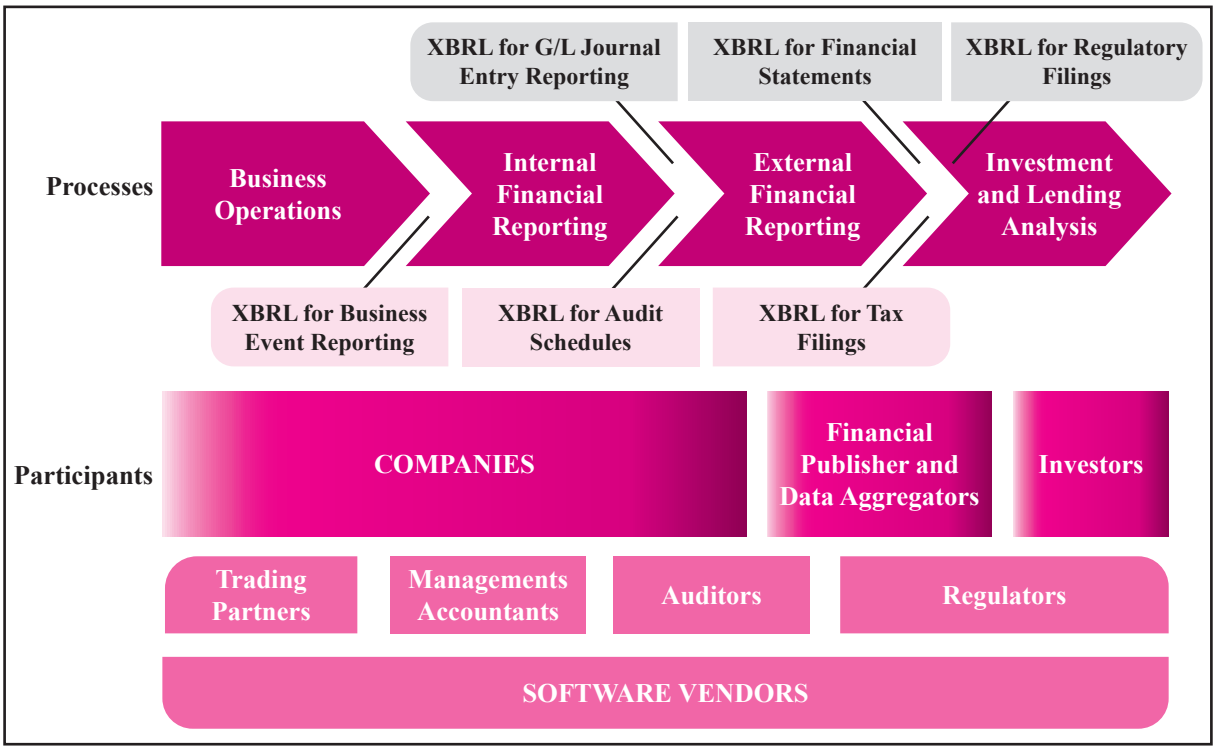

Figure 11.1: XBRL working model (Source: http://www.xbrl.org/business/general/softwareag-caseforxbrl.pdf)

XBRL allows organisations to arrange data using tags. When a piece of data is labelled as "revenue," for instance, XBRL enabled applications know that it pertains to revenue. It conforms to a fixed definition of income and may appropriately utilise it. The integrity of the data is safeguarded by norms that have been already accepted. In addition, XBRL offers expanded contextual information on the precise data content of financial documents. For example, when a a monetary amount is stated. XBRL tags may designate the data as "currency" or "accounts" within a report.

With XBRL, a business, a person, or another software programme may quickly produce a variety of output formats and reports based on a financial statement.

11.4.4 Benefits of XBRL

- All reports are automatically created from a single source of information, which reduces the chance of erroneous data entry and hence increases data reliability.
- Reduces expenses by simplifying and automating the preparation and production of reports for various clients.
- Accelerates the decision-making of financial entities such as banks and rating services.
- Facilitates the publication of analyst and investor reports
- Access, comparison, and analytic capabilities for information are unparalleled.

Cloud Computing, Business Intelligence, Artificial Intelligence, Robotic Process Automation and Machine Learning

11.5

11.5.1 Cloud computing

Simply described, cloud computing is the delivery of a variety of services through the Internet, or "the cloud." It involves storing and accessing data via distant servers as opposed to local hard drives and private datacenters.

Before the advent of cloud computing, businesses had to acquire and operate their own servers to suit their demands. This necessitated the purchase of sufficient server capacity to minimise the risk of downtime and disruptions and to meet peak traffic volumes. Consequently, significant quantities of server space were unused for the most of the time. Today's cloud service providers enable businesses to lessen their reliance on costly onsite servers, maintenance staff, and other IT resources.

Types of cloud computing

There are three deployment options for cloud computing: private cloud, public cloud, and hybrid cloud.

(i) Private cloud:

Private cloud offers a cloud environment that is exclusive to a single corporate organisation, with physical components housed on-premises or in a vendor's datacenter. This solution gives a high level of control due to the fact that the private cloud is available to just one enterprise. In a virtualized environment, the benefits include a customizable architecture, enhanced security procedures, and the capacity to expand computer resources as needed. In many instances, a business maintains a private cloud infrastructure on-premises and provides cloud computing services to internal users over the intranet. In other cases, the company engages with a third-party cloud service provider to host and operate its servers off-site.

(ii) Public cloud:

The public cloud stores and manages access to data and applications through the internet. It is fully virtualized, enabling an environment in which shared resources may be utilised as necessary. Because these resources are offered through the web, the public cloud deployment model enables enterprises to grow with more ease; the option to pay for cloud services on an as-needed basis is a significant benefit over local servers. Additionally, public cloud service providers use rigorous security measures to prevent unauthorised access to user data by other tenants.

(iii) Hybrid cloud:

Hybrid cloud blends private and public cloud models, enabling enterprises to exploit the benefits of shared resources while leveraging their existing IT infrastructure for mission-critical security needs. The hybrid cloud architecture enables businesses to store sensitive data on-premises and access it through apps hosted in the public cloud. In order to comply with privacy rules, an organisation may, for instance, keep sensitive user data in a private cloud and execute resource-intensive computations in a public cloud.

11.5.2 Business Intelligence:

Business intelligence includes business analytics, data mining, data visualisation, data tools and infrastructure, and best practises to assist businesses in making choices that are more data-driven. When you have a complete picture of your organization's data and utilise it to drive change, remove inefficiencies, and swiftly adjust to market or supply changes, you have contemporary business intelligence. Modern BI systems promote adaptable self-service analysis, controlled data on dependable platforms, empowered business users, and rapid insight delivery.

