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STRATEGIC FINANCIAL MANAGEMENT

Unit Structure

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- 1.7 Interface of Financial Policy and Strategic Management
- 1.8 Relationship of Finance to Economics and Accounting
- 1.9 Role of Financial Manager
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1.0 LEARNING OBJECTIVE

After reading this chapter learner will be able to:

- Understand The Meaning of Finance, Financial Planning and Strategic Financial Management
- Understand The Need and Importance of Financial Planning Strategic Financial Management
- Identify The Different Business Strategies
- Understand the meaning of profit maximisation and wealth maximisation and also understand the difference between the same.
- Understand the relationship between financial policy and strategic management
- Discuss the various roles of the finance manager

1.1 STRATEGIC FINANCIAL MANAGEMENT -MEANING, NEEDS AND IMPORTANCE

1.1.1 Basic Concepts and Meaning

a. Finance: In order to accomplish various financial objectives, people, businesses, and institutions manage their money, assets, and investments. This is referred to as finance. It includes a broad variety of actions connected to the distribution, acquisition, and application of money.

- **b.** Financial Management: One of the finest definitions of Financial Management is given by S. C. Kuchhal who defines it as "Financial management deals with procurement of funds and their effective utilization in the business."
- c. Strategic Financial Management: The process of arranging, planning, and regulating an organization's financial resources to meet its long-term goals and objectives is referred to as strategic financial management. It entails making strategic choices that have an effect on the organization's overall sustainability and financial health. To increase an organization's value while lowering financial risks, this branch of management integrates financial planning, budgeting, risk management, and investment research.

1.1.2. Key Components and Concepts Associated with Strategic Financial Management

- 1. **Financial Planning:** This include identifying the organization's financial goals and objectives, preparing a plan to attain those goals, and coming up with ways to allocate resources wisely.
- 2. Capital Budgeting: Making choices on long-term investments in assets and projects is a part of strategic financial management. This includes weighing the risks and potential returns of various investment possibilities.
- 3. **Risk Management:** Strategic financial management requires the identification and control of financial risks. This entails evaluating and reducing risks associated with changes in interest rates, the market, and other variables that may have an impact on the organization's financial stability.
- 4. Cost Management: Cost management is crucial for preserving profitability and long-term financial viability. This entails assessing and controlling both fixed and variable costs to make sure they support the strategic goals of the company.
- 5. Financing Decisions: A key component of strategic financial management is deciding how to finance operations and investments. The best combination of debt and equity funding must be chosen, and conditions with lenders and investors must be negotiated.
- 6. **Performance Measurement:** It is crucial to regularly evaluate and assess financial performance in comparison to set benchmarks and goals. For evaluation, important financial parameters including profitability ratios, return on equity, and ROI are used.
- 7. Financial Forecasting: Making reasonably justifiable projections about future financial performance based on previous data and market trends is a common task in strategic financial management. Making proactive decisions to reach financial goals is aided by this.

- 8. Liquidity Management: Financial stability requires that the company has enough cash and liquid assets on hand to cover its short-term obligations.
- **9. Dividend Policy:** An essential strategic financial choice is how much of the company's revenues should be retained for future business investments and how much should be distributed as dividends to shareholders.
- **10. Strategic Risk Assessment:** Analysing the financial effects of strategic choices and weighing the possible benefits and hazards of different action plans.

In general, strategic financial management focuses on coordinating financial choices with the organization's overarching strategic objectives and vision. Making wise and practical financial decisions that contribute to the organization's long-term performance necessitates a full understanding of financial concepts, market dynamics, and the competitive landscape.



1.1.3 Needs and Importance of Strategic Financial Management (SFM)

Strategic Financial Management (SFM) plays a critical role in the success and sustainability of organizations across various sectors. Its needs and importance can be summarized as follows:

- 1. Long-Term Planning: SFM aids in the creation of long-term financial plans and strategies for organisations. Setting specific financial objectives, spotting investment opportunities, and guaranteeing long-term financial sustainability of the business all depend on this.
- 2. **Resource Allocation:** SFM assists organisations for decisions related to allocation of resources effectively, allowing them to properly

deploy their financial resources (money, finances, etc.) to various initiatives, departments, or investments. This ensures that resources are utilised as effectively as possible to produce the best yields.

- **3. Risk Management:** Organizations can detect, evaluate, and manage financial risks with the use of SFM. This encompasses the dangers posed by changes in the market, interest rates, credit, and liquidity. In order to mitigate potential risks to the organization's financial stability, effective risk management procedures are essential.
- 4. **Decision-Making:** SFM offers useful financial data and analysis to assist in making strategic decisions. This entails examining investment proposals, choosing a financing strategy, and figuring out the financial effects of different strategic decisions.
- 5. **Performance Evaluation:** SFM enables firms to assess their financial performance in comparison to predetermined benchmarks and objectives. This aids in locating problem areas and implementing the required changes to meet financial goals.
- 6. Capital Budgeting: SFM entails making judgments about capital budgeting and evaluating investment prospects. Based on possible returns and compatibility with strategic objectives, organisations can choose which projects or assets to invest in.
- 7. Cost Management: One of the core components of SFM is cost management and control. To preserve profitability, businesses must make sure that their cost structures are effective and consistent with their strategic objectives.
- 8. Financial Sustainability: SFM helps an organisation maintain its financial viability over the long term. Organizations can continue to exist and compete in the market by making wise financial decisions and successfully managing resources.
- **9. Stakeholder Confidence:** The confidence of stakeholders, including shareholders, investors, lenders, and employees, is increased by effective SFM procedures. Strong financial management makes a business more attractive to investors and helps it keep good ties with important stakeholders.
- **10.** Compliance and Reporting: SFM makes ensuring businesses adhere to reporting and financial regulation standards. Maintaining transparency and accountability as well as legal and regulatory compliance depend on this.
- 11. Strategic Growth: SFM promotes an organization's expansion by offering the financial foundation for growth through diversification, mergers, and acquisitions. It aids in locating chances for strategic expansion and minimising the monetary hazards connected with them.

12. Adaptation to Change: SFM enables businesses to respond to changing market dynamics, monetary conditions, and commercial environments. It assists in creating adaptable financial plans that take into account shifting external conditions.

In conclusion, the necessity and significance of strategic financial management are rooted in its capacity to assist businesses in making wise financial decisions, controlling risks, achieving long-term financial sustainability, and coordinating financial strategies with overarching strategic objectives. Organizations can improve their financial performance and competitiveness in a business environment that is always changing by attending to these needs.

1.2 THE THREE LEVELS OF BUSINESS STRATEGY: CORPORATE, BUSINESS, AND FUNCTIONAL STRATEGIES

A high-level plan or series of coordinated actions that are intended to accomplish particular goals or objectives is known as a strategy. It is a roadmap outlining how a person, group, or entity intends to get to a desirable future state or position, taking into account the difficulties, resources, and limitations at hand. Strategies can be used in a variety of contexts, including business, the military, sports, and personal growth. They are not exclusive to one field.

In a business setting, decisions on where to compete, how to compete, and how to deploy resources to gain sustained competitive advantage are frequently included in the definition of strategy. It entails making decisions that minimise vulnerabilities and risks while coordinating an organization's strengths with opportunities in the external environment.

In business, there are typically three levels of strategies that organizations develop to guide their actions and decisions. These levels of strategy help ensure alignment and coherence throughout the organization. The three levels of strategies in business are:

1. Corporate Level Strategy:

The highest level of strategy in a company is the corporate level strategy. It involves top management choices that determine the general direction and purview of the whole organisation. Establishing long-term goals and objectives, defining the organization's mission, and choosing which markets or businesses to enter, exit, or keep are all important elements of corporate level strategy. Diversification, portfolio management, and resource allocation issues across several company units or divisions are frequently addressed through corporate level initiatives. A case study of a strategic financial decision related to an Indian company:

Case Study: Reliance Industries' Strategic Investment by Jio Platforms (2020):

Background: In order to develop its digital business arm, Jio Platforms, Reliance Industries Limited (RIL), one of India's major conglomerates, made a number of important financial moves in 2020. These choices had a big impact on the corporate environment in India.

Strategic Decision: RIL embarked on a path of strategic investments and stake sales in Jio Platforms. The company attracted investments from a range of global technology and investment firms, including Facebook, Google, Silver Lake, and many others. These investments were strategic in nature, aiming to position Jio Platforms as a leading player in India's digital and technology ecosystem.

Financial Implications: These investments brought substantial financial inflows into Jio Platforms, totalling billions of dollars. The strategic decision helped RIL reduce its debt levels, strengthen its balance sheet, and accelerate its digital ambitions. It also positioned Jio Platforms for future growth in sectors such as e-commerce, digital services, and technology.

This case study showcases a strategic financial decision made by an Indian company, Reliance Industries, which involved attracting substantial investments to support its digital expansion and reduce debt.

2. Business Level Strategy:

The intermediate level of strategy, known as business level strategy, is concerned with how a particular business unit or division competes in its selected market or industry. It outlines how the company will gain a competitive edge and provide value to its clients. Compared to corporate level plans, business level strategies are more focused and frequently entail choices about target markets, product differentiation, pricing, and promotional techniques. These tactics address the issue of how the company will dominate its market.

Case Study: Flipkart's Acquisition of Myntra (2014):

Background: Two of the top e-commerce businesses in India that focused on fashion and leisure items were Flipkart and Myntra. By purchasing Myntra in 2014, Flipkart took a high-level strategic business choice.

Business Level Strategy: The acquisition of Myntra by Flipkart was a strategic move aimed at strengthening Flipkart's position in the fashion ecommerce segment. This decision represented a business-level strategy known as horizontal integration, where a company expands its operations by acquiring or merging with a competitor in the same industry.

Financial Implications: The financial implications of this acquisition included the cost of the acquisition itself, which was reported to be around

\$300 million, and ongoing investments required for integrating the two platforms, optimizing supply chain operations, and marketing synergies.

Results: Following the acquisition, Flipkart and Myntra continued to operate as separate brands, but they leveraged synergies in areas like logistics and technology. This strategic move helped Flipkart solidify its position in the fashion e-commerce market in India and compete more effectively with other players like Amazon.

This case study illustrates a business-level strategy where Flipkart, a leading Indian e-commerce player, expanded its market presence and competitive advantage in the fashion segment by acquiring Myntra, a competitor in the same industry. The acquisition had both financial and strategic implications, and it influenced the competitive dynamics of the Indian e-commerce market.

3. Functional Level Strategy:

The lowest level of strategy is functional level, which is created inside specific organisational departments or functions like marketing, finance, operations, and human resources. It describes how each functional area will aid the overall corporate and company level strategies. Strategies at the functional level concentrate on the specific actions and activities needed to accomplish departmental or functional goals. These tactics include allocating resources, developing competencies, and establishing key performance indicators (KPIs) for each function.

Case Study: Hindustan Unilever Limited's (HUL) Distribution Network Optimization (Ongoing):

Background: Hindustan Unilever Limited (HUL) is one of India's largest consumer goods companies, known for its extensive product portfolio, including personal care, home care, and food products. HUL has been continuously working on optimizing its distribution network.

Functional Level Strategy: HUL's functional-level strategy revolves around optimizing its distribution network to enhance supply chain efficiency and reach a wider customer base. This strategy includes initiatives to streamline distribution channels, reduce delivery lead times, and improve inventory management.

Financial Implications: The financial implications of HUL's distribution network optimization strategy include investments in technology, logistics infrastructure, and process improvement. These investments aim to reduce operational costs, lower inventory carrying costs, and enhance the company's ability to respond to market demand effectively.

Results: HUL's ongoing efforts to optimize its distribution network have led to improved inventory turnover, reduced transportation costs, and increased delivery speed to retailers and customers. This functional-level strategy has contributed to better cost management and increased competitiveness in the fast-moving consumer goods (FMCG) market.

This case study highlights how a functional-level strategy focused on distribution network optimization can result in improved cost efficiency, better inventory management, and enhanced competitiveness for a company like HUL in the highly competitive FMCG sector.

To guarantee that the organisation works cohesively and efficiently toward its goals, these three layers of strategies should be in harmony. Business level strategies define competitive advantage, whereas functional level strategies lead specific actions within each department to efficiently carry out the larger strategies. Corporate level strategies establish the overall direction. In order to accomplish their goals, successful organisations meticulously coordinate and integrate different layers of strategy.





1.3.1 Meaning

Financial planning is a methodical strategy in which the financial planner assists the client in making the most of his current financial resources by utilising financial instruments to meet his financial objectives.

Financial planning consists of three main parts:

- a. Financial Resources (FR)
- b. Financial Tools (FT)
- c. Financial Goals (FG)

Financial Planning = FR + FT + FG

The financial objectives, financial decision-making, and financial measures for assessing business success are outcomes of financial planning. Financial goals must be established right away so that subsequent decisions can be made in accordance with them. The success of the company is assessed using financial metrics including ratio analysis and cash flow statement analysis.

1.3.2 Need for Financial Planning

- **1. Goal Achievement:** Organizations can better define their financial goals with the aid of financial planning, which also guarantees that these goals are achievable.
- 2. Budgeting and Expense Control: Budgeting entails establishing a list of your income and expenses. This aids organisations in effectively allocating resources and preventing waste.
- **3. Risk Management:** Financial planning includes strategies for managing financial risks, such as insurance coverage for unexpected events, diversifying investments, and creating emergency funds.
- 4. **Investment Decision-Making:** By assessing risk tolerance, time horizons, and anticipated returns, it helps with making informed investment decisions. It is essential for long-term wealth growth.
- 5. **Debt Management:** Debt management options covered in financial planning include consolidating debt, paying off high-interest loans, and creating repayment schedules.

1.3.3 Importance of Financial Planning

1. **Improved profitability:** Financial planning enables businesses to find waste, get rid of it, and allocate resources more effectively. Profitability may rise significantly as a result of this.