Traditional Business Intelligence, complete with capitalization, originated in the 1960s as a method for disseminating information across enterprises. Alongside computer models for decision making, the phrase "Business Intelligence" was coined in 1989. Before becoming a distinct product from BI teams with IT-dependent service solutions, these programmes evolved to transform data into insights.

 # BI Methods:

Company intelligence is a broad word that encompasses the procedures and methods of gathering, storing, and evaluating data from business operations or activities in order to maximise performance. All of these factors combine to provide a full perspective of a firm, enabling individuals to make better, proactive decisions. In recent years, business intelligence has expanded to incorporate more procedures and activities designed to enhance performance. These procedures consist of:

(i) **Data mining:** Large datasets may be mined for patterns using databases, analytics, and machine learning (ML).

(ii) **Reporting:** The dissemination of data analysis to stakeholders in order for them to form conclusions and make decisions.

(iii) **Performance metrics and benchmarking:** Comparing current performance data to previous performance data in order to measure performance versus objectives, generally utilising customised dashboards.

(iv) **Descriptive analytics:** Utilizing basic data analysis to determine what transpired

(v) **Querying:** BI extracts responses from data sets in response to data-specific queries.

(vi) **Statistical analysis:** Taking the results of descriptive analytics and use statistics to further explore the data, such as how and why this pattern occurred.

(vii) **Data Visualization:** Data consumption is facilitated by transforming data analysis into visual representations such as charts, graphs, and histograms.

(viii) **Visual Analysis:** Exploring data using visual storytelling to share findings in real-time and maintain the flow of analysis.

(ix) **Data Preparation:** Multiple data source compilation, dimension and measurement identification, and data analysis preparation.

11.5.3 Artificial Intelligence (AI)

John McCarthy of Stanford University defined artificial intelligence as, " It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable."

However, decades prior to this description, Alan Turing's landmark paper "Computing Machinery and Intelligence" marked the genesis of the artificial intelligence discourse. Turing, commonly referred to as the "father of computer science," poses the question "Can machines think?" in this article. From there, he proposes the now-

famous "Turing Test," in which a human interrogator attempts to differentiate between a machine and a human written answer. Although this test has been subjected to considerable examination since its publication, it remains an essential aspect of the history of artificial intelligence and a continuing philosophical thought that employs principles from linguistics.

Stuart Russell and Peter Norvig then published 'Artificial Intelligence: A Modern Approach', which has since become one of the most influential AI textbooks. In it, they discuss four alternative aims or definitions of artificial intelligence, which distinguish computer systems based on reasoning and thinking vs. acting:

- **Human approach:**
  - Systems that think like humans
  - Systems that act like humans
- **Ideal approach:**
  - Systems that think rationally
  - Systems that act rationally

Artificial intelligence is, in its simplest form, a topic that combines computer science and substantial datasets to allow problem-solving. In addition, it includes the subfields of machine learning and deep learning, which are commonly associated with artificial intelligence. These fields consist of AI algorithms that aim to develop expert systems that make predictions or classifications based on input data.

As expected with any new developing technology on the market, AI development is still surrounded by a great deal of hype. According to Gartner's hype cycle, self-driving vehicles and personal assistants follow "a normal evolution of innovation, from overenthusiasm through disillusionment to an ultimate grasp of the innovation's importance and position in a market or area." According to Lex Fridman's 2019 MIT lecture, we are at the top of inflated expectations and nearing the trough of disillusionment.

AI has several applications in the area of financial services (fig 11.2).

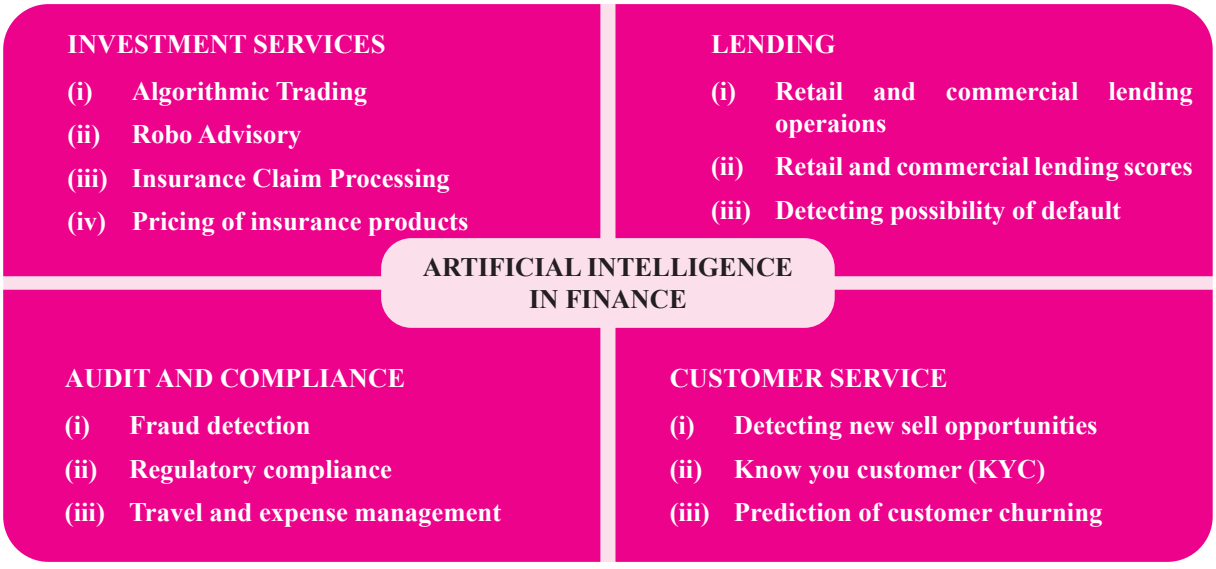

Fig 11.2: Artificial intelligence in finance

Types of Artificial Intelligence – Weak AI vs. Strong AI

Weak AI, also known as Narrow AI or Artificial Narrow Intelligence (ANI), is AI that has been trained and honed to do particular tasks. Most of the AI that surrounds us today is powered by weak AI. This form of artificial intelligence is anything but feeble; it allows sophisticated applications such as Apple's Siri, Amazon's Alexa, IBM Watson, and driverless cars, among others.

Artificial General Intelligence (AGI) and Artificial Super Intelligence (AIS) comprise strong AI (ASI). Artificial general intelligence (AGI), sometimes known as general artificial intelligence (AI), is a hypothetical kind of artificial intelligence in which a machine possesses human-level intellect, a self-aware consciousness, and the ability to solve problems, learn, and plan for the future. Superintelligence, also known as Artificial Super Intelligence (ASI), would transcend the intelligence and capabilities of the human brain. Despite the fact that strong AI is yet totally theoretical and has no practical applications, this does not preclude AI researchers from studying its development. In the meanwhile, the finest instances of ASI may come from science fiction, such as HAL from 2001: A Space Odyssey, a superhuman, rogue computer aide.