- Financial Management-II2. Reduced risk: Companies can identify and reduce financial risks with the use of financial planning. By doing this, the business can avoid suffering financial setbacks and guarantee its long-term sustainability.
 - **3. Increased access to capital:** Companies that have a strong financial plan are more likely to be successful in obtaining funding from lenders and investors. This may be crucial for financing development and growth.
 - 4. **Improved decision-making:** The management of the company has a thorough awareness of its financial condition and future objectives owing to financial planning. Making more educated and calculated decisions is possible using this information.
 - 5. Enhanced communication: Management, staff, and investor communication can all be made better with the aid of financial planning. Everyone can cooperate to accomplish the company's financial objectives by having a clear understanding of those objectives.

Generally speaking, financial planning is a crucial tool for businesses of all sizes. It can assist businesses in lowering risk, raising financing, attracting and retaining talent, and boosting profitability.

1.4 PROFIT MAXIMIZATION

1.4.1 Meaning

Every economic activity's fundamental goal is to generate profits. Being an economic organisation, a business needs to make a profit to pay its bills and have money for expansion. Without making money, no company can remain in operation. Profitability of a company enterprise is gauged by its profit. Profit can also be used as insurance against unavoidable risk. A business can handle risks like price declines and competition from other units thanks to the accumulated earnings.

1.4.2 Arguments in Favor of Profit Maximization :

- 1. Profit maximisation should be the clear goal when making a profit is the business's primary goal.
- 2. Since profitability is the yardstick for gauging a company enterprise's effectiveness and economic prosperity, profit maximisation is rationally justifiable.
- 3. The state of the economy and the state of business are not constant. Negative economic conditions, such as a recession, a depression, intense competition, etc., could exist. A company will only be able to survive in adversity if it can fall back on some of its prior profits. Therefore, when conditions are favourable, a business should endeavour to earn more and more.

- 4. The primary sources of funding for a firm' expansion are its profits. Therefore, a company should strive for profit maximisation to support its expansion and development.
- 5. In order to achieve social objectives, profitability is also necessary. By pursuing the goal of profit maximisation, a company also seeks to maximise socioeconomic wellbeing.

1.4.3 Criticism of Profit Maximization

- 1. Profit is an ambiguous concept that cannot be clearly defined. For various people, it signifies various things. Should we take long-term or short-term gains into account? Does this refer to gross earnings or earnings per share? Do we need to take profits before or after taxes? Does this refer to profits available to shareholder or operating profit?
- 2. The goal of maximising profits disregards both the size and timeliness of earnings as well as the concept of time value of money. Despite the fact that they happen at various periods, it regards all earnings equally.
- 3. The danger of the potential revenue stream is not taken into account. Certain initiatives carry greater risk than others. Even though the predicted earnings per share of two companies may be the same, the market value of the shares of the riskier company will be somewhat lower.
- 4. The goal of profit maximisation also does not take the impact of dividend policy on the market price of shares into account.

1.5 WEALTH MAXIMIZATION

1.5.1 Meaning

Stockholder's current wealth in a firm can be arithmetically described as: = (No. of shares owned)*(Current stock price per share)

As a performance indicator, the share's market price shows how well management is performing on behalf of the shareholder. Maximizing wealth refers to generating the most money possible for the stockholders. Therefore, the finance manager seeks to provide the shareholders the largest dividend possible. Additionally, he makes an effort to raise the share's market worth. The performance of the company has a direct impact on the market value of the shares. The market value of shares rises with better performance and vice versa. The finance manager must therefore make an effort to maximise shareholder value.

1.5.2 Arguments in Favor of Wealth Maximization

1. While a company's profit maximisation aim does not take into account the impact of EPS, dividends, or any other payouts to shareholders on the wealth of shareholders, the wealth maximisation objective of a firm takes into account all future cash flows, dividends, earning per share, etc.

- 2. Since the anticipated revenue for various years is discounted at a specific rate, it acknowledges the concept of time value of money (known as cost of capital).
- 3. In order to choose the optimum course of action from a variety of options, it assesses risk and uncertainty.
- 4. Other goals, such as maximising sales or share market value, are not at conflicts with wealth maximisation. In fact, it aids in the accomplishment of these other goals.

1.5.3 Criticism of Wealth Maximization

- 1. It is a directive concept. The objective does not accurately reflect what the companies actually do.
- 2. Whether the goal is to maximise stakeholders' wealth or the wealth of the company, which includes other financial claimholders like debt holders, preferred shareholders, etc., is a matter of some debate.
- 3. When ownership and management are divided, as they are in huge corporate forms of organisations, the goal of wealth maximisation may also encounter challenges. The managers may choose to enhance their managerial utility at the expense of the firm's or its stockholders' value.

Basis	Wealth Maximization	Profit Maximization
Definition	Managing financial resources to raise the value of the company's stakeholders is how it is described.	It is characterised as the management of financial resources to raise the profit of the business.
Concentration	It concentrates on enhancing the long-term value of the company's stakeholders.	It concentrates on boosting the company's short-term earnings.
Risk	It takes into account the risks and ambiguity that the company's business plan entails.	The risks and ambiguity built into the business model of the company are not taken into account.
Usage	It contributes to increasing a firm's value, which could result in the company gaining more market share.	It assists in achieving efficiency in the day- to-day operations of the firm to maximise profitability.

1.6 PROFIT MAXIMIZATION V/S WEALTH MAXIMIZATION

Strategic Financial Management



FIGURE 3 HTTPS://WWW.WALLSTREETMOJO.COM/WEALTH-MAXIMIZATION-VS-PROFIT-MAXIMIZATION/

1.7 INTERFACE OF FINANCIAL POLICY AND STRATEGIC MANAGEMENT

Any organization's financial policy and strategic management are linked processes. Strategic management is the process of establishing and putting into practise plans to meet the objectives of the organisation, whereas financial policy specifies the financial rules and criteria that an organisation will adhere to.

The interface of financial policy and strategic management can be summarized as follows:

- 1. Financial policy gives strategic planning a basis. The organization's financial goals and objectives are outlined in the financial policy, along with the plans that will be employed to accomplish them. This framework is crucial for strategic planning because it enables the business to choose wisely how to use its resources and accomplish its objectives.
- 2. Financial judgments are informed by strategic management. The organization's long-term goals and objectives, as well as the dangers and opportunities it faces, can be better understood through strategic management. Since it enables the business to make wise financial

decisions that are in line with its strategic goals, this information is crucial for financial decision-making.

3. Analytical methods are used in both financial policy and strategic management. Strategic management and financial policy are not two distinct and independent processes. They actually function as two sides of the same coin. Strategic management and financial decision-making are both influenced by financial policy. This analytical approach makes sure that the organization's strategic management and financial policies are in sync and working together to accomplish the organization's objectives.

Here are some concrete instances of the interactions between financial policy and strategic management:

- 1. The strategic objectives of the company can be supported by financial policy. An organisation that prioritises expansion, for instance, can have a finance strategy that prioritises investing in new markets and products. Similar to this, a company that prioritises profitability can have a financial strategy that places a strong emphasis on cost management and effectiveness.
- 2. Financial decisions can benefit from strategic management. Strategic management, for instance, may be used by a company preparing to introduce a new product to evaluate the risks and opportunities as well as the financial resources needed. Similar to this, a firm thinking about entering a new market may utilise strategic management to evaluate the expansion's financial viability.
- 3. Strategic management and financial policy can be utilised to create and carry out backup plans. For instance, a company might create a backup plan in case of an emergency like a recession. Changes to the organization's financial policy and strategic objectives may be part of this contingency plan.
- 4. The success of the organisation can be tracked and evaluated using financial policy and strategic management. To evaluate the success of its financial policies and strategic management, the company may utilise financial measures like profitability and return on investment.

In general, any organisation must perform both financial policy and strategic management. Organizations can make better financial decisions and accomplish their strategic objectives by understanding the relationship between these two activities.

1.8 RELATIONSHIP OF FINANCE TO ECONOMICS AND ACCOUNTING

Accounting, economics, and finance are three disciplines that have a lot in common. Although each of the three fields has a different focus, they are all interested in money and how it is used.

How to manage and allocate financial resources is the subject of finance. It is focused on how money is made, spent, and invested. Finance experts are employed across a range of sectors, such as banking, investment management, and corporate finance.

Economics is the study of the production, distribution, and consumption of goods and services. It is worried about how people and companies act in the marketplace. A wide range of industries, including the public and private sectors of government and academia, employ economists.

The process of recording, summarizing, and reporting financial data is known as accounting. It deals with the creation of financial statements including the income statement and balance sheet. Public accounting, private accounting, and government accounting are just a few of the fields where accounting experts work.

Following is a concise description of how accounting and economics relate to finance:

- 1. Finance is built on the foundation of economics: Economics serves as the basis for finance. Understanding economics helps one to comprehend the economic system as well as the variables that affect people's and businesses' conduct. Making wise financial decisions requires this knowledge.
- 2. Finance uses accounting data to inform decision-making: Accounting data is used by finance to assist in decision-making process. Information about a company's financial situation and performance is available through accounting data. Making informed financial decisions, such as whether to invest in a new product or enter into a new market, requires the use of this information.
- 3. Finance and accounting are both essential for the successful operation of businesses: Both accounting and finance are necessary for a business to run successfully. Finance experts assist organisations with capital raising, financial management, and wise financial decision-making. Accounting experts assist companies in tracking their financial performance, creating financial statements, and adhering to accounting requirements.

Here are some specific examples of how finance, economics, and accounting are interrelated:

- 1. A financial analyst may use economic data to forecast demand for a company's products or services. This information can then be used to make decisions about how much inventory to produce and how to price the company's products or services.
- 2. An investment manager may use accounting data to assess the financial performance of a company before investing in it. This information can be used to identify companies that are well-managed and financially sound.

3. A corporate accountant may use financial data to prepare financial statements for the company. These financial statements can then be used by management to make decisions about how to allocate the company's resources and achieve its financial goals.

Accounting, economics, and finance are three crucial academic disciplines that are interconnected in many ways. Professionals can make wiser financial judgments and reach their financial objectives by comprehending how these three disciplines interact.

1.9 ROLE OF FINANCIAL MANAGER

By monitoring the financial situation and the decision-making procedures, financial managers play an important role within businesses. Their duties cover a range of financial obligations, and also maintaining the organization's financial stability and sustainability as their main objective. The following are the main duties and roles of financial managers:

1. Financial Planning and Analysis: Creating financial forecasts, plans, and strategies to direct the organization's financial activities.

Evaluating financial data and performance indicators to spot trends, changes, and problem areas.

To evaluate the probable effects of various strategies and decisions, financial models are created.

2. Capital Management: Figuring out the capital structure of the company, including the proportion of debt and equity financing.

Obtaining funding through taking out loans, selling stocks or bonds, or finding investors.

Managing and maximising the organization's utilisation of its financial resources to maximise results and cut expenditures.

3. Investment Decision-Making: assessing prospective investments, ventures, or acquisitions to determine their viability financially and probable return on investment (ROI).

making cost-benefit evaluations and risk assessments in order to make wise investment decisions.

maximising returns while reducing risk by managing the organization's asset portfolio.

4. **Risk Management:** Identifying and evaluating financial risks, including as operational, credit, and market risks.

Utilising financial products like derivatives or insurance to mitigate risks, and creating risk management methods.

Ensuring adherence to legal standards for risk management and financial reporting.

5. Cash Flow Management: Monitoring and controlling the company's cash flow will guarantee that it has the resources to meet its operational and financial commitments.

Creating cash flow projections and backup strategies to deal with unforeseen financial constraints.

Developing methods to time financial inflows and outflows as efficiently as possible.

6. Financial Reporting and Compliance: Preparing balance sheets, income statements, and cash flow statements in a timely and correct manner.

Adhering to regulatory reporting standards and accounting standards (such as GAAP or IFRS).

Delivering financial information to management, internal stakeholders, and external parties like creditors, investors, and regulatory bodies.

7. Strategic Financial Management: Working with top management to match the organization's overarching strategic goals with its financial strategies.

Offering financial analysis and advice to assist in making strategic decisions.

Assessing the financial effects of various strategic options and assisting in the establishment of long-term financial objectives.

8. Tax Planning and Compliance: Creating tax plans to reduce the organization's tax obligations while guaranteeing adherence to tax rules and regulations.

Taking care of tax reporting and compliance, which includes tax return preparation and submission.

9. Treasury Management: Controlling the treasury operations of the company, such as cash management, banking relationships, and investment of surplus funds.

Monitoring financial transactions, such as payments, collections, and transfers of funds.

10. Stakeholder Communication: Providing shareholders, board members, and other stakeholders with financial information and performance.

Interacting with creditors, analysts, and investors to gain their confidence and support for the company's financial plans.

Financial decision-making that promotes an organization's expansion and success while preserving its financial stability depends heavily on financial management. To properly perform their duties, they need to have good analytical, strategic, and communication abilities as well as keep up with changing market conditions and financial rules.

1.10 EXERCISE

A. State whether the following statements are true or false:

- 1. Strategic financial management primarily focuses on short-term financial goals and objectives.
- 2. Risk management is not a significant concern in strategic financial management.
- 3. Strategic financial management involves making financial decisions independently of the organization's overall strategic plan.
- 4. Strategic financial management only involves raising capital and managing investments.
- 5. Financial ratios such as liquidity ratios and profitability ratios are not used in strategic financial management.
- 6. Strategic financial management involves determining the most profitable short-term projects to undertake.
- 7. Strategic financial management is concerned solely with generating profits and increasing revenue.
- 8. Strategic financial management is primarily the responsibility of the finance department and does not involve other departments within the organization.
- 9. Strategic financial management is a one-time activity and does not require continuous monitoring and adjustment.
- 10. Effective strategic financial management can help an organization achieve a competitive advantage in the marketplace.