Deep Learning vs. Machine Learning

Given that deep learning and machine learning are frequently used interchangeably, it is important to note the distinctions between the two. As stated previously, both deep learning and machine learning are subfields of artificial intelligence; nonetheless, deep learning is a subfield of machine learning.

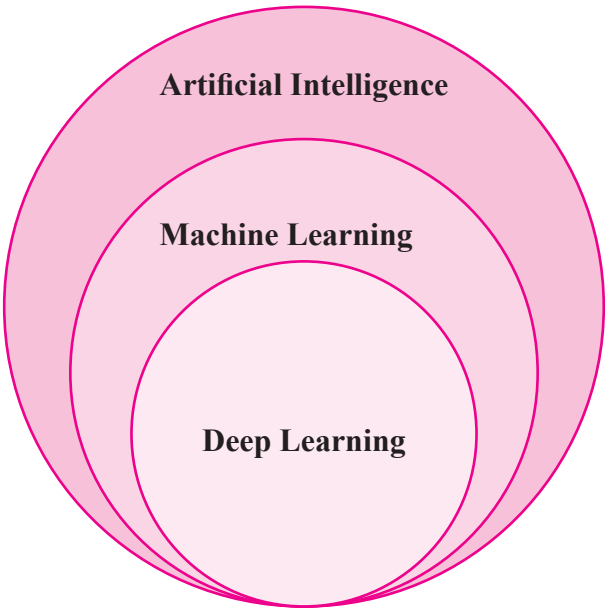

Fig 11.3: Artificial intelligence, machine learning, and deep learning

Neural networks truly constitute deep learning. "Deep" in deep learning refers to a neural network with more than three layers, which includes inputs and outputs, and may be termed a deep learning method. Typically, this is depicted by the following diagram (fig 11.4):

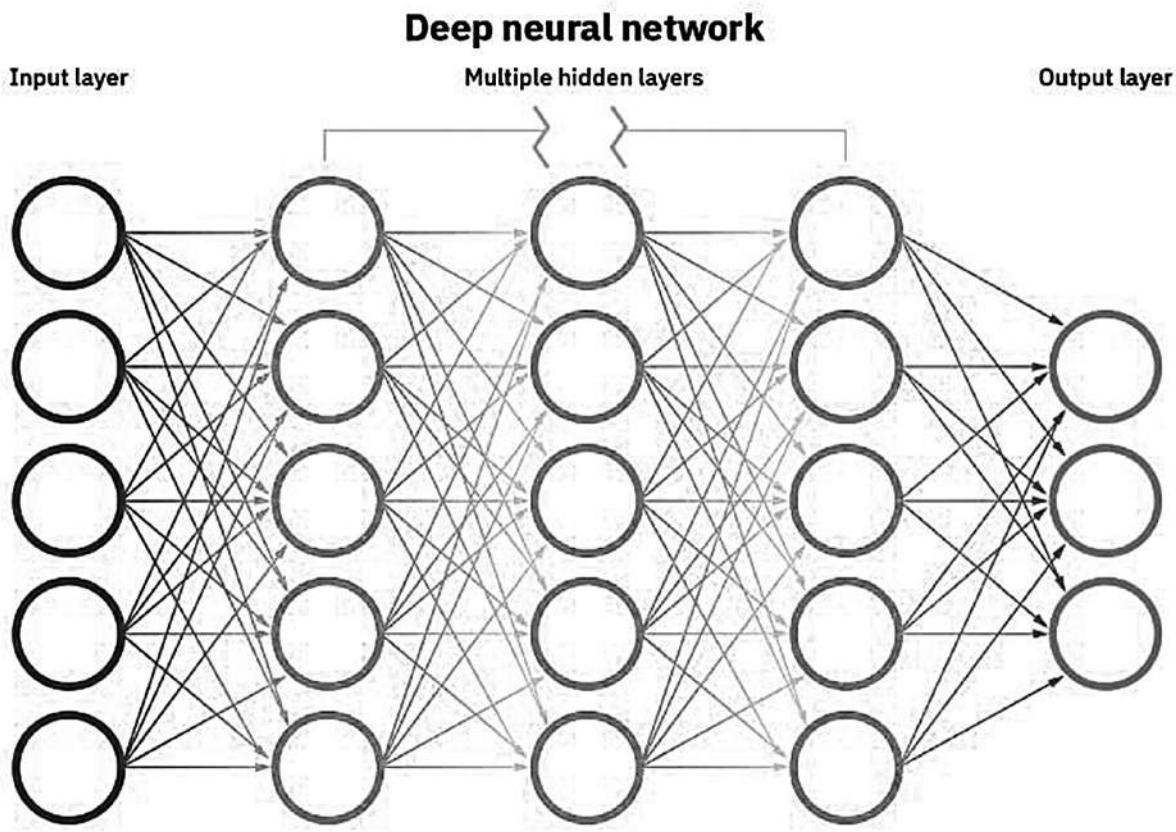

Fig 11.4: Deep neural network

Deep learning and machine learning differ in how their respective algorithms learn. Deep learning automates a significant portion of the feature extraction step, reducing the need for manual human involvement and enabling the usage of bigger data sets. Deep learning may be thought of as "scalable machine learning," as Lex Fridman stated in the aforementioned MIT presentation. Classical or "non-deep" machine learning requires more human interaction to learn. Human specialists develop the hierarchy of characteristics in order to comprehend the distinctions between data inputs, which often requires more structured data to learn.

Deep machine learning can utilise labelled datasets, also known as supervised learning, to educate its algorithm, although a labelled dataset is not required. It is capable of ingesting unstructured data in its raw form (e.g., text and photos) and can automatically establish the hierarchy of characteristics that differentiate certain data categories from one another. It does not require human interaction to interpret data, unlike machine learning, allowing us to scale machine learning in more exciting ways.

11.5.4 Robotic Process Automation:

With RPA, software users develop software robots or "bots" that are capable of learning, simulating, and executing rules-based business processes. By studying human digital behaviours, RPA automation enables users to construct bots. Give your bots instructions, then let them to complete the task. Robotic Process Automation software bots can communicate with any application or system in the same manner that humans can, with the exception that RPA bots

can function continuously, around-the-clock, and with 100 percent accuracy and dependability.

Robotic Process Automation bots possess a digital skill set that exceeds that of humans. Consider RPA bots to be a Digital Workforce capable of interacting with any system or application. Bots may copy-paste, scrape site data, do computations, access and transfer files, analyse emails, log into programmes, connect to APIs, and extract unstructured data, among other tasks. Due to the adaptability of bots to any interface or workflow, there is no need to modify existing corporate systems, apps, or processes in order to automate.

RPA bots are simple to configure, utilise, and distribute. You will be able to configure RPA bots if you know how to record video on a mobile device. Moving files around at work is as simple as pressing record, play, and stop buttons and utilising drag-and-drop. RPA bots may be scheduled, copied, altered, and shared to conduct enterprise-wide business operations.

Benefits of RPA

(i) Higher productivity

(ii) Higher accuracy

(iii) Saving of cost

(iv) Integration across platforms

(v) Better customer experience

(vi) Harnessing AI

(vii) Scalability

11.5.5 Machine learning

Machine learning (ML) is a branch of study devoted to understanding and developing systems that "learn," or ways that use data to improve performance on a set of tasks. Considered a component of artificial intelligence. In order to generate predictions or conclusions without being explicitly taught to do so, machine learning algorithms construct a model based on training data and sample data. In applications such as medicine, email filtering, speech recognition, and computer vision, when it is difficult or impractical to create traditional algorithms to do the required tasks, machine learning techniques are utilised.

The premise underlying learning algorithms is that tactics, algorithms, and conclusions that performed well in the past are likely to continue to perform well in the future. These deductions may be clear, such as "because the sun has risen every morning for the past 10,000 days, it will likely rise again tomorrow." They can be nuanced, as in "X% of families include geographically distinct species with colour variations; thus, there is a Y% possibility that unknown black swans exist."

Programs that are capable of machine learning can complete tasks without being expressly designed to do so. It includes computers learning from available data in order to do certain jobs. For basic jobs handed to computers, it is feasible to build algorithms that instruct the machine on how to perform all steps necessary to solve the problem at hand; no learning is required on the side of the computer. For complex jobs, it might be difficult for a person to manually build the necessary algorithms. In reality, it may be more efficient to assist the computer in developing its own algorithm as opposed to having human programmers describe each step.

The field of machine learning involves a variety of methods to educate computers to perform jobs for which there is no optimal solution. In situations when there are a large number of viable replies, one strategy is to classify some of the correct answers as legitimate. This information may subsequently be utilised to train the computer's algorithm(s) for determining accurate replies.

Approaches towards machine learning

On the basis of the type of "signal" or "feedback" provided to the learning system, machine learning systems are generally categorised into five major categories:

(i) Supervised learning

Supervised learning algorithms construct a mathematical model of a data set that includes both the inputs and expected outcomes. The data consists of a collection of training examples and is known as training data. Each training example consists of one or more inputs and the expected output, sometimes referred to as a supervisory signal. Each training example in the mathematical model is represented by an array or vector, sometimes known as a feature vector, and the training data is represented by a matrix. By optimising an objective function iteratively, supervised learning algorithms discover a function that may be used to predict the output associated with fresh inputs. A function that is optimum will enable the algorithm to find the proper output for inputs that were not included in the training data. It is claimed that an algorithm has "learned" to do a task if it improves its outputs or predictions over time. Active learning, classification, and regression are examples of supervised-learning algorithms.

Classification algorithms are used when the outputs are limited to a certain set of values, whereas regression techniques are used when the outputs may take on any value within a given range. For a classification algorithm that filters incoming emails, for instance, the input would be an incoming email and the output would be the folder name in which to file the email.

Similarity learning is a subfield of supervised machine learning that is closely connected to regression and classification, but its objective is to learn from examples by employing a similarity function that quantifies how similar or related two items are. It has uses in ranking, recommendation systems, monitoring visual identities, face verification, and speaker verification.

(ii) Unsupervised learning

Unsupervised learning approaches utilise a dataset comprising just inputs to identify data structure, such as grouping and clustering. Therefore, the algorithms are taught using unlabeled, unclassified, and uncategorized test data. Unsupervised learning algorithms identify similarities in the data and respond based on the presence or absence of such similarities in each new data set. In statistics, density estimation, such as calculating the probability density function, is a fundamental application of unsupervised learning. Despite the fact that unsupervised learning encompasses additional disciplines, such as data feature summary and explanation.

Cluster analysis is the process of assigning a set of data to subsets (called clusters) so that observations within the same cluster are similar based on one or more preset criteria, while observations obtained from other clusters are different. Different clustering approaches necessitate varying assumptions regarding the structure of the data, which is frequently characterised by a similarity metric and evaluated, for example, by internal compactness, or the similarity between members of the same cluster, and separation, the difference between clusters. Other methods rely on estimated graph density and connectivity.

(iii) Semi supervised learning

Semi-supervised learning is intermediate between unsupervised learning (without labelled training data) and supervised learning (with completely labelled training data). Many machine-learning researchers have discovered that when unlabeled data is combined with a tiny quantity of labelled data, there is a significant gain in learning accuracy.

In poorly supervised learning, the training labels are noisy, restricted, or inaccurate; yet, these labels are frequently less expensive to acquire, resulting in larger effective training sets.

(iv) Reinforcement learning

Reinforcement learning is a subfield of machine learning concerned with determining how software agents should operate in a given environment so as to maximise a certain concept of cumulative reward. Due to the field's generic nature, it is explored in several different fields, including game theory, control theory, operations research, information theory, simulation-based optimization, multi-agent systems, swarm intelligence, statistics, and genetic algorithms. The environment is generally represented as a Markov decision process in machine learning (MDP). Many methods for reinforcement learning employ dynamic programming techniques. Reinforcement learning techniques do not need prior knowledge of an accurate mathematical model of the MDP and are employed when exact models are not practicable. Autonomous cars and learning to play a game against a human opponent both employ reinforcement learning algorithms.

(v) Dimensionality reduction

Dimensionality reduction is the process of acquiring a set of major variables in order to reduce the number of random variables under consideration. In other words, it is the process of lowering the size of the feature set, which is also referred to as the "number of features." The majority of dimensionality reduction strategies may be categorised as either deletion or extraction of features. Principal component analysis is a well-known technique for dimensionality reduction (PCA). PCA includes transforming data with more dimensions (e.g., 3D) to a smaller space (e.g., 2D). This results in a decreased data dimension (2D as opposed to 3D), while retaining the original variables in the model and without altering the data. Numerous dimensionality reduction strategies assume that high-dimensional data sets reside along low-dimensional manifolds, leading to the fields of manifold learning and manifold regularisation.