Answer:

1. False	2. False	3. False	4. False	5. False
6. False	7. False	8. False	9. False	10. True

B. Match the Pair

Column A	Column B
1. Risk Assessment	A. Net Present Value (NPV)
2. Capital Budgeting	B. Weighted Average Cost of Capital (WACC)
3. Cost of Capital	C. Sensitivity Analysis
4. Financial Forecasting	D. Payback Period
5. Working Capital Management	E. Liquidity Management
6. Strategic Investment	F. Break-Even Analysis

Answer:

1 9			4 5		
I – C	2 - A	3 - B	4 - F	5 - E	6 - D
1 0	- 11	5 0	· •	υĽ	

C. Select the most appropriate Alternative

1. What is the primary objective of financial management?

A. Maximizing sales revenue	B. Maximizing shareholder wealth
C. Minimizing expenses	D. Achieving market leadership

2. In the context of risk management, what does "hedging" refer to?

A. Reducing exposure to unfavorable market movements.	B. Investing aggressively in high- risk assets
C. Speculating on commodity prices	D. Maximizing profits at all costs

3. Which financial statement provides information about a company's financial position at a specific point in time?

A. Income Statement	B. Cash Flow Statement
C. Balance Sheet	D. Statement of Retained Earnings

Answers:

- 1. B. Maximizing shareholder wealth
- 2. A. Reducing exposure to unfavorable market movements
- 3. C. Balance Sheet

Financial Management-II

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CAPITAL BUDGETING DECISIONS

Unit Structure

- 2.0 Objectives
- 2.1 Introduction
- 2.2 Budget, Capital Expenditure and Capital Budgeting
- 2.3 Need and Importance of Capital Budgeting
- 2.4 Types of Capital Budgeting Decisions
- 2.5 Process of Capital Budgeting
- 2.6 Techniques of Capital Budgeting
- 2.7 Solved Problems
- 2.8 Summary
- 2.9 Exercise

2.0 OBJECTIVES

After studying the unit the students will be able to :

- Understand the concept of Finance and Financial Management
- Know the types of Financial Decisions
- Realize the meaning of Budget and Capital Expenditure.
- Understand the meaning, need and importance of Capital Budgeting
- Discuss the various types of Capital Budgeting decisions
- Analyse the process of Capital Budgeting
- Explain the concept of Evaluation of Project or Proposal of investment
- Analyse the classification of techniques of Capital Budgeting or investment Appraisal Methods
- Point out the Merits and Demerits of each method under different techniques
- Describe different methods of Capital Budgeting alongwith their formulae
- To know the calculation procedure of the various methods.
- To Illustrate the Evaluating methods namely Pay-Back period, Average Rate of Return, Discounted Pay-Back period, Net Present Value, Profitability Index and Internal Rate of Return

2.1 INTRODUCTION

2.1.1 : Meaning of Finance :

Finance is the soul of every business entity and nobody can imagine the world without finance. When we mention 'Finance', usually it means money, but it is merely not the money, it is a vast concept which is concerned with money and its flow. The word 'Finance' is a French word which means 'Management of Money'.

Finance is such a powerful medium that, it performs an important role to Operate, co-ordinate and control the various economic activities of the business enterprise. Finance is also limited resource like other resources and a business entity needs to manage its finances resourcefully, effectively and efficiently.

2.1.2 : Definition of Finance

According to John J. Hampton, the term finance can be defined as 'The management of the flows of money through an organization, whether it will be a corporation, school, bank or government agency.'

In the words of F.W.Paish, Finance may be defined as the position of money at the time it is wanted.

Howard and Upton says, "Finance may be defined as that administrative area or set of administrative functions in an organization which relates with the arrangement of each and credit so that the organization may have the means to carry out the objectives as satisfactorily as possible.

According to Bonneville and Dewey, Financing consists in the raising, providing, managing of all the money, capital or funds of any kind to be used in connection with the business.

The Encyclopedia Britannica defines finance as "the act of providing the means of payment." It is thus the financial aspect of corporate planning which may be described as the management of money.

Therefore Finance is essential for expansion, diversification, modernization, as well as for establishment of new projects, viz. The financial policy of any organization mainly determines not only its existence and survival but also the performance and success of that organization. Finance is required for investment purposes and also to meet substantial capital expenditure projects.

2.1.3 : Financial Management :

As finance is a scarce resource, it must be systematically raised form the cheapest source of funds and must be judiciously utilized for the development and growth of the organization.

Financial Management is a managerial process that is concerned with the planning, organizing, directing and controlling of financial resources.

It also helps in monitoring the effective deployment of funds in fixed assets and in working capital.

It aims at ensuring that adequate cash is on hand to meet the required current and capital expenditure. It facilitates ensuring that significant capital is procured at the minimum cost to maintain adequate cash to meet any requirements which might arise in the future. It enhances market value of the firm through efficient and effective financial management.

Financial management helps in ascertaining and managing not only current requirements but also future needs of an organization. It influences the profitability of a firm. Financial management is very much required for the survival, growth, expansion and diversification of business. It is required to ensure purposeful resource allocation.

The financial manager is concerned with the efficient allocation of funds. He plays vital role in investment and financing decisions of the business enterprise.

It is concerned with providing solutions to problems like investment, financing and dividend decisions of the financial activities of an organization.

Capital Budgeting and capital structure designing of an organization is one of the important functions of Financial Management.

2.1.4 : Types of Financial Decisions :

Financial decisions refer to decisions concerning financial matters of a business firm. There are many kinds of financial management decisions that the firm makes for maximizing shareholders' wealth, like types of assets to be acquired, pattern of capitalisation, distribution of firm's income, etc.

These decisions can be classified into four major groups:

- 1. Investment decisions
- 2. Financing decision
- 3. Dividend decisions
- 4. Liquidity decisions

1) Investment Decisions / Capital Budgeting Decisions -

Investment Decisions relates to the determination of total amount of assets to be held in the firm, the composition of these assets and the business risk complexities of the firm as perceived by the investors. It is concerned with the selection of both long-term and short-term assets in which a firm's funds will be invested. Long-term assets or fixed assets will generate a return over time; whereas short-term assets, or current assets, are those that can be converted into cash within a financial period, such as a year. It is the most important financial decision. Since funds involve cost and are available in a limited quantity, its proper utilization is very necessary to achieve the goal of wealth maximisation.

The investment decisions can be classified under two broad groups:

- 1. Long-term investment decision and
- 2. Short-term, investment decision.

The long-term investment decision is referred to as the Capital Budgeting and the short-term investment decision as Working Capital Management.

2.2 BUDGET, CAPITAL EXPENDITURE AND CAPITAL BUDGETING

2.2.1 : MEANING OF BUDGET :

The word 'Budget' is derived from the Old French term "Bougette" (little bag).

The first pronunciation of the term 'Budget' was done by Sir Robert Walpole (British Prime Minister and Chancellor of the Exchequer) during his annual financial statement in the year 1733. He said to "open" his budget, i.e. the container of documents and accounts.

The term 'Budget' is specifically used in the Government departments, businesses and individuals along with people and households at any income level. Budget means to plan for future. A budget is the total amount of money allocated for a particular purpose during a particular period of time. A budget is a financial or spending plan based on your income or revenue. It estimates the amount of money you'll spend based on how much you make in a given period.

During the early years Budgetary Control has become a very popular technique of cost control. Now a day it exists in almost all the organizations in various forms. Capital Budget is one of the forms of Budgeting.

2.2.2 : Meaning Of Capital Expenditure :

A 'Capital Expenditure' is an expenditure incurred for acquiring or improving the fixed assets, the benefits of which are expected to be received over a number of years in future. The capital expenditures means the expenditures incurred on acquiring or for extension of the long-term asset. Capital Asset or a Long-term asset may be a new building, a new machinery or a new project.

The following are some of the examples of capital expenditure.

- 1) Cost of acquisition of permanent assets such as land & buildings, plant & machinery, goodwill, etc.
- 2) Cost of addition, expansion, diversification, improvement or alteration in the fixed assets.

- 3) Cost of replacement and modernization of permanent assets in case of Obsolescence and Wear and Tear of the old equipments.
- 4) Research and Development project cost for Product and for improving the productivity, etc.
- 5) Capital expenditure involves non-flexible long term commitment of funds.

2.2.3 : Meaning of Capital Budgeting :

The final Objective of each organization is to earn more and more profit.

Hence to plan and control the capital expenditure to achieve the targeted profit is the significant function of every business enterprise.

Capital Budget relates to the investment decisions in capital expenditures. Capital expenditure decisions include current (expenditures), the benefits of which are expected to be received over a long period of time exceeding one year. The term Capital Budget is used interchangeable with Capital Expenditure Decision, Long Term Investments Decision.

The Finance Manager has to study and assess the profitability of various future long term projects before committing the funds. The investment proposals should be evaluated in terms of its expected profitability through the systematic investment programme viz. costs involved and the risks associated with the projects. That is the main role of Capital Budgeting. As per firm's cash flows and availability of funds Capital Budgeting should be essentially done.

Capital Budgeting involves the preparation of Cost and Revenue estimates for all the possible projects, an examination of the merits and demerits of each and every possibility and finally selection of the project giving the highest return on investment. The Capital Budget includes the planning and utilization of available capital to increase the profitability of the business organization.

Capital Budgeting means planning for capital assets and management of fixed assets. It is a complex process as it involves decisions relating to the investment of current funds for the benefit to be achieved in future.

Capital Budgeting is budgeting for capital projects.

Capital Budgeting refers to long-term investment decisions. Capital Budgeting can also refer to long-term planning for allocating funds among various investment options.

Capital Budgeting is the decision-making process concerned with "whether or not

(i) The firm should invest funds in long term project to make profit and

(ii) How to choose among competing projects.

The long-term activities are those activities that influence firms' operation beyond the one year period. The basic features of Capital Budgeting decisions are:

- (i) There is an investment in long term activities
- (ii) Current funds are exchanged for future benefits
- (iii) The future benefits will be available to the firm over series of years.

2.2.4 : Definition of Capital Budgeting :

- 1) "Capital Budgeting is long-term planning for making and financing proposed capital outlay". Charles T. Horngreen.
- 2) "The Capital Budgeting generally refers to acquiring inputs with long-term returns". –

Richards & Greenlaw.

3) "Capital Budgeting involves the planning of expenditure for assets, the returns from which will be realized in future time periods".

- Milton H. Spencer.

2.3 NEED AND IMPORTANCE OF CAPITAL BUDGETING

2.3.1 : Need of Capital Budgeting :

According to Joel Dean (American Economist), "The capital expenditure budget holds a company's plans for replacing, improving and adding to its capital equipment." These words show that Capital Budgeting is a inevitable function of management. Capital Budgeting is significant for survival and growth of the organization as it is related to the decisions of long-term investment.

The investment decision is important not only for the setting up of new units but also for the expansion of present units, replacement of permanent assets, research and development project costs and reallocation of funds, if investments made earlier do not bring result as per the expectations.

Capital Budgeting decisions are very important in financial decisions, because efficient allocation of capital resources is one of the most crucial decisions of financial management. The right decision made by the process of Capital Budgeting will help the company to maximize the shareholder value which is the primary goal of any business.

The overall objective of Capital Budgeting is to maximize the profitability of the firm in way of the return on investment.

It is significant because it deals with right kind of evaluation of projects.

In Capital Budgeting decisions a project is accepted if it has positive net cash flows.

Positive cash flow means Excess of present Value of Cash inflows over the Present investment value.

E.g. A Co. Planning to buy a Machinery for ₹ 1,00,000 and its useful life is 5 years cash flow expected from these investment is ₹ 22000 Per year.

Here,

Particulars	Amount (₹)
Total Cash Inflow : (22000 X 5 Years)	1,10,000
Less: Total Investment	(1,00,000)
Net Cash flow (Positive)	10,000

Capital Budgeting involves identification of all cash outflows (Capital Investment, expenses related to capital investment) & all Cash Inflows (Receipts from employment of capital Assets & all other receipts from Capital Assets e.g. scrap value on sale of capital asset.)

2.3.2 : Importance of Capital Budgeting :

- 1) For Careful Investment Decisions As the capital investment is a long-term investment where involvement of investment is huge and benefits are expected in future years. Hence if once the decision has been taken, it becomes very difficult to reverse it. Even any modification or alternation becomes impossible. Capital Budgeting helps in taking careful capital expenditure decisions.
- 2) For overcoming Risk & Uncertainty Capital investment decisions involve risk and uncertainty due to huge investment. The future Cash Inflows are just estimated cash inflows and not the actual cash inflows. Therefore cautious and thoughtful Capital Budgeting decisions become significant for overcoming Risk & Uncertainty.
- 3) For avoiding over and under investment Capital Budgeting includes the decisions about acquisition of assets and an estimation of earnings from of such assets during its life span. An incorrect decision in this matter leads to over or under investment. Both the situations are risky from the profitability point of view. Hence proper planning of capital expenditure is essential.
- 4) For avoiding unnecessary blocking of funds The main feature of Capital Budgeting is to ensure the proper timing of acquisition of assets. If the assets are not acquired on proper time, it is the unessential blocking of funds. It results into loss of revenue.
- 5) For arranging the necessary finance in time Capital Budgeting means the estimation of capital investment decisions. Therefore it

enables the organization to arrange the necessary funds in time for long-term investment.

- 6) For looking into the various aspects and alternatives Capital Budgeting decisions may have positive or negative impacts on business entity, industry and on economy at large. In-depth study/ analysis of various projects, proposals and their various aspects is a significant stage in the process of Capital Budgeting. It ensures that the investment will be made in the most profitable project or proposal. Capital Investment proposals if properly analysed and selected can result in increase in profitability and Sales. It increases the productivity of the business entity and finally the overall economy of the country. Alternatively it will result in increasing the wealth of the investors/shareholders.
- 7) For analysing and evaluating the technological changes For facing cut-throat competition, analysis of technological changes is necessary. To explore and evaluate the technological changes is the important function of Capital Budgeting. The cost of production decreases thorough exploration, evaluation and application of advanced techniques as well as it increases the probability which enables the business entity for facing the cut-throat competition.

2.4 TYPES OF CAPITAL BUDGETING DECISIONS

The overall objective of Capital Budgeting is to maximize the profitability of a firm or the Return On Investment (ROI). This objective can be achieved either by increasing the revenues or by reducing costs. Thus, Capital Budgeting decisions can be broadly classified into two categories:

- I. Investment Decisions which Increases Revenues It means the decision are taken in expectation of increasing the revenue of the firm through expansion of the production capacity or size of operations by adding new capital assets or new plant or introducing new product line.
- **II. Investment Decisions which Reduces Cost** It means the decision are taken in expectation of increasing the revenue of the firm by reducing costs and includes decisions relating to replacement of obsolete, outmoded or worn out assets or old asset or old plant. In such cases, a firm has to decide whether to continue with the same asset or replace it. Such a decision is taken by the firm by evaluating the benefit from replacement of the asset in the form of reduction in operating costs and the cost/expenditures (outlay) needed for replacement of the asset which ultimately reduces the cost.

Both categories of above decisions involve investment in fixed assets but the basic difference between the two decisions lies in the fact that Increasing Revenue Investment Decisions are subject to more uncertainty as compared to Cost Reducing Investment Decisions. Further, in view of the investment proposals under consideration, Capital Budgeting decisions may also be classified as:

- 1. Accept / Reject Decisions
- 2. Mutually Exclusive Project Decisions
- 3. Capital Rationing Decisions
- Accept / Reject Decisions Accept / Reject decisions relate to independent project/ proposal which do not compete with one another. Such decisions are generally taken on the basis of minimum Return On Investment (ROI). All those proposals which yield a rate of return higher than the minimum required Rate Of Return (ROR) or the Cost Of Capital (CoC) are accepted and the rest are rejected. If the proposal is accepted, the firm makes investment in it and if it is rejected the firm does not invest in the same.
- 2) Mutually Exclusive project Decisions Such decisions relate to projects/ proposals which compete with one another in such a way that acceptance of one automatically exclude the acceptance of the other. Thus, one of the proposals is selected at the cost of the other.

For example, a company may have the option of buying a new machine or a second hand machine or taking an old machine on hire or selecting some machines from more than one brand available in the market. In such a case, the company may select one best alternative out of the various options by adopting some suitable technique or method of Capital Budgeting. Once one alternative is selected the others are automatically rejected.

3) Capital Rationing Decisions - A firm may have several profitable investment proposals but only limited funds to invest. In such case, these various investments compete for limited funds and thus the firm has to ration (Allotment in appropriate share or portion accordingly) them. The firm effects the combination of proposals that will yield the greatest profitability by ranking them in descending order of their profitability.

2.5 PROCESS OF CAPITAL BUDGETING

2.5.1 : Process of Capital Budgeting :

The important steps involved in the Capital Budgeting process are :

- 1. Project Generation
- 2. Project Analysis
- 3. Project Selection and
- 4. Project Execution.
- 5. Monitoring and Evaluation

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- Project Generation In a dynamic and progressive firm there is a continuous flow of profitable investment proposals. Investment proposals of various types may originate at different levels within a firm. Investment proposals may be either proposals to add new product to the product line or proposals to expand capacity in existing product lines. Moreover, proposals designed to reduce costs of the output of existing products without changing the number of operations.
- 2) **Project Analysis** Project Analysis involves two steps:
 - i) Estimation of benefits (cash flows or profits) and costs (outlays or expenditures) and
 - ii) Selection of an appropriate criterion to judge the desirability of the projects.

All the project proposals are analyzed by forecasting their cash flows to determine expected profitability of each project. The analysis of projects should be done by an unbiased group. The criterion selected must be consistent with the firm's objective of maximizing its market value.

- 3) **Project Selection** Once the profitable projects are shortlisted, they are prioritized according to the available company resources, a timing of the cash flows of the project and the overall strategic plan of the company. There is no uniform selection procedure for investment proposals. Since Capital Budgeting decisions are of vital importance, the final approval of the projects rest on the top management.
- 4) **Project Execution** After the final selection of investment proposals which fits the company's strategy, funds are assigned for capital expenditures. Funds for the purpose of project execution should be spent in accordance with appropriations made in the capital budget.
- 5) Post completion Monitoring and Evaluation (with Post-Auditing) – Monitoring the execution of projects is also a vital stage in the process of Capital Budgeting. The thorough follow-up on the actual execution of the project includes the comparison of actual results of the project with forecasted results and arrives at deviation if any. Systematic errors in cash-flows are recognized in the post-audit. The deviations and errors are evaluated and corrections are done for future benefits from it.

2.5.2 : Project Evaluation / Investment Evaluation :

Capital Budgeting is a dual-purpose technique that analyses investment opportunities and cost of capital simultaneously while evaluating worthiness and viability of a project. A wide range of criteria has been suggested to judge the usefulness of investment projects. Capital projects need to be evaluated in-depth with their costs and benefits. The costs of capital projects include the initial investment at the commencement of the project. Initial investment made in land, building, plant, machinery, equipment, furniture, fixtures, etc. generally contributes to the installed capacity.

2.5.3: Criteria for Evaluation of Project / Investment :

The Capital Budgeting process begins with collecting of investment proposals of different departments of a firm. The departmental head will have numerous alternative projects available to meet his demands. He has to select the best alternative from the competing proposals. This selection is made after estimating return (profit or yield) on the projects and comparing the same with the Cost of Capital (CoC). Investment proposal which gives the highest net marginal return will be chosen.

Following are the steps involved in the evaluation of an investment:

- 1) Estimation of cash flows
- 2) Estimation of the required rate of return
- 3) Application of a decision rule for making the choice

2.5.4: Features Essential for Investment Evaluation Criteria :

A comprehensive appraisal technique should be used to measure the economic worthiness of an investment project. Porter field, J.T.S. in his book, 'Investment Decisions and Capital Costs', has outlined some of the features which must exist in comprehensive investment evaluation criteria.

- i) It should consider all cash flows to determine the true profitability of the project.
- ii) It should provide an objective and definite technique of separating good projects from bad projects.
- iii) It should help ranking of projects according to their true profitability.
- iv) It should recognize the fact that bigger cash flows are preferable to smaller ones and early cash flows are preferable to later ones.
- v) It should help to choose among mutually exclusive projects which maximize the shareholders' wealth.
- vi) It should be a criterion which is applicable to any conceivable investment project independent of others.

2.6 TECHNIQUES OF CAPITAL BUDGETING

The technique used in Capital Budgeting for the evaluation or re-evaluation of an investment proposal is called as 'Evaluation Technique'. While taking long term investment decisions, the comparison among the several investment proposals is necessary. One most optimum proposal should be selected for investment after comparison and evaluation of all proposals which gives the best results. Key terms used in these techniques :

• Cash Outflows - It means the expenditures on the project.



• **Cash Inflows** - It means the profits or earnings or income before depreciation but after tax.



• **Payback period** – A method of evaluating investment proposal which determines the time a project's cash inflows will take to repay the original investment of the project.

Pay-back period is the period within which the capital investment is to be recovered through cash inflows. The payback period therefore, can be looked upon as the length of time required for a proposal to 'break even' on its net investment.

• Rate of Return (RoR) – In view of Finance, Return means profit or gain on an investment. It includes any change in the value of the investment and / or the cash flows which the investor receives from that investment over a specified period of time. It is the amount business receives after the cost of initial investment.

Rate of Return is a calculation of the value of an investment over the course of a period of time. It compares the original investment with the current (present) value of the investment, the result of which is in the form of a percentage. A RoR is the net gain or loss of an investment over a specified time period expressed as a percentage of the investment's initial cost. The percentage can be either positive or negative. Positive RoR is considered to be gain or profit whereas negative RoR reflects loss.

- Average rate of return Also known as 'Accounting Rate of Return' (ARR), 'Return On Investment' (ROI) or 'Return On Assets' (ROA), is obtained by dividing average annual post-tax profit by the average investment.
- Time Value of Money We know that ₹ 100 in hand today is more valuable than ₹ 100 receivable after a year. We will not spend or invest ₹ 100 now if the same amount is refunded or paid back after a year. But we can spend or invest ₹ 100 now if we are assured that ₹ 110 will be refunded or paid back at the end of the first year. This "additional Compensation" required for spending or investing ₹ 100 today is called "interest" or "the Time Value of Money". It is expressed in terms of percentage per annum.
- **Present Value** Inflation reduces the value of money in hand since the price of goods and services rises due to inflation, which means the amount worth today might not be equally worth tomorrow. PV calculations make sure the inflationary impact is calculated from either the inflation rate or the expected rate of returns.

Present value (PV) is the current value of a future sum of money or stream of cash flows given a specified rate of return. Present value takes the future value and applies a discount rate or the interest rate that could be earned if invested.

This concept is used in the valuation of stocks, bond pricing, financial modeling, and analysis of various investment options. The investor calculates a present value from the future cash flow of investment to decide whether that investment is worth investing in today. The expected cash flow of the future is discounted at a discount rate, which is the expected rate of return calculated inversely with future cash flow.

Present value is the current worth of cash to be received in the future with one or more payments, which has been discounted at a market rate of interest. The present value of future cash flows is always less than the same amount of future cash flows, since you can immediately invest cash received now, thereby achieving a greater return than from a promise to receive cash in the future.

An essential component of the present value calculation is the interest rate to use for discounting purposes. While the market rate of interest is the most theoretically correct, it can also be adjusted up or down to account for the perceived risk of the underlying cash flows. For example, if cash flows were perceived to be highly problematic, a higher discount rate might be justified, which would result in a smaller present value.

- **Discount rate** The rate at which cash flows are discounted. This rate may be taken as the required rate of return on capital, or the cost of capital.
- **Present Value (PV) Factor** PV Factor or PV Interest Factor is a factor that is used to calculate the present (current) value of money to be received at some future point of time (future cash flows) based on the 'Time value of money'.

It is a number that is always less than one (< 1) and is calculated by dividing number (one) 1 by 1 plus (+) rate of interest to the power i.e. the number of periods (generally years), over which cash flows are made.

It helps to determine if the cash received now (in present or currently) is worth more or less than when it would be received later. It assists in determining whether it is preferable to continue with an existing investment and / or which new project proposal to be accepted or in worst case whether the portion of some investment should be sold.

- **Discounted Cash Inflows** Cash inflows after considering their value in future by taking into account the rate of discounting.
- **Discounted Cash Outflows** Cash outflows (investments or expenses) after considering their value in future by taking into account the rate of discounting.
- Net Present Value A method of evaluation consisting of comparing the present value of all net cash flows (discounted by cost of capital as the interest rate) to the initial investment cost. Net Present Value is very important technique which takes into consideration the Time Value of Money.

The NPV of any proposal includes cash inflows and outflows over a period of time, is equal to the net present value of all the cash flows.

• **Internal rate of return** - The IRR is a method of evaluating investment proposals. It is that rate of discount (or interest rate) that equals the present value of outflows to the present value of inflows, thus making NPV=Q.

The IRR of a proposal is defined as the discount rate which produces a zero NPV i.e., IRR is the discount rate at which the total present value of cash inflows will be equal to the total present value of cash outflows. This discount rate is determined by the trial-and-error procedure.

- **Mutually exclusive projects** A situation in which the acceptance of one investment proposal eliminate the acceptance of another proposal.
- **Cost of Capital** Cost of capital is the cost incurred for procurement of funds. Each fund involves different costs. It is the responsibility of the finance manager to plan the capital structure in such a manner that the cost of capital is minimised.

The cost of capital is an important concept in financial management. It is used for evaluating investment projects, for determining the capital structure, for assessing leasing proposals, etc. In particular, the concept of cost of capital has two applications, i.e.

- i) In Capital Budgeting, it is used to discount the future cash flows to obtain their present values.
- ii) It is used in optimization of the capital structure of the company.

The concept of cost of capital is widely used in Capital Budgeting. It means 'the discount rate or minimum required rate of return a project must earn in order to cover, the cost of raising funds being used by the firm in financing the proposals'.

It enables the organization to estimate the future discounted cash flows arising due to operation of the project. The project is feasible only if the discounted cash inflow exceed the discounted cash outflows.

In a nutshell, it is the rate of return the firm must earn on its assets to justify the using and acquiring of investible resources.

2.6.1 : Types of Evaluation Techniques :

- I. Traditional / Non-Discounted Cash-Flow Criteria (Techniques) -Traditional techniques are also called 'Non time adjusted' or 'Non-Discounted Cash-Flow' techniques because it does not consider time value of money.
- **II. Discounted Cash-Flow Criteria (Techniques)** Discounted cash flow Techniques are also called 'Time adjusted' techniques because it considers time value of money.



I] TRADITIONAL / NON-DISCOUNTED CASH-FLOW CRITERIA (TECHNIQUES) :

1) <u>Pay-Back Period (PBP) Method</u> - It is the traditional technique of Capital Budgeting. In this technique, calculation of the period is done, within which the cost (expenses) of the project will be completely recovered. Such period is termed as 'Pay-back Period'.

The basic element of this method is to calculate the recovery time, by yearwise accumulation of cash inflows (inclusive of Depreciation i.e. discounted cash inflows) until the cash inflows equals the amount of the original investment. The time taken to recover such original investment is called as the "payback period" for the project.

This method is popularly known as pay off, pay-out, recoupment period method also. It gives the number of years in which the total investment in a particular capital expenditure pays back itself. This method is based on the principle that every capital expenditure pays itself back over a number of years. It means that it generates income within a certain period. When the total earnings (or net cash-inflow) from investment equals the total outlay, that period is the 'Pay-Back' Period of the capital investment. Cash inflow means profit after tax but before depreciation.

An investment project is adopted as long as it pays for itself within a specified period of time — like 5 years or less. This standard of recoupment period is settled by the management taking into account a number of considerations. While there is a comparison between two or more projects, the lesser the number of pay-back years, the project will be acceptable.

a) Formula :



(i) **Consistent (even or same) annual Cash Inflows** : The formula for the pay-back period calculation is simple. First of all, net-cash-inflow is determined. Then the initial cost i.e. original investment (or any value business firm wish to recover) is divided by the annual cashinflows and the resulting quotient is the pay-back period.