Model vs. Data-driven Decision-making

11.6

In artificial intelligence, there are two schools of thought: data-driven and model-driven. The data-driven strategy focuses on enhancing data quality and data governance in order to enhance the performance of a particular problem statement. In contrast, the model-driven method attempts to increase performance by developing new models and algorithmic manipulations (or upgrades). In a perfect world, these should go hand in hand, but in fact, model-driven techniques have advanced far more than data-driven ones. In terms of data governance, data management, data quality handling, and general awareness, there is still much room for improvement.

Recent work on Covid-19 serves as an illustration in this perspective. While the globe was struggling from the epidemic, several AI-related projects emerged. Whether it's recognising Covid-19 from a CT scan, X-ray, or other medical imaging, estimating the course of the disease, or even projecting the overall number of fatalities, artificial intelligence is essential. On the one hand, this extensive effort around the globe has increased our understanding of the illness and, in certain locations, assisted clinical personnel in their work with vast populations. However, only few of the vast quantity of work was judged suitable for any actual implementation procedure, such as in the healthcare industry. Primarily data quality difficulties are responsible for this deficiency in practicality. Numerous projects and studies utilised duplicate photos from different sources. Even still, training data are notably lacking in external validation and demographic information. The majority of these studies would fail a systematic review and fail to reveal biases. Consequently, the quoted performance cannot be applied to real-world scenarios.

A crucial feature of Data science to keep in mind is that poor data will never result in superior performance, regardless of how strong your model is. Real-world applications require an understanding of systematic data collection, management, and consumption for a Data Science project. Only then can society reap the rewards of the 'wonderful AI'.

Solved Case 1

Arjun joined as an instructor in a higher learning institution. His responsibility is to teach data analysis to students. He is particularly interested in teaching analytics and model building. Arjun was preparing a teaching plan for the new upcoming batch.

What elements do you think, he should incorporate into the plan.

Teaching note - outline for solution:

The instructor may explain first the utility of data analytics from the perspective of business organizations. He may explain how data analytics may translate their discoveries into insights that eventually aid executives, managers, and operational personnel in making more educated and prudent business choices.

He may further explain the four forms of data analytics:

(i) Descriptive analytics

(ii) Diagnostic analytics

(iii) Predictive analytics

(iv) Prescriptive analytics

The instructor should explain each of the terms along with their appropriateness in using under real-life problem situations.

The advantages and disadvantages of using each of the methods should also be discussed thoroughly.

Exercise

A. Theoretical Questions:

⊙ **Multiple Choice Questions**

1. Following are the benefits of data analytics
   (a) Improves decision making process
   (b) Increase in efficiency of operations
   (c) Improved service to stakeholders
   (d) All of the above
2. Following are the techniques of data mining
   (a) Association rules
   (b) Neural network
   (c) Decision tree
   (d) All of the above
3. XML is the abbreviated form of
   (a) Extensible mark-up language
   (b) Extended mark-up language
   (c) Extendable mark-up language
   (d) Extensive mark-up language
4. XBRL is the abbreviated form of
   (a) eXtensible Business Reporting Language
   (b) eXtensive Business Reporting Language
   (c) eXtended Business Reporting Language
   (d) eXtensive Business Reporting Language
5. Following are the types of cloud computing
   (a) Private cloud
   (b) Public cloud
   (c) Hybrid cloud
   (d) All of the above

Answer:

1	**d**	**2**	**d**	**3**	**a**	**4**	**a**	**5**	**d**

⊙ **State True or False**

1. Decision tree classifies or predicts likely outcomes based on a collection of decisions.
2. K-nearest neighbour, often known as the KNN algorithm, classifies data points depending on their closeness to and correlation with other accessible data.
3. Utilizing data mining techniques, hidden patterns and future trends and behaviours in financial markets may be predicted.
4. Social analytics are virtually always a type of descriptive analytics.
5. Diagnostic analytics highlights the tools are employed to question the data, "Why did this occur?"

Answer:

1	**T**	**2**	**T**	**3**	**T**	**4**	**T**	**5**	**T**

- **Fill in the blanks**

1. Data analytics helps us to identify patterns in the raw _____ and extract useful information from them.
2. Through smart _____ analytics, data mining has enhanced corporate decision making.
3. Data _____ techniques are utilised to develop descriptions and hypotheses on a specific data set.
4. Data mining typically involves _____ steps.
5. Primarily utilised for deep learning algorithms, _____ replicate the interconnection of the human brain through layers of nodes to process training data.

Answer:

1	**data**	**2**	**Data**
3	**mining**	**4**	**Four**
5	**neural network**		

- **Short essay type questions**

1. What are descriptive analytics?
2. Define diagnostic analytics.
3. What is the difference between descriptive analytics and prescriptive analytics?
4. Discuss the advantages and disadvantages of prescriptive analytics.
5. How does the prescriptive analytics work?

- **Essay type questions**

1. Discuss the different steps in the process of data analytics.
2. Discuss the benefits of data analytics
3. Define data mining. Discuss the various steps in data mining.
4. Discuss the various techniques of data mining.
5. Discuss various applications of data mining techniques in finance and accounting.

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Present value and Future value tables

Table 1 - Future value interest factors for single cash flows. Formula: FV = (1 + k)^n