As per formula:


(ii) **Inconsistent (uneven or different) annual Cash Inflows** : If the annual cash-inflows are not even or same, then the calculation of payback period is done by taking into account the cash-inflows in cumulative form. Annual cash-inflows are accumulated till the recovery of investment. As soon as this accumulated amount is recovered (it becomes equal to the original investment), the number of years of pay-back period is determined. An asset or capital expenditure outlay that pays back itself comparatively early is to be preferred. The Pay-Back period (PBP) is calculated by preparing a table with column of 'Cumulative Cash inflows'

b) Advantages of Pay-Back Period Method :

- i) This method is simple to understand.
- ii) It is quick to calculate.
- iii) It is easy to communicate to others.
- iv) In case of uncertainty in future, this method is most appropriate.
- v) Ranking of projects as per their pay-back period may be useful for firms undergoing liquidity constraints.
- vi) It gives importance to the speedy recovery of investment in capital assets. So it is useful technique in such industries where technical developments are occurring swiftly and continuously which requires the replacements of such assets rapidly.
- vii) In this method investment recovery period is calculated. So business unit can identify the period within which the funds will remain tied up.
- viiii) This method is more suitable for the industries where risk of obsolescence is high where the project having short pay-back period are accepted.

c) Disadvantages of Pay-Back Period Method :

- i) This method completely ignores all cash inflows (earnings) once the pay-back period is attained. This can be misleading as it does not take into account the total benefits occurring from the project. In many cases these earnings are substantial, particularly in research and welfare projects.
- ii) The timing of returns is not considered.
- ii) It overlooks the cost of capital which is the main basis of thorough investment decisions.

- iii) It ignores the time value of money. In this method money received in present and receivable in future are considered as of equal value.
- iv) Projects with long payback periods are characteristically those involved in long-term planning, which are ignored in this approach.
- This method does not take into consideration the entire life of v) the project. As a result, project with large cash inflows in the latter part of pay-back period and less cash inflows in the earlier years may be rejected.
- This method ignores residual value or salvage value of an vi) investment.

d) Accept or Reject criterion :



- * Project PBP > Target PBP : Reject the project
- PBP.
- * Project PBP = Target PBP : Stay indifferent

The shorter the payback period, the more desirable is the project.

Procedure : e)

> **Case 1 : If the cash inflows are consistent/same/equal/even or** uniform every year :

Formula for calculation of Pay-back Period = Initial Cash Outflow / Annual Cash Inflow

Illustration No. 1 :

An investment of ₹ 32,000 in a machine is expected to yield ₹ 8,000 (yearly) for a period of 10 years.

Solution :

Pay-back Period = Initial Cash Outflow / Annual Cash Inflow

= 32000 / 8000 = 4 years

Pay-back Period = 4 Years

Illustration No. 2 :

	Project X (₹)	Project Y (₹)	Project Z (₹)
Initial Cash Outflow	4,00,000	3,50,000	2,80,000
Annual Cash Inflow After Tax	1,00,000	1,00,000	1,00,000
Life of Project	5 Years	5 Years	5 Years

Calculate pay-back period in following cases:

Solution :

Pay-back Period = Initial Cash Outflow / Annual Cash Inflow

	Statement to	calculate	Pay-Back	period
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	Particulars	Project X (₹)	Project Y (₹)	Project Z (₹)
1.	Initial Cash Outflow (₹) (1)	4,00,000	3,50,000	2,80,000
2.	Annual Cash Inflow after Tax (₹) (2)	1,00,000	1,00,000	1,00,000
3.	Pay-back Period (3 = 1/2)	4.5 Years	3.5 Years	2.8 Years

Accept or Reject Decision :

The project having lower Pay-back period, i.e. Project 'Z' will be accepted.

Illustration No. 3 :

A hardware company's project of \gtrless 20,00,000 yielded annually a profit of \gtrless 3,00,000 after depreciation @ 12.5% and is subject to income tax @ 50%. Calculate pay-back period.

Solution :

Calculation of Annual Cash Flow

Particulars	Amount (₹)
Profit after depreciation but before tax	3,00,000
Less : Tax @ 50%	(1,50,000)
Profit after tax	1,50,000
Add : Depreciation (12.5% on ₹ 20,00,000)	2,50,000
Cash Flow	4,00,000

Pay-back period = Initial Outlay /Annual Cash Flow

= 20,00,000 / 4,00,000

Pay-back Period = 5 Years

<u>Case 2 :</u> If the cash inflows are unequal or not uniform every year:

Steps:

- i) Prepare the column for cumulative cash inflows.
- ii) Here the Pay-back period is the time when the cumulative cash inflows become equal to the original cost of proposal or project or investment.

Illustration No. 4 :

A plastic company requires a cash outflow of \gtrless 40,000 for an investment project and is expected to generate cash inflows as follows :

	Cash inflows (₹)				
Year	1	2	3	4	5
Amount (₹)	16,000	12,000	8,000	4,000	4,000

Solution :

Statement to calculate Pay-Back period

Year	Annual earnings (₹)	Cumulative earnings (₹)
1.	16,000	16,000
2.	12,000	28,000
3.	8,000	36,000
4.	4,000	40,000
5.	4,000	44,000

Here,

The Initial Cash Outflow = \gtrless 40,000 Pay-back Period lies at the 4th year.

Pay-back Period = 4 Years

Illustration No. 5 :

Initial investment : ₹ 1,00,000.

Cash Flows After Tax (CFAT) in 3 years : ₹40,000, ₹30,000 and ₹50,000. Calculate the Pay-back period.

Solution :

Statement to calculate Pay-Back period

Year	CFAT (₹)	Cumulative CFAT (₹)
1	40,000	40,000
2	30,000	70,000
3	50,000	1,20,000

Initial investment is ₹ 1,00,000. And this investment recovery falls between year 2 and 3. That means Pay-back period lies in year 2 & 3.

Pay-back Period = 2 Years and [(Balance of Unrecovered Initial Investment) / CFAT of 3rd year] years

2 Years and [(Original Investment – Cumulative CFAT of the 2^{nd} year) / CFAT of 3^{rd} year] years

- = 2 years and (1,00,000 70,000) /50,000
- = 2 years and (30,000) /50,000
- = 2 years and 3/5 years
- = 2 years and $3/5 \times 12$ months
- = 2 years and 7.2 months
- = 2 years 7 months and 0.2 months
- = 2 years 7 months and 0.2 X 30 days

Pay-back Period = 2 Years 7 months and 15 days

Illustration No. 6 :

When an investment of ₹ 70,000 in a machine is expected to yield earnings of ₹ 6,000, ₹ 12,000, ₹ 17,000, ₹ 20,000, ₹ 20,000 and ₹ 25,000 in 6 years are expected. Calculate the pay-back period.

Solution :

Statement to calculate Pay-Back period

Year	Annual earnings (₹)	Cumulative earnings (₹)
1	6,000	6,000
2	12,000	18,000
3	17,000	35,000
4	20,000	55,000
5	20,000	75,000
6	25,000	1,00,000

Here,

The Initial Cash Outflow = ₹ 70,000

Pay-back Period lies between the 4th and the 5th year.

Pay-back Period = 4 years + Part of the 5th year to recover the cost of the Machine \gtrless 70,000 which is calculated as below :

Pay-back Period = 4 Years and [(Initial Cash Outflows – Cumulative earnings of the 4^{th} year) / Annual earnings of 5^{th} year] years

= 4 years and (70,000 - 55,000) /20,000

- = 4 years and (15,000) / 20,000
- = 4 years and $\frac{3}{4}$ years
- = 4 years and $\frac{3}{4}$ X 12 months

Pay-back Period = 4 Years and 9 months

Illustration No. 7 :

Following are the details of three investment proposals namely A, B & C for a chemical company.

	A	В	С
Cost (₹)	50,000	70,000	70,000
Life	10 years	12 years	14 years
Estimated scrap (₹)	5,000	10,000	7,000
Annual-Profit :			
Less Taxation (₹)	5,000	6,000	5,500

Select the best one using Pay-back period.

Solution :

Calculation of Annual Cash Flow

Particulars	Proposal 'A' (₹)	Proposal 'B' (₹)	Proposal 'C' (₹)
Annual Profits Less			
Taxation	5,000	6,000	5,500
Add Depreciation (Cost – Scrap) Life	4,500	5,000	4,500
Cash flow (₹)	9,500	11,000	10,000

Particulars	Proposal 'A'	Proposal 'B' (₹)	Proposal 'C' (₹)
Initial Outlay / Annual	(₹)		
Cash flow Ranking	50,000 / 9,500 = 5.26 Years	70,000 / 11,000 = 6.36 Years	70,000 / 10,000 = 7 Years
	Ι	II	II

Statement to calculate Pay-Back period

Accept or Reject Decision :

Project A has short payback period hence it should be selected.

Illustration No. 8 :

An apparel manufacturing company wishing to expand production has the choice of on automatic machine costing \gtrless 21,000 or a semi-automatic one costing \gtrless 7,500. The following data are available :

Particulars	Automatic Machine (₹)	Semi-Automatic Machine (₹)
Annual costs :		
Materials	6,000	6,000
Labour	1,000	5,000
Variable overheads	2,000	1,500
Estimated life	6 years	7 years
Sales (limited by market	15,000 per year	15,000 per year
conditions		

Other things being equal, which machine should the company purchase?

Solution :

Computation of Cash flow and Pay-back period

Particulars	Automatic Machine (₹)		Semi-Au Machi	itomatic ine (₹)
Sales		15,000		15,000
Less : Materials Labor charges Variable overheads Depreciation	6,000		6,000	
	1,000		5,000	
	2,000		1,500	
(Automatic machine : $21,000/6$)	3,500	(12,500)	1,071	(13,571)
Semi-Automatic				
machine : 7,500/7)				

Particulars	Automatic Machine (₹)	Semi-Automatic Machine (₹)
Profit before tax	2,500	1,429
Less : Tax (a) 50% (assumed)	(1,250)	(715)
Profit after tax Add Depreciation	1,250	714
	3,500	1,071
Annual Cash flow	4,750	1,785
Pay-back period : = Initial Outlay /	21,000 / 4,750	7,500 / 1,785
Annual Cash Flow	= 4.42 Years	= 4.2 Years

Accept or Reject Decision :

Semi-Automatic Machine has less payback period hence it should be selected.

2) Accounting Rate of Return OR Average Rate of Return Method -

Accounting Rate of Return Method (ARR) is also known as Average Rate of Return or Financial Statement Method or Unadjusted Rate of Return Method.

It is based on the accounting concept of benefits, i.e. Net Profit After Tax (NPAT). This method measures the increase in profit expected to result from the investment.

According to this method, capital projects are ranked in order of earnings. Projects which yield the highest earnings are selected and others are ruled out.

Accounting Rate of Return formula is used to measure the Annual yield earned on the Capital Investment.

a) Formula :

	Average (Annual) Profit After Tax (PAT) p.a.	
Average Rate of Return =	Average or Net Initial Investment	— X 100

b) Advantages of Accounting Rate of Return Method :

- i) This method is simple and easy to understand.
- ii) It is quick to compute.

iii) This method considers all the years in the life of the project.

- iv) It takes into account the total earnings from the project during its entire economic life.
- v) It is based upon profits and not concerned with cash flows.
- vi) This approach gives due weightage to the profitability of the project.
- vii) In case of extremely long term investment, the simple rate of return will be equally close to the real rate of return. It is often used for financial analysis to measure current performance of a firm.

c) Disadvantages of Accounting Rate of Return Method :

- i) The results by different methods are inconsistent.
- ii) It is simply an averaging technique which does not consider the various impacts of external factors on over-all profits of the firm.
- iii) This method also ignores the time factor (Time Value of Money) which is very essential in business decision.
- iv) It is biased against short-term projects.
- v) This method does not determine the fair rate of return on investments. It is handed over to the management for decision.

d) **Procedure :**

Under this method we calculate the average annual profit and then we divide it by the total outlay of capital project. Thus, this method establishes the ratio between the average annual profits and total outlay of the projects.

As per formula:



Thus, the Average Rate of Return method considers whole earnings over the entire economic life of an asset. Higher the percentage of return, the project will be acceptable.



```
Total Profit After Tax (PAT)
```

Average PAT p.a. =

X 100

No. of Years of Project

Average Investment = ¹/₂ (Initial Investment - Salvage Value) + Salvage value + Working Capital

OR

```
Average Investment = (Opening Investment + Closing Investment) / 2
```

Where,

Opening Investment = Cost of Capital

Closing Investment = Salvage value



Here we are using the following formula :

e) Accept or Reject criterion :

Generally, the ARR is not an indicator of acceptance or rejection, unless the



rates are compared with the arbitrary management target.

Illustration No. 9 :

Giridhar Ltd. has one 5 year investment proposal, its investment cost and annual profits are as follows –

	Investment (₹)	Profits (₹)				
Year	0	1	2	3	4	5
Amount (₹)	(10,00,000)	1,60,000	1,20,000	80,000	40,000	40,000

Salvage value of the project at the end is ₹ 1,60,000. Depreciation is to be charged on straight line method. Calculate ARR of this investment proposal.

Solution :

Average Rate of Return = [Average Profit after tax (PAT) p.a]. / (Average Investment) X 100

Working Notes:

Average profit after tax (\mathbf{X}) = Total PAT / No. of years of project

= (1,60,000 + 1,20,000 + 80,000 + 40,000 + 40,000 + 40,000) /5 years

Average profit after tax $(\mathbf{R}) = 4,40,000/5$

= 88,000

Average Investment (\mathfrak{T}) = $\frac{1}{2}$ (Initial Investment -Salvage Value) + Salvage value

Average Investment (₹)= $\frac{1}{2}$ (10,00,000 - 1,60,000) + 1,60,000

= 5,80,000

Average Rate of Return = (88,000 /5,80,000) X 100

Average Rate of Return = 15.17 %

Illustration No. 10 :

A leather company is seeking to invest \gtrless 5,00,000 in a project. The estimated salvage value is zero; tax rate is 55%. The company uses straight line depreciation and the proposed project has cash flows before tax (CFBT) as follows :

Year	CFBT (₹)
1	1,00,000
2	1,00,000
3	1,50,000
4	1,50,000
5	2,50,000

Determine the following :

i) Pay-back period

ii) Average rate of return

Year	CFBT (₹)	Depreciation (₹)	Net Earnings (₹)	Tax (₹)	CFAT (₹)	Cumulative CFAT (₹)
(1)	(2)	(3)	(4 = 2-3)	(5 = 4 X 55%)	[6 = (4 - 5) + 3]	(7)
1	1,00,000	1,00,000			1,00,000	1,00,000
2	1,00,000	1,00,000			1,00,000	2,00,000
3	1,50,000	1,00,000	50,000	27,500	1,22,500	3,22,500
4	1,50,000	1,00,000	50,000	27,500	1,22,500	4,45,000
5	2,50,000	1,00,000	1,50,000	82,500	1,67,500	6,12,500
			2,50,000		6,12,500	

Computation of Cash flow and net earnings

Note : Depreciation p. a. = (Initial investment – Salvage value) / Life of project

Depreciation p. a. = $(5,00\ 000 - 0) / 5$ Depreciation p. a = $\gtrless 1,00,000$

(i) Pay-Back Period Method :

Refer column No. 7, i.e. Cumulative CFAT. Recovery of Initial investment in project \gtrless 5,00,000 is occurring during 5th year. The Cumulative CFAT upto the 4th year is \gtrless 4,45,000 and CFAT of 5th year is \gtrless 1,67,500.

So, the Pay-Back period = 4 years + (5,00,000 - 4,45,000) / 1,67,500 years.

- = 4 years + (55,000/1,67,000) years
- = 4 years + 0.33 years
- = 4 years + 0.33 X 12 months
- = 4 years and 3.95 months
- = 4 years and 3 months and .95 months
- = 4 years and 3 months and 0.95×30 days
- = 4 years and 3 months and 29 days

(ii) Average Rate of Return (A.R.R.) Method :

a) On Initial investment basis -

A. R. R. = (Average Earnings / Initial Investment) X 100

 $= (50,000 / 5,00,000) \times 100$

= 10%

Average Rate of Return (on original investment basis) = 10 %

b) On average investment basis -

20 %

Ave	erage Rate of Return (on average investment basis) =
	= 20 %
	= (50,000 / 2,50,000) X 100
R. R.	= (Average Earnings / Average Investment) X 100

Working Notes:

Average Earnings (₹)	= Total Net Earnings/ No. of years of project
	= (2,50,000) / 5
Average Earnings (₹)	= 50,000
Average Investment (₹)	= ½ (Original Investment - Salvage Value) + Salvage value
	$= \frac{1}{2} (5,00,000 - 0) + 0$
Average Investment (₹)	= 2,50,000

II] TIME-ADJUSTED / DISCOUNTED CASH-FLOW CRITERIA (TECHNIQUES) :

Another method of computing expected rates of return is the 'Present Value' method. The method is popularly known as 'Discounted Cash-flow Method' also. This method involves calculating the present value of the cash benefits discounted at a rate equal to the firm's cost of capital. It means, the 'present value of an investment is the maximum amount a firm could pay for the opportunity of making the investment without getting financially affected.'

The finance executive compares the present values with the cost of the proposal. If the present value is greater than the net investment, the proposal should be accepted. On the contrary, proposal should be rejected if the present value is smaller than the net investment. Making the investment in this case will cause a financial loss to the firm as the return is less than the cost of financing.

This technique takes into consideration the time value of money while evaluating the project. The meaning of Time Value of money is that the sum received today is worth more than the same to be received tomorrow.

For e.g. if \gtrless 1,000/- are invested at @ 15% \gtrless 1,150 will be received after a year. It means \gtrless 1,150/- to be received in the next year has a present value of \gtrless 150/- represents the time value of money.

Financial Management-II

A) Necessity of Money having Time Value :

Money should have time value for the following reasons:

- i) Money can be engaged or utilised efficiently and productively to produce genuine returns;
- ii) In an inflationary period, a rupee today has higher purchasing power than a rupee in the future;
- iii) Due to uncertainties in the future, current consumption is preferred than future consumption.

B) Methods of Time Value Of Money :

- I) **Compounding:** We find the Future Values (FV) of all the cash flows at the end of the time period at a given rate of interest.
- II) Discounting: We determine the Time Value of Money at Time "0" (zero) by comparing the initial outflow with the sum of the Present Values (PV) of the future inflows at a given rate of interest. Discounting i.e. Present Values (PV) method has the types as : (a) Single Flow (b) Uneven Multiple Flows (c) Annuity (d) Perpetuity.

Here we are using 'Discounting' method for computing 'Time Value' of money with Single Flow and Uneven Multiple flows while learning the concept of 'Time Value' of money in Capital Budgeting.

C) Main features of Discounted Cash flow technique :

- i) This technique considers the time value of the money.
- ii) All the benefits and costs arising during the entire life of the project are taken into account as per this technique.

iii) The cash inflows are discounted at a certain rate as per this technique.

D) Advantages of Discounted Cash flow technique :

- i) This method takes into account the entire economic life of an investment and income there from. It gives the rate of return offered by a new project.
- ii) It gives due weight to time factor of financing. In the words of Charles Horngreen "Because the discounted cash-flow method explicitly and routinely weights the time value of money, it is the best method to use for long-range decisions.
- iii) It permits direct comparison of the projected returns on investments with the cost of borrowing money which is not possible in other methods.

- iv) It makes allowance for differences in the time at which investment generate their income.
- v) This approach by recognising the time factor makes sufficient provision for uncertainty and risk. It offers a good measure of relative profitability of capital expenditure by reducing the earnings to the present values.

E) Disadvantages of Discounted Cash flow technique :

- i) This method is criticized on the following grounds:
- ii) It involves a good amount of calculations. Hence it is difficult and complicated one. But this criticism has no force.
- iii) It is very difficult to forecast the economic life of any investment exactly.
- iv) The selection of cash-inflow is based on sales forecasts which are in itself an indeterminable element.
- v) The selection of an appropriate rate of interest is also difficult.

F) Types of Discounted Cash flow technique :

There are four methods to judge the profitability of different proposals on the basis of this technique :

- 1) Discounted Pay-Back period method
- 2) Net Present Value (NPV) method
- 3) Benefit-Cost Ratio (Profitability Index) method
- 4) Internal Rate of Return (IRR) method
- 5) Modified Internal Rate of Return method
- 1) <u>Discounted Pay-back Period method</u> This method is a combination of the original payback method and discounted cash flow technique.

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

In this method, the cash flows of the project are discounted to find their present values. The present value of the cash inflows is then compared with the present value of the outflows.

To implement this approach, the expected cash inflows of an investment discounted at the cost of capital are found out and are accumulated till the end of the life of the project.

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

The discounting factors are given by : = --

 $(1 + i)^{n}$

1

Where

i = rate of interest per annum

n = no. of years over which discounting is made.

Ultimately, if discounting rate is 12%, means 0.12 then, i = 0.12

a) Accept or Reject criterion :



Illustration No. 11 :

A proposal for a software company requires a cash outflow of ₹ 40,000 and is expected to generate cash inflows as follows :-

	Cash inflows (₹)				
Year	1	2	3	4	5
Amount (₹)	16,000	12,000	18,000	10,100	4,000

Calculate the discounted pay-back period using discounting factor as 10%.

Solution :

Computation of Cash flow and Discounted Pay-Back period

Year	Cash inflow (₹) (1)	Discount-ing factor @ 10% (2)	Discounted Cashflow (₹) (3 = 1 X 2)	Cumulative Discounted Cashflow (₹)
1.	16,000	0.909	14,544	14,544
2.	12,000	0.826	9,912	24,456
3.	18,000	0.751	13,518	37,974

Capital Budgeting Decisions

Year	Cash inflow (₹)	Discount-ing factor @ 10%	Discounted Cashflow (F) (3 = 1 X 2)	Cumulative Discounted Cashflow (₹)
	(1)	(2)		
4.	10,100	0.683	6,898	44,872
5.	4,000	0.621	2,484	47,356

Initial outflow : \gtrless 40,000. And this investment recovery falls between 3rd and 4th year. So the Pay-back period falls between year 3 and 4.

Pay-back Period = 3 Years and [(Original Investment – Cumulative CFAT of the 3^{nd} year) / CFAT of 4^{th} year] years

- = 3 years and (40,000 37,974) / 6,898
- = 3 years and (2,026) /6,898
- = 3 years and 0.29 years
- = 3 years and 0.29 X 12 months
- = 3 years and 3.52 months
- = 3 years 3 months and 0.52 months
- = 3 years 3 months and 0.52 X 30 days

Pay-back Period = 3 Years 3 months and 16 days

2) <u>Net Present Value Method</u> - This method is also known as Excess Present Value or Net Gain Method.

The NPV of an investment proposal may be defined as 'The sum of the present values of all the cash inflows less the sum of the present values of all the cash outflows' of it.

Net Present Value is the difference between Present value of Cash Inflows and all Cash Outflows of the capital project.

a) Procedure :

To implement this approach, the present value of the expected net cash inflows of an investment discounted at the cost of capital are found out and it is subtracted from it the initial cost outlay of the project.

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

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

Where

i = rate of interest per annum

n = no. of years over which discounting is made.

Financial Management-II

b) Formula :

NPV = Total Present value of cash inflows – Net Investment i.e. Total Present value of

c) Advantages of Net Present Value Method :

- i) It recognizes the Time Value of Money.
- ii) It considers total benefits during the entire life of the Project.
- iii) This method is applicable in case of mutually exclusive Projects.
- iv) As it is based on the assumptions of cash flows, it helps in determining Shareholders Wealth.

d) Disadvantages of Net Present Value Method :

- i) This method is not an absolute measure.
- ii) Desired rate of return may vary from time to time due to changes in cost of capital by using this method.
- iii) It is not effective when there is difference in economic life of the projects.
- iv) This method does not give due importance to Initial investment.

e) Accept or Reject criterion :



If the Net Present Value is positive, the project should be accepted whereas if it is negative, it should be rejected.

A project is accepted if Project has Positive ('+'ve) NPV i.e. NPV > 0

A project is rejected if Project has Negative ('-'ve) NPV i.e. NPV < 0

If the two projects are mutually exclusive (special or difficult to compare), then the one with higher Net Present Value should be selected.

f) Example :

The following example will illustrate the process:

Assume, the cost of capital after taxes of a firm is 6%. Assume further, that the net cash-inflow (after taxes) on an investment of ₹ 5,000 is forecasted as being ₹ 2,800 per annum for 2 years. The present value of this stream of net cash-inflow discounted at 6% comes to ₹ 5,272.

Therefore, the present value of the cash inflow = ₹ 5,272

(-) Less present value of net investment = \gtrless 5,000

So, Net Present value = \gtrless 272.

g) Format to calculate Net Present Value :

Year	CFAT (₹)	PV Factor at	PV of CFAT (i.e. Discounted Cash Inflow)
(1)	(2)	(3)	$(\mathbf{R}) \ [4 = (2) \ X \ (3)]$
1			
2			
3			
4			
5			
Total Dis	scounted Cash I	nflows (₹)	
Less : Initial Investment or Total Present Value of Cash Outflow			()
Net Pres	ent Value (₹)		

Illustration No. 12 :

Uptronixs Ltd. is envisioning of an investment proposal costing \gtrless 40,000 which will produce annual returns as follows –

Year	1	2	3	4	5
Amount (₹)	16,000	12,000	18,000	10,100	4,000

Calculate Net Present Value for this proposal using PV factor : 10%.

Solution :

Year	Cash inflow (₹) (1)	Discount-ing factor @ 10% (2)	Discounted Cash flow (₹) (3 = 1 X 2)
1.	16,000	0.909	14,544
2.	12,000	0.826	9,912
3.	18,000	0.751	13,518
4.	10,100	0.683	6,898
5.	4,000	0.621	2,484
То	47,356		

Statement to calculate Net Present Value (at 10% Discount Factor)

NPV = Total Present Value of Discounted Cash Inflow - Total Present Value of Cash Outflow

NPV = 47,356 - 40,000

NPV = ₹ 7,356

Illustration No. 13 :

The initial outlay of the project is \gtrless 50,000 and it generates cash inflows of \gtrless 25,000, \gtrless 20,000, \gtrless 15,000 and \gtrless 10,000 in the four years of its lifespan. You are required to calculate the Net Present Value of the project assuming 10% rate of discount. The present value of Re. 1 at 10% discount rate is as follows:

Year	1 st	2 nd	3 rd	4 th
Present Value	0.909	0.826	0.751	0.683

You are required to calculate the Net Present Value of the project.

Solution :

(Profitability) Statement to calculate Net Present Value (at 10% Discount Factor)

Year	Cash Inflows (₹) (2)	Discounted Factor at 10%	Present Value (₹)
(1)		(3)	[4 = (2) X (3)]
1	25,000	0.909	22,725
2	20,000	0.826	16,520
3	15,000	0.751	11,265
4	10,000	<u>0.683</u>	6,830
		Total Discounted Cash Inflows	57,340
		Less : Initial outlay	<u>(50,000</u>)
		Net Present Value	7,340

Illustration No. 14 :

Vedanta Graphics Pvt. Ltd. is willing to expand their printing business and become market leader. They received proposals from 2 printing machine sellers. Help Vedanta to take appropriate Capital Budgeting decision on the basis of NPV method so that they can accomplish their dream with the given data. Discounting factor would be 6%.