Period(n)/ percent(k)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%
1	1.0100	1.0200	1.0300	1.0400	1.0500	1.0600	1.0700	1.0800	1.0900	1.1000	1.1100	1.1200	1.1300	1.1400	1.1500	1.1600	1.2000
2	1.0201	1.0404	1.0609	1.0816	1.1025	1.1236	1.1449	1.1664	1.1881	1.2100	1.2321	1.2544	1.2769	1.2996	1.3225	1.3456	1.4400
3	1.0303	1.0612	1.0927	1.1249	1.1576	1.1910	1.2250	1.2597	1.2950	1.3310	1.3676	1.4049	1.4429	1.4815	1.5209	1.5609	1.7280
4	1.0406	1.0824	1.1255	1.1699	1.2155	1.2625	1.3108	1.3605	1.4116	1.4641	1.5181	1.5735	1.6305	1.6890	1.7490	1.8106	2.0736
5	1.0510	1.1041	1.1593	1.2167	1.2763	1.3382	1.4026	1.4693	1.5386	1.6105	1.6851	1.7623	1.8424	1.9254	2.0114	2.1003	2.4883
6	1.0615	1.1262	1.1941	1.2653	1.3401	1.4185	1.5007	1.5869	1.6771	1.7716	1.8704	1.9738	2.0820	2.1950	2.3131	2.4364	2.9860
7	1.0721	1.1487	1.2299	1.3159	1.4071	1.5036	1.6058	1.7138	1.8280	1.9487	2.0762	2.2107	2.3526	2.5023	2.6600	2.8262	3.5832
8	1.0829	1.1717	1.2668	1.3686	1.4775	1.5938	1.7182	1.8509	1.9926	2.1436	2.3045	2.4760	2.6584	2.8526	3.0590	3.2784	4.2998
9	1.0937	1.1951	1.3048	1.4233	1.5513	1.6895	1.8385	1.9990	2.1719	2.3579	2.5580	2.7731	3.0040	3.2519	3.5179	3.8030	5.1598
10	1.1046	1.2190	1.3439	1.4802	1.6289	1.7908	1.9672	2.1589	2.3674	2.5937	2.8394	3.1058	3.3946	3.7072	4.0456	4.4114	6.1917
11	1.1157	1.2434	1.3842	1.5395	1.7103	1.8983	2.1049	2.3316	2.5804	2.8531	3.1518	3.4785	3.8359	4.2262	4.6524	5.1173	7.4301
12	1.1268	1.2682	1.4258	1.6010	1.7959	2.0122	2.2522	2.5182	2.8127	3.1384	3.4985	3.8960	4.3345	4.8179	5.3503	5.9360	8.9161
13	1.1381	1.2936	1.4685	1.6651	1.8856	2.1329	2.4098	2.7196	3.0658	3.4523	3.8833	4.3635	4.8980	5.4924	6.1528	6.8858	10.6993
14	1.1495	1.3195	1.5126	1.7317	1.9799	2.2609	2.5785	2.9372	3.3417	3.7975	4.3104	4.8871	5.5348	6.2613	7.0757	7.9875	12.8392
15	1.1610	1.3459	1.5580	1.8009	2.0789	2.3966	2.7590	3.1722	3.6425	4.1772	4.7846	5.4736	6.2543	7.1379	8.1371	9.2655	15.4070
16	1.1726	1.3728	1.6047	1.8730	2.1829	2.5404	2.9522	3.4259	3.9703	4.5950	5.3109	6.1304	7.0673	8.1372	9.3576	10.7480	18.4884
17	1.1843	1.4002	1.6528	1.9479	2.2920	2.6928	3.1588	3.7000	4.3276	5.0545	5.8951	6.8660	7.9861	9.2765	10.7613	12.4677	22.1861
18	1.1961	1.4282	1.7024	2.0258	2.4066	2.8543	3.3799	3.9960	4.7171	5.5599	6.5436	7.6900	9.0243	10.5752	12.3755	14.4625	26.6233
19	1.2081	1.4568	1.7535	2.1068	2.5270	3.0256	3.6165	4.3157	5.1417	6.1159	7.2633	8.6128	10.1974	12.0557	14.2318	16.7765	31.9480
20	1.2202	1.4859	1.8061	2.1911	2.6533	3.2071	3.8697	4.6610	5.6044	6.7275	8.0623	9.6463	11.5231	13.7435	16.3665	19.4608	38.3376
21	1.2324	1.5157	1.8603	2.2788	2.7860	3.3996	4.1406	5.0338	6.1088	7.4002	8.9492	10.8038	13.0211	15.6676	18.8215	22.5745	46.0051
22	1.2447	1.5460	1.9161	2.3699	2.9253	3.6035	4.4304	5.4365	6.6586	8.1403	9.9336	12.1003	14.7138	17.8610	21.6447	26.1864	55.2061
23	1.2572	1.5769	1.9736	2.4647	3.0715	3.8197	4.7405	5.8715	7.2579	8.9543	11.0263	13.5523	16.6266	20.3616	24.8915	30.3762	66.2474
24	1.2697	1.6084	2.0328	2.5633	3.2251	4.0489	5.0724	6.3412	7.9111	9.8497	12.2392	15.1786	18.7881	23.2122	28.6252	35.2364	79.4968
25	1.2824	1.6406	2.0938	2.6658	3.3864	4.2919	5.4274	6.8485	8.6231	10.8347	13.5855	17.0001	21.2305	26.4619	32.9190	40.8742	95.3962

Table 2 - Future value interest factors for an annuity. Formula: FV = [(1 + k)^n - 1] / k

Period (n)/per cent(k)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%
1	1.0000	1.0200	1.0300	1.0400	1.0500	1.0600	1.0700	1.0800	1.0900	1.1000	1.1100	1.1200	1.1300	1.1400	1.1500	1.1600	1.2000
2	2.0100	2.0200	2.0300	2.0400	2.0500	2.0600	2.0700	2.0800	2.0900	2.1000	2.1100	2.1200	2.1300	2.1400	2.1500	2.1600	2.2000
3	3.0301	3.0604	3.0909	3.1216	3.1525	3.1836	3.2149	3.2464	3.2781	3.3100	3.3421	3.3744	3.4069	3.4396	3.4725	3.5056	3.6400
4	4.0604	4.1216	4.1836	4.2465	4.3101	4.3746	4.4399	4.5061	4.5731	4.6410	4.7097	4.7793	4.8498	4.9211	4.9934	5.0665	5.3680
5	5.1010	5.2040	5.3091	5.4163	5.5256	5.6371	5.7507	5.8666	5.9847	6.1051	6.2278	6.3528	6.4803	6.6101	6.7424	6.8771	7.4416
6	6.1520	6.3081	6.4684	6.6330	6.8019	6.9753	7.1533	7.3359	7.5233	7.7156	7.9129	8.1152	8.3227	8.5355	8.7537	8.9775	9.9299
7	7.2135	7.4343	7.6625	7.8983	8.1420	8.3938	8.6540	8.9228	9.2004	9.4872	9.7833	10.0890	10.4047	10.7305	11.0668	11.4139	12.9159
8	8.2857	8.5830	8.8923	9.2142	9.5491	9.8975	10.2598	10.6366	11.0285	11.4359	11.8594	12.2997	12.7573	13.2328	13.7268	14.2401	16.4991
9	9.3685	9.7546	10.1591	10.5828	11.0266	11.4913	11.9780	12.4876	13.0210	13.5795	14.1640	14.7757	15.4157	16.0853	16.7858	17.5185	20.7989
10	10.4622	10.9497	11.4639	12.0061	12.5779	13.1808	13.8164	14.4866	15.1929	15.9374	16.7220	17.5487	18.4197	19.3373	20.3037	21.3215	25.9587
11	11.5668	12.1687	12.8078	13.4864	14.2068	14.9716	15.7836	16.6455	17.5603	18.5312	19.5614	20.6546	21.8143	23.0445	24.3493	25.7329	32.1504
12	12.6825	13.4121	14.1920	15.0258	15.9171	16.8699	17.8885	18.9771	20.1407	21.3843	22.7132	24.1331	25.6502	27.2707	29.0017	30.8502	39.5805
13	13.8093	14.6803	15.6178	16.6268	17.7130	18.8821	20.1406	21.4953	22.9534	24.5227	26.2116	28.0291	29.9847	32.0887	34.3519	36.7862	48.4966
14	14.9474	15.9739	17.0863	18.2919	19.5986	21.0151	22.5505	24.2149	26.0192	27.9750	30.0949	32.3926	34.8827	37.5811	40.5047	43.6720	59.1959
15	16.0969	17.2934	18.5989	20.0236	21.5786	23.2760	25.1290	27.1521	29.3609	31.7725	34.4054	37.2797	40.4175	43.8424	47.5804	51.6595	72.0351
16	17.2579	18.6393	20.1569	21.8245	23.6575	25.6725	27.8881	30.3243	33.0034	35.9497	39.1899	42.7533	46.6717	50.9804	55.7175	60.9250	87.4421
17	18.4304	20.0121	21.7616	23.6975	25.8404	28.2129	30.8402	33.7502	36.9737	40.5447	44.5008	48.8837	53.7391	59.1176	65.0751	71.6730	105.931
18	19.6147	21.4123	23.4144	25.6454	28.1324	30.9057	33.9990	37.4502	41.3013	45.5992	50.3959	55.7497	61.7251	68.3941	75.8364	84.1407	128.117
19	20.8109	22.8406	25.1169	27.6712	30.5390	33.7600	37.3790	41.4463	46.0185	51.1591	56.9395	63.4397	70.7494	78.9692	88.2118	98.6032	154.740
20	22.0190	24.2974	26.8704	29.7781	33.0660	36.7856	40.9955	45.7620	51.1601	57.2750	64.2028	72.0524	80.9468	91.0249	102.444	115.380	186.688
21	23.2392	25.7833	28.6765	31.9692	35.7193	39.9927	44.8652	50.4229	56.7645	64.0025	72.2651	81.6987	92.4699	104.768	118.810	134.841	225.026
22	24.4716	27.2990	30.5368	34.2480	38.5052	43.3923	49.0057	55.4568	62.8733	71.4027	81.2143	92.5026	105.491	120.436	137.632	157.415	271.031
23	25.7163	28.8450	32.4529	36.6179	41.4305	46.9958	53.4361	60.8933	69.5319	79.5430	91.1479	104.603	120.205	138.297	159.276	183.601	326.237
24	26.9735	30.4219	34.4265	39.0826	44.5020	50.8156	58.1767	66.7648	76.7898	88.4973	102.174	118.155	136.831	158.659	184.168	213.978	392.484
25	28.2432	32.0303	36.4593	41.6459	47.7271	54.8645	63.2490	73.1059	84.7009	98.3471	114.413	133.334	155.620	181.871	212.793	249.214	471.981

Table 3 - Present value interest factors for single cash flows. PV = 1/(1 + k)^n)

Period (n)/per cent(k)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621	0.8333
2	0.9803	0.9612	0.9426	0.9246	0.9070	0.8900	0.8734	0.8573	0.8417	0.8264	0.8116	0.7972	0.7831	0.7695	0.7561	0.7432	0.6944
3	0.9706	0.9423	0.9151	0.8890	0.8638	0.8396	0.8163	0.7938	0.7722	0.7513	0.7312	0.7118	0.6931	0.6750	0.6575	0.6407	0.5787
4	0.9610	0.9238	0.8885	0.8548	0.8227	0.7921	0.7629	0.7350	0.7084	0.6830	0.6587	0.6355	0.6133	0.5921	0.5718	0.5523	0.4823
5	0.9515	0.9057	0.8626	0.8219	0.7835	0.7473	0.7130	0.6806	0.6499	0.6209	0.5935	0.5674	0.5428	0.5194	0.4972	0.4761	0.4019
6	0.9420	0.8880	0.8375	0.7903	0.7462	0.7050	0.6663	0.6302	0.5963	0.5645	0.5346	0.5066	0.4803	0.4556	0.4323	0.4104	0.3349
7	0.9327	0.8706	0.8131	0.7599	0.7107	0.6651	0.6227	0.5835	0.5470	0.5132	0.4817	0.4523	0.4251	0.3996	0.3759	0.3538	0.2791
8	0.9235	0.8535	0.7894	0.7307	0.6768	0.6274	0.5820	0.5403	0.5019	0.4665	0.4339	0.4039	0.3762	0.3506	0.3269	0.3050	0.2326
9	0.9143	0.8368	0.7664	0.7026	0.6446	0.5919	0.5439	0.5002	0.4604	0.4241	0.3909	0.3606	0.3329	0.3075	0.2843	0.2630	0.1938
10	0.9053	0.8203	0.7441	0.6756	0.6139	0.5584	0.5083	0.4632	0.4224	0.3855	0.3522	0.3220	0.2946	0.2697	0.2472	0.2267	0.1615
11	0.8963	0.8043	0.7224	0.6496	0.5847	0.5268	0.4751	0.4289	0.3875	0.3505	0.3173	0.2875	0.2607	0.2366	0.2149	0.1954	0.1346
12	0.8874	0.7885	0.7014	0.6246	0.5568	0.4970	0.4440	0.3971	0.3555	0.3186	0.2858	0.2567	0.2307	0.2076	0.1869	0.1685	0.1122
13	0.8787	0.7730	0.6810	0.6006	0.5303	0.4688	0.4150	0.3677	0.3262	0.2897	0.2575	0.2292	0.2042	0.1821	0.1625	0.1452	0.0935
14	0.8700	0.7579	0.6611	0.5775	0.5051	0.4423	0.3878	0.3405	0.2992	0.2633	0.2320	0.2046	0.1807	0.1597	0.1413	0.1252	0.0779
15	0.8613	0.7430	0.6419	0.5553	0.4810	0.4173	0.3624	0.3152	0.2745	0.2394	0.2090	0.1827	0.1599	0.1401	0.1229	0.1079	0.0649
16	0.8528	0.7284	0.6232	0.5339	0.4581	0.3936	0.3387	0.2919	0.2519	0.2176	0.1883	0.1631	0.1415	0.1229	0.1069	0.0930	0.0541
17	0.8444	0.7142	0.6050	0.5134	0.4363	0.3714	0.3166	0.2703	0.2311	0.1978	0.1696	0.1456	0.1252	0.1078	0.0929	0.0802	0.0451
18	0.8360	0.7002	0.5874	0.4936	0.4155	0.3503	0.2959	0.2502	0.2120	0.1799	0.1528	0.1300	0.1108	0.0946	0.0808	0.0691	0.0376
19	0.8277	0.6864	0.5703	0.4746	0.3957	0.3305	0.2765	0.2317	0.1945	0.1635	0.1377	0.1161	0.0981	0.0829	0.0703	0.0596	0.0313
20	0.8195	0.6730	0.5537	0.4564	0.3769	0.3118	0.2584	0.2145	0.1784	0.1486	0.1240	0.1037	0.0868	0.0728	0.0611	0.0514	0.0261
21	0.8114	0.6598	0.5375	0.4388	0.3589	0.2942	0.2415	0.1987	0.1637	0.1351	0.1117	0.0926	0.0768	0.0638	0.0531	0.0443	0.0217
22	0.8034	0.6468	0.5219	0.4220	0.3418	0.2775	0.2257	0.1839	0.1502	0.1228	0.1007	0.0826	0.0680	0.0560	0.0462	0.0382	0.0181
23	0.7954	0.6342	0.5067	0.4057	0.3256	0.2618	0.2109	0.1703	0.1378	0.1117	0.0907	0.0738	0.0601	0.0491	0.0402	0.0329	0.0151
24	0.7876	0.6217	0.4919	0.3901	0.3101	0.2470	0.1971	0.1577	0.1264	0.1015	0.0817	0.0659	0.0532	0.0431	0.0349	0.0284	0.0126
25	0.7798	0.6095	0.4776	0.3751	0.2953	0.2330	0.1842	0.1460	0.1160	0.0923	0.0736	0.0588	0.0471	0.0378	0.0304	0.0245	0.0105