₹ 2,00,000 would be payable immediately for Machine 'Printoswift'. For Machine 'AksharChitra', whose cost is ₹ 2,40,000, instalment facility is available. Half of the cost would be payable immediately in one year and the remaining to be paid during following year. The expected revenue generated from both machines would be as follows :-

Year	1 st	2 nd	3 rd	4 th	5 th
Machine	40,000	1,20,000	80,000	60,000	40,000
'Printoswift' (₹)					
Machine	Nil	1,20,000	1,20,000	1,60,000	Nil
'AksharChitra'(₹)					

Solution :

a) Statement to calculate Discounted or Present Value of Cash Inflows

Year	PV Factor	Machine 'Pr	Machine 'AksharChitra'		
	@6 %	Cash	Present	Cash	Present
	(1)	Inflow (₹)	Value (₹)	Inflow	Value (₹)
		(2)	(3 = 1 X 2)	(₹)	(5 = 1 X)
				(4)	4)
1.	0.943	40,000	37,720	000	000
2.	0.890	1,20,000	1,06,800	1,20,000	1,06,800
3.	0.840	80,000	67,200	1,20,000	1,00,800
4.	0.792	60,000	47,520	1,60,000	1,26,720
5.	0.747	40,000	29,880	000	000
Total D	iscounted (Cash Inflow (₹)	2,89,120		334,320

(at 6% Discount Factor)

b) <u>Statement to calculate Discounted or Present Value of Cash</u> <u>Outflows (at 6% Discount Factor)</u>

Year	PV Factor	Machine 'Pri	ntoswift'	Machine 'AksharChitra'		
	(a)6%	Cash Present		Cash	Present	
	Ũ	Outflow (₹)	Value (₹)	Outflow (₹)	Value (₹)	
	(1)	(2)	(3 = 1 X)	(4)	(5 = 1 X 4)	
			2)			
0.	1.000	2,00,000	2,00,000	1,20,000	1,20,000	
1.	0.943	000	000	1,20,000	1,13,160	
Total D	iscounted (Cash Outflow	2,00,000		2,33,160	
(₹)						

Year	PV	Machine 'Printoswift'		Mac	hine
	Factor			'AksharChitra'	
	@6 %	Cash	Present	Cash	Present
		Outflow (₹)	Value (₹)	Outflow (₹)	Value (₹)
	(1)	(2)	(3 = 1 X 2)	(4)	(5 = 1 X 4)
0.	1.000	2,00,000	2,00,000	1,20,000	1,20,000
1.	0.943	000	000	1,20,000	1,13,160
Total Di	scounted i.e	e. Total	2,89,120		3,34,320
Present '	Value of Ca	ish Inflow (₹)			
[1]					
Less : Total Discounted i.e. Total			(2,00,000)		(2,33,160)
Present Value of Cash Outflow					
(₹) [2]					
Net Present Value (₹)			89,120		1,01,120
[3 = 1 -	2]				

(at 6% Discount Factor)

Accept or Reject Decision :

Here, the Net Present Value of both machines is positive.

So, in this case of mutually exclusive investment proposals, the investment in the Machine 'AksharChitra' is advisable as it has higher Net Present Value than Machine 'Printoswift', which would be optimum and costeffective for Vedanta Graphics Pvt. Ltd.

3) <u>Benefit-Cost Ratio (Profitability Index) method</u> - Profitability Index is also known as 'Profit to Investment ratio or Benefit-Cost Ratio'.

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

Profitability Index (PI) identifies relationship between Present value of Cash inflows and Cash Outflows of capital investments. It is defined as the benefits (in present value terms) per rupee invested in the proposal.

Profitability Index is advanced version of Net Present Value as it helps to rank the projects having different Net Present Values.

One major disadvantage of the present value method is that, it is not easy to rank projects on the basis of net present value particularly when the cost of projects differs significantly. To compare such projects the present value profitability index is prepared. The index establishes relationship between cash-inflows and the amount of investment.

Capital Budgeting Decisions

The higher profitability index, the more desirable is the investment. Thus, this index provides a ready compatibility of investment having various magnitudes. By computing profitability indices for various projects, the financial manager can rank them in order of their respective rates of profitability.

a) Procedure :

- 1) Calculate Cash Outflows and its present value.
- 2) Calculate the present value of Cash Inflows.
- 3) Calculate the ratio of present value of cash inflows to the present value of cash outflows.

b) Formula :

Profitability Index = Sum of Present Value of Cash Inflows OR Discounted Cash Inflows
Present Value of Cash Total Outflows OR Discounted Cash Outflows

c) Advantages of Benefit-Cost Ratio (Profitability Index)Method :

- i) This method is helpful in comparing the project having different amounts of investment therefore it is superior to Net Present Value method.
- ii) It considers the time value of money.
- iii) It considers all cash inflows.

d) Disadvantages of Benefit-Cost Ratio (Profitability Index)Method :

- i) It is difficult to understand and to calculate.
- ii) In case of mutually exclusive nature investment, the Present Value Method is superior to this method.

e) Accept or Reject criterion :



Financial Management-II

A project is accepted if Project has Profitability Index more than (>) 1.

A project is rejected if project has Profitability Index less than (<) 1.

In case of mutually exclusive projects, the selection of project is based on ranking i.e. the project with the highest Profitability Index is given the first rank followed by others.

Illustration No. 15 :

Vallabh Ltd. has one 5 year investment proposal, its investment cost and annual profits are as follows –

	Investment (₹)	CFAT (₹)				
Year	0	1	2	3	4	5
Amount (₹)	(10,00,000)	4,80,000	3,60,000	2,40,000	1,20,000	1,20,000

Calculate Net Present Value & Profitability Index for this investment proposal.

(Note: Use PV factor at 10% upto 3 decimals)

Solution :

Year	CFAT	PV Factor	PV of CFAT			
	(₹)	at 10 %	(₹)			
(1)	(2)	(3)	[4 = (2) X (3)]			
1	4,80,000	0.909	4,36,364			
2	3,60,000	0.826	2,97,521			
-3	2,40,000	0.751	1,80,316			
4	1,20,000	0.683	81,962			
5	1,20,000	0.621	74,511			
Total	Discounted (10,70,672				
(1)						
Less : Initial Investment (2)			(10,00,000)			
Net Present Value (3 = 1-2)			70,672			

(Profitability) Statement to calculate Net Present Value (at 10% Discount Factor)

Profitability Index = Sum of Present Value of Discounted Cash Inflows / Initial Investment

Profitability Index = 10,70,672 / 10,00,000

Profitability Index = 1.070672, i.e. more than (>) 1

Accept or Reject Decision :

As the investment proposal has the Profitability Index more than (>) 1, it will be accepted.

Illustration No. 16 :

An electronic instruments mfg. firm has proposal of initial outlay of \gtrless 40,000 and it generates annual cash inflows as per data given in the table below –

	Initial outlay (₹)	Cash inflow (₹)				
Year	0	1	2	3	4	5
Amount (₹)	(40,000)	16,000	12,000	18,000	10,100	4,000

Calculate Profitability Index for this investment proposal using discounting factor at 10%.

Solution :

Statement to calculate Profitability Index (at 10% Discount Factor)

Year	Cash inflow (₹)	Discount-ing factor @ 10%	Discounted Cash flow (₹)	
	(1)	(2)	(3 = 1 X 2)	
1.	16,000	0.909	14,544	
2.	12,000	0.826	9,912	
3.	18,000	0.751	13,518	
4.	10,100	0.683	6,898	
5.	4,000	0.621	2,484	
Τα	Total Discounted Cash inflow (₹)			

Profitability Index = Total Present Value of Discounted Cash Inflows / Total Present Value of outlay

Profitability Index = 47,356 / 40,000

Profitability Index = 1.18, i.e. more than (>) 1

Accept or Reject Decision :

As the investment proposal has the Profitability Index more than (>) 1, it will be accepted.

4) <u>Internal Rate of Return method</u> - It is one of the methods under Discounted Cash Flow Technique.

This method is popularly known as Time Adjusted Rate of Return method, Discounted Rate of Return method, Yield on Investment Technique, Marginal Efficiency of Capital and Marginal Productivity of capital. The Internal Rate of Return (IRR) is defined as the interest rate that equates the present value of expected future receipts to the cost of the investment outlay.

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

The Internal Rate of Return is usually the rate of return that a project earns. It is defined as, 'The Discounted Rate which equates the aggregate present value of the net cash inflows with the aggregate present value of cash outflows.' In other words, it is the rate which gives Net Present Value ZERO to the project.

In the IRR technique, the cash inflows are known but the discount rate is to be ascertained as it is not known. IRR requires many attempts to determine the present value of earnings which would equal the investment; this approach is also called the Trial and Error approach or method.

a) Main features of Internal Rate of Return method :

- i) Internal Rate of Return is the rate of return at which NPV is Zero.
- ii) At IRR, PV of all cash inflows are equal to PV of all cash outflows.
- iii) IRR takes into consideration time value of money.
- iv) It is referred as internal rate because it is particularly related to that specific project, for which the IRR is ascertained and do not consider any other project's rate.

b) Procedure :

This Internal Rate of Return is found by trial and error.

- i) The discounted rate of return is calculated by picking up the estimated rates.
- ii) First the present value of the cash-flows from an investment is computed using an arbitrarily elected interest rate.
- iii) Then the present value so obtained is compared with the investment cost.
- iv) If the present value is higher than the cost figure, a higher rate of interest is tried.
- v) The procedure is repeated again.
- vi) On the other hand, if the present value is lower than the cost, the interest rate is lowered and the process is repeated.
- vii) This process is continued up to the times the estimated rate is acquired which equalize the present values of cash inflows and cash outflows.

The interest rate (Discounted Rate) that brings about this equality is defined as the Internal Rate of Return.



* IRR = CoC : Stay indifferent

While taking the decision for accepting or rejecting the project, the Internal Rate of Return is compared with the cost of capital. If the Internal Rate of Return exceeds the cost of capital, the project would be accepted as the investment is expected to increase shareholders' wealth.

If the projects are mutually exclusive, their Internal rate of return is compared with the cost of capital and the project having higher difference is adopted and other one is rejected.

If the Internal Rate of Return is equal to the cost of capital, then the unresponsive situation arises for Managers for taking decision between Accepting & Rejecting the project as the investment is expected not to change shareholders' wealth.

d) Formula :

IRR may be calculated in two ways :

Forward Method :

Taking positive ('+' ve) NPV at Lower IRR :

	NPV at LDR	
$\mathbf{IKK} = \mathbf{LDK} + \mathbf{IKK}$		A HDK-LDK
	NPV at LDR - NPV at HDR i.e.	
	Difference in NPV at both IRR	

Backward Method :

Taking negative ('-' ve) NPV at Higher IRR :



Where,

NPV = Net Present Value

LDR = Lower Discount Rate at which NPV is Positive

HDR = Higher Discount Rate at which NPV is Negative

<u>Note</u> : We are using Forward method for calculation of IRR while solving problems here.

e) Advantages of Internal Rate of Return method :

- i) It considers the Time Value of money.
- ii) It takes into account the total cash inflows and outflows.
- iii) It does not use the required rate of return or the cost of capital.
- iv) Therefore, calculations for cost of capital are not necessary.
- v) It provides a separate rate of return which indicates the profitability of the proposal.

f) Disadvantages of Internal Rate of Return method :

- i) This method is difficult to understand and to calculate.
- ii) It is based on future earnings as the estimates of future earnings cannot be made correctly.
- iii) It provides the multiple rates which can be confusing leading difficult interpretation of it.
- iv) If two projects with different inflow/outflow patterns are compared, IRR will lead to peculiar situations.

Illustration No. 17 :

Meenakshi Eyewears Ltd. is planning to grow its business for through a project, which would have initial outlay of \gtrless 20,000 and cash inflow as following -

Year	1	2	3	4
Cash inflow (₹)	2,000	2,000	4,000	20,000

Determine the IRR and justify the decision for accepting or rejecting the project if the opportunity cost is 14%. (Interpolate between 10% and 11%)

Solution :

a) <u>State</u> and 11	ement to calc <u>%</u>	<u>ulate Net Pı</u>	resent Value fo	or discounte	<u>ed rates : 10%</u>
Year	Cash	PV factor	PV of Cash	PV	PV of Cash

Year	Cash	PV factor	PV of Cash	PV	PV of Cash
	inflow (₹)	<i>a</i> 10%	inflow (₹)	factor@	inflow (₹)
	(1)	(2)	(3 = 1 X 2)	11% (4)	(5 = 1 X 4)
1.	2,000	0.909	1,818	0.901	1,802
2.	2,000	0.826	1,652	0.812	1,624
3.	4,000	0.751	3,004	0.731	2,924
4.	20,000	0.683	13,660	0.659	13,180
Total P	V of Inflows		20,134		19,530
Less : Total PV of Outflows		(20,000)		(20,000)	
Net P	resent Value	At LDR	134	At HDR	(470)

b) Calculation of Internal Rate of Return for two discounted rates :

Internal Rate of Return (IRR) =

	NPV at LDR	
$\mathbf{IKK} = \mathbf{LDK} +$	NPV at LDR - NPV at 1	HDR

Where,

LDR = Lower Discount Rate at which NPV is Positive

HDR = Higher Discount Rate at which NPV is Negative

Here :

LDR = 10%, HDR = 11%

NPV at LDR = + 134, NPV at HDR = (- 470)

By substituting values in the formula :

Internal Rate of Return (IRR) =

$$\mathbf{IRR} = 10\% + \frac{134}{134 - (-470)} \times 11 - 10$$

$$\mathbf{IRR} = 10\% + \frac{134}{134 + 170} \ge X \ 1$$



IRR = 10% + 0.22 X 1

IRR = 10 % + 0.22

Accept or Reject Decision :

As the estimated IRR for the project of Meenakshi Eyewears Ltd. comes to 10.22%, which is lesser than the opportunity cost or Required Rate of Return of the firm (14%), the project should be rejected.