Table 4 - Present value interest factors for an annuity. Formula: PV = [1 - 1/(1 + k)^n] / k

Period (n)/per cent(k)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621	0.8333
2	1.9704	1.9416	1.9135	1.8861	1.8594	1.8334	1.8080	1.7833	1.7591	1.7355	1.7125	1.6901	1.6681	1.6467	1.6257	1.6052	1.5278
3	2.9410	2.8839	2.8286	2.7751	2.7232	2.6730	2.6243	2.5771	2.5313	2.4869	2.4437	2.4018	2.3612	2.3216	2.2832	2.2459	2.1065
4	3.9020	3.8077	3.7171	3.6299	3.5460	3.4651	3.3872	3.3121	3.2397	3.1699	3.1024	3.0373	2.9745	2.9137	2.8550	2.7982	2.5887
5	4.8534	4.7135	4.5797	4.4518	4.3295	4.2124	4.1002	3.9927	3.8897	3.7908	3.6959	3.6048	3.5172	3.4331	3.3522	3.2743	2.9906
6	5.7955	5.6014	5.4172	5.2421	5.0757	4.9173	4.7665	4.6229	4.4859	4.3553	4.2305	4.1114	3.9975	3.8887	3.7845	3.6847	3.3255
7	6.7282	6.4720	6.2303	6.0021	5.7864	5.5824	5.3893	5.2064	5.0330	4.8684	4.7122	4.5638	4.4226	4.2883	4.1604	4.0386	3.6046
8	7.6517	7.3255	7.0197	6.7327	6.4632	6.2098	5.9713	5.7466	5.5348	5.3349	5.1461	4.9676	4.7988	4.6389	4.4873	4.3436	3.8372
9	8.5660	8.1622	7.7861	7.4353	7.1078	6.8017	6.5152	6.2469	5.9952	5.7590	5.5370	5.3282	5.1317	4.9464	4.7716	4.6065	4.0310
10	9.4713	8.9826	8.5302	8.1109	7.7217	7.3601	7.0236	6.7101	6.4177	6.1446	5.8892	5.6502	5.4262	5.2161	5.0188	4.8332	4.1925
11	10.3676	9.7868	9.2526	8.7605	8.3064	7.8869	7.4987	7.1390	6.8052	6.4951	6.2065	5.9377	5.6869	5.4527	5.2337	5.0286	4.3271
12	11.2551	10.5753	9.9540	9.3851	8.8633	8.3838	7.9427	7.5361	7.1607	6.8137	6.4924	6.1944	5.9176	5.6603	5.4206	5.1971	4.4392
13	12.1337	11.3484	10.6350	9.9856	9.3936	8.8527	8.3577	7.9038	7.4869	7.1034	6.7499	6.4235	6.1218	5.8424	5.5831	5.3423	4.5327
14	13.0037	12.1062	11.2961	10.5631	9.8986	9.2950	8.7455	8.2442	7.7862	7.3667	6.9819	6.6282	6.3025	6.0021	5.7245	5.4675	4.6106
15	13.8651	12.8493	11.9379	11.1184	10.3797	9.7122	9.1079	8.5595	8.0607	7.6061	7.1909	6.8109	6.4624	6.1422	5.8474	5.5755	4.6755
16	14.7179	13.5777	12.5611	11.6523	10.8378	10.1059	9.4466	8.8514	8.3126	7.8237	7.3792	6.9740	6.6039	6.2651	5.9542	5.6685	4.7296
17	15.5623	14.2919	13.1661	12.1657	11.2741	10.4773	9.7632	9.1216	8.5436	8.0216	7.5488	7.1196	6.7291	6.3729	6.0472	5.7487	4.7746
18	16.3983	14.9920	13.7535	12.6593	11.6896	10.8276	10.0591	9.3719	8.7556	8.2014	7.7016	7.2497	6.8399	6.4674	6.1280	5.8178	4.8122
19	17.2260	15.6785	14.3238	13.1339	12.0853	11.1581	10.3356	9.6036	8.9501	8.3649	7.8393	7.3658	6.9380	6.5504	6.1982	5.8775	4.8435
20	18.0456	16.3514	14.8775	13.5903	12.4622	11.4699	10.5940	9.8181	9.1285	8.5136	7.9633	7.4694	7.0248	6.6231	6.2593	5.9288	4.8696
21	18.8570	17.0112	15.4150	14.0292	12.8212	11.7641	10.8355	10.0168	9.2922	8.6487	8.0751	7.5620	7.1016	6.6870	6.3125	5.9731	4.8913
22	19.6604	17.6580	15.9369	14.4511	13.1630	12.0416	11.0612	10.2007	9.4424	8.7715	8.1757	7.6446	7.1695	6.7429	6.3587	6.0113	4.9094
23	20.4558	18.2922	16.4436	14.8568	13.4886	12.3034	11.2722	10.3711	9.5802	8.8832	8.2664	7.7184	7.2297	6.7921	6.3988	6.0442	4.9245
24	21.2434	18.9139	16.9355	15.2470	13.7986	12.5504	11.4693	10.5288	9.7066	8.9847	8.3481	7.7843	7.2829	6.8351	6.4338	6.0726	4.9371
25	22.0232	19.5235	17.4131	15.6221	14.0939	12.7834	11.6536	10.6748	9.8226	9.0770	8.4217	7.8431	7.3300	6.8729	6.4641	6.0971	4.9476