Illustration No. 18 :

An electrical business concern is evaluating a proposal costing \gtrless 1,60,000 and expected to generate cash inflows of \gtrless 40,000, \gtrless 60,000, \gtrless 50,000, \gtrless 50,000, \gtrless 50,000 at the end of each of next 5 years respectively.

Compute the given cash flows at discounted rate of 15% and 16% by using the Internal Rate of Return method.

Solution :

Year	Cash inflow (₹) (1)	PV factor @ 15% (2)	PV of Cash inflow (₹) (3 = 1 X 2)	PV factor@ 16% (4)	PV of Cash inflow (₹) (5 = 1 X 4)
1.	40,000	0.870	34,800	0.862	34,480
2.	60,000	0.756	45,360	0.743	44,580
3.	50,000	0.658	32,900	0.641	32,050
4.	50,000	0.572	28,600	0.552	27,600
5.	40,000	0.497	19,880	0.476	19,040
Total P	V of Inflows	5	161,540		157,750
Less : 7	Fotal PV of C	Dutflows	160,000		160,000
Net P Value	resent e	At LDR	1,540	At LDR	(2,250)

a) <u>Statement to calculate Net Present Value</u> <u>for discounted rates : 15% and 16%</u>

b) Calculation of Internal Rate of Return for two discounted rates :

Internal Rate of Return (IRR) =

$$IRR = LDR + \frac{NPV \text{ at } LDR}{NPV \text{ at } LDR - NPV \text{ at } HDR}$$

Where,

LDR = Lower Discount Rate at which NPV is Positive

HDR = Higher Discount Rate at which NPV is Negative

Here :

LDR = 15%

HDR = 16%

NPV at LDR = 1,540

NPV at HDR = (-2,250)

By substituting values in the formula :

Internal Rate of Return (IRR) =

$$\mathbf{IRR} = 15\% + \frac{1,540}{1,540 - (-2,250)} \times 16 - 15$$

$$\mathbf{IRR} = 15\% + \frac{1,540}{1,540 + 2,250} \times 1$$

IRR =
$$15\% + \frac{1,540}{3,790}$$
 X 1

IRR = 15% + 0.4063 X 1

IRR = 15 % + 0.4063

IRR = 15 % + 0.41

IRR = 15.41%

5)

Modified Internal Rate of Return method – Modified Internal Rate
of Return is that Rate of Return at which Present Value of Cash
Inflows (PVCI) equals Present Value of Cash Outflows (PVCO).

i.e. PVCI = PVCO

or PVCI - PVCO = 0

Under this method, the Cash Inflows of every year are not withdrawn; rather they are re-invested upto the end of the project life. Every year's Cash Inflows will be re-invested upto the end of the project life and a lumpsum amount is received at the end.

Since this will be a terminal Cash Inflow, it shall be discounted with the last year's discounting factor to calculate the PVCI. The rate at which, this PVCI equated PVCO is called as 'Modified Internal Rate of Return'.

2.7 SOLVED PROBLEMS

Problem 1)

A limited company is thinking to purchase a new machine which will carry out some operations performed by labours. 'X' and 'Y' are its alternative models.

From the following information, you are required to prepare a profitability statement and work out the Pay-Back Period in respect of each assets :

Particulars	Machine 'X'	Machine 'Y'
Estimated life of machine (Years)	5	5
	₹	₹
Cost of machine	15,000	25,000
Cost of indirect materials	3,000	4,000
Estimated savings in scrap	5,000	7,500
Additional cost of maintenance	9,500	13,500
Estimated savings in direct wages :		
Employees not required	75	100
Wages per employee	300	300

Taxation is to be considered as 50% of profit (ignore depreciation for calculation of tax).

Statement to calculate Annual Cash Inflows

Particulars	Machine 'X'		Machine 'Y'	
Saving per annum				
A. In Labor charges (No. of Employees not required X				
Wages per employee)	75 X 300	22,500	100 X 300	30,000
B. In Scrap		5,000		7,500
C. Total Savings (A + B)		27,500		37,500
Less :				
Additional cost per annum				
D. Indirect materials	3,000		4,000	
E. Maintenance	9,500	(10,500)	13,500	(17,500)
F. I otal cost $(D + E)$		(12,500)		(17,500)
G. Profit before Tax and		15,000	6	20,000
<u>Depreciation</u> (C - F)				
Tax @ 50%		(7.500)		(10,000)
Depreciation	15,000/5	(3,000)	25,000/5	(5,000)
Net increase in Savings		4,500		5,000
ANNUAL CASH INFLOWS =				
Net increase in savings	4,5 00		5,000	
+ Depreciation	3,000	7,500	5,000	10,000

Pay-Back period = Cost of machine / Annual Cash inflows SDFSFDSDF

Pay-Back period of Machine 'X' = 15,000 / 7,500

Pay-Back period of Machine 'X' = 2 Years

Pay-Back period of Machine 'Y' = 25,000 / 10,000

= 2.5 Years

= 2 Years and 0.5 years

= 2 Years and 0.5 X 12 Months

Pay-Back period of Machine 'Y' = 2 Years and 6 Months

Financial Management-II

Accept or Reject Decision :

The investment proposal of machine having lower Pay-back period, i.e. of Machine 'X' will be accepted. As the Pay-Back Period of Machine 'X' is less than Machine 'Y', the investment in Machine 'X' is more profitable as per the Pay-back Period Method.

Problem 2)

A giant Xerox copier enterprises has decided to purchase a machine to increase the installed capacity. The enterprise has two machines under consideration. Either of them is to be purchased. Find out which of the two will be more profitable from the following information. The average rate of tax may be taken at 50%.

	Machine 'A' (₹)	Machine 'B' (₹)
Cost of Machine	50,000	80,000
Working life	4 years	6 years
Earnings before tax :		
1 st year	10,000	8,000
2 nd year	15,000	14,000
3 rd year	20,000	25,000
4 th year	15,000	30,000
5 th year		18,000
6 th year		13,000

Solution :

Machine 'A' :

(i) Pay-Back Period Method :

(a) Statement to calculate Pay-Back period

Year	EBT (₹)	Tax (₹50% (₹)	EAT (₹)	Cash Flows (Add Depr.) (₹)	Cumulative Cash Flows (₹)
	(1)	(2)	(3 = 1-2)	[4 = (3) + (50,000/4)]	(5)
1.	10,000	5,000	5,000	17,500	17,500
2.	15,000	7,500	7,500	20,000	37,500
3.	20,000	10,000	10,000	22,500	60,000
4.	15,000	7,500	7,500	20,000	80,000
			30,000		

Pay-Back Period of Machine 'A' :

Cash Outflow or cost of Machine 'A' = ₹ 50,000

i.e. The Pay-Back Period lies between 2nd and 3rd year.

Pay-Back Period = 2 Years and $\frac{50,000 - 37,500}{22,500}$

Pay-Back Period = 2 Years and 0.55 Yea
--

Pay-Back Period = 2 Years and 0.55 X 12 Months

Pay-Back Period of Machine 'A' = 2 Years and 7 Months

(ii) Average Rate of Return (A.R.R.) Method :

a) On original investment basis -

A. R. R.	= (Average Earnings / Original Investment) X	100
	= (7,500 / 50,000) X 100	
	= 15%	

Average Rate of Return (on original investment basis) = 15 %

Working Note :

Average Earnings (₹) = Total Net Earnings/ No. of years of project = (30,000) / 4

Average Earnings $(\mathbf{X}) = \mathbf{7,500}$

Machine 'B' :

(a) Statement to calculate Pay-Back period

Year	EBT	Tax 50%	EAT (₹)	Cash Flows	Cumulative
	(₹)	(₹)		(Add Depr.)	Cash Flows
				(₹)	(₹)
	(1)	(2)	(3 = 1 - 2)	[4 = (3) +	(5)
				(80,000/6)]	
1.	8,000	4,000	4,000	17,333	17,333
2.	14,000	7,000	7,000	20,333	37,666
3.	25,000	12,500	12,500	25,833	63,499
4.	30,000	9,000	15,000	28,333	91,832
5.	18,000	6,500	9,000	22,333	1,14,165
6.	13,000		6,500	19,833	1,33,498
Total Net Earnings (₹)			54,000		

Pay-Back Period of Machine 'B' :

Cash Outflow or cost of Machine 'B' =₹ 80,000

i.e. The Pay-Back Period lies between 3rd and 4th year.

Pay-Back Period= 3 Years and $\frac{80,000 - 63,499}{28,333}$ = 3 Years and $\frac{16,501}{28,333}$ Pay-Back Period= 3 Years and 0.58 YearsPay-Back Period= 3 Years and 0.58 X 12 Months

Pay-Back Period of Machine 'B' = 3 Years and 7 Months

(ii) Average Rate of Return (A.R.R.) Method :

a) On original investment basis -

Average Rate of Return (on original investment basis) = 11.25 %

Working Note :

Average Earnings (₹) = Total Net Earnings/ No. of years of project

=(54,000)/6

Average Earnings $(\mathbf{X}) = 9,000$

Accept or Reject Decision :

Machine 'A' has lower Pay-back period as well as higher Average Rate of Returns compared with machine 'B'. So the investment in Machine 'A' is more profitable as per both the techniques.

Note :

It has been assumed that Earnings before tax in the problem is after considering depreciation on Straight Line method.

Financial Management-II
Problem 3)

The following statements give quantitative consideration relevant to ranking of Project 'A' and 'B'.

Criteria	Project 'A'	Project 'B'
Investment	₹ 400	₹ 300
Internal rate of return	Nearly 18%	Nearly 20%
Present value of 6% discount factor	₹ 542.70	₹ 421.20
Net Present Value at 6% discount factor	₹ 142.70	₹ 121.20
Net Present Value at 12% discount factor	₹ 60.50	₹ 60.50

Project A required an investment of \gtrless 400 and was expected to have cash inflows of \gtrless 110, \gtrless 120, \gtrless 130, \gtrless 140 and \gtrless 150 over its five year economic life.

Project B involved an investment of \gtrless 300 and expected to have cash inflows of \gtrless 100 each over its five year economic life.

Which of the two projects will you select if cost of capital is (a) 10%, (b) 12% and (c) 15%?

Give reasons in support of your decision.

Solution :

	P.V. Pr		ject 'A'	Pro	roject 'B'	
Year	Factor @ 10%	Cash Inflows	P.V. of Cash	Cash Inflows	P.V. of Cash inflows	
			inflows		(₹)	
	(1)	(₹)	(₹)	(₹)	(5 = 1 X 4)	
	(1)	(2)	(3 = 1 X 2)	(4)		
1.	0.909	110	99.99	100	90.90	
2.	0.826	120	99.12	100	82.60	
3.	0.751	130	97.63	100	75.10	
4.	0.683	140	95.62	100	68.30	
5.	0.621	150	93.15	100	62.10	
Net disc	ounted Cash in	nflows	485.51		379.00	
Less : C	Cash Outflows	~	(400.00)		(300.00)	
Net Pre	esent Value (₹	()	85.51		79.00	

a) Statement to calculate Net Present Value @ 10% discount

Financial Management-II Accept or Reject Decision :

With P. V. factor 10%, project 'A' has higher Net Present Value compared with project 'B'. So the investment in project 'A' is more profitable as per NPV method.

	P.V.	Proj	ect 'A'	Pro	ject 'B'		
Year	Factor @ 12%	Cash Inflows	P.V. of Cash	Cash Inflows	P.V. of Cash		
			inflows		inflows		
	(1)	(₹)	(₹)	(₹)	(₹)		
	(1)	(2)	(3 = 1 X 2)	(4)	(5 = 1 X 4)		
1.	0.8929	110	98.21	100	89.29		
2.	0.7972	120	95.66	100	79.72		
3.	0.7118	130	92.53	100	71.18		
4.	0.6355	140	88.97	100	63.55		
5.	0.5674	150	85.11	100	56.74		
Net disco	ounted Cash	inflows	460.48		360.48		
Less : Cash Outflows		400.00		300.00			
Net Pro	esent Value ((र)	60.48		60.48		

b) Statement to calculate Net Present Value @ 12% discount

Accept or Reject Decision :

With P. V. factor 12%, both projects are at par. However, preference can be given to project 'B', because investment is lower so it is more profitable as per NPV method.

c) Statement to calculate Net Present Value @ 15% discount

	P.V.	Proj	ect 'A'	Pro	ject 'B'
Year	Factor @	Cash	P.V. of	Cash	P.V. of
	15%	Inflows	Cash	Inflows	Cash
			inflows		inflows
		(₹)	(₹)	(₹)	(₹)
	(1)	(2)	(3 = 1 X 2)	(4)	(5 = 1 X 4)
1.	0.870	110	95.70	100	87.00
2.	0.756	120	90.72	100	75.60
3.	0.658	130	85.54	100	65.80
4.	0.572	140	80.08	100	57.20
5.	0.497	150	74.55	100	49.70
Net disc	counted Cash i	nflows	426.54		335.30
Less : Cash Outflows		(400.00)		(300.00)	
Net Pr	esent Value (₹)	26.59		35.30

Accept or Reject Decision :

With P. V. factor 15%, project 'B' has higher Net Present Value compared with project 'A'. So the investment in project 'B' is more profitable as per NPV method.

Problem 4)

Given below is the information regarding two machines 'X' and 'Y' each costing \gtrless 1,00,000. During comparing the profitability of the machines, a discount rate of 9% is to be used.

Earnings after taxation are expected to be as follows:

Year	Machine 'X'	Machine 'Y'
1	30,000	10,000
2	40,000	30,000
3	50,000	40,000
4	30,000	60,000
5	20,000	40,000

Indicate which machine would be more profitable investment under :

(i) Pay-Back Period Method

(ii) Net Present Value Method

Calculate the Pay-Back Profitability.

The Present Value of Re. 1 at 9% discount rate is as follows :

Year	1^{st}	2^{nd}	3 rd	4 th	5 th
Present Value	0.92	0.84	0.77	0.71	0.65

Solution :

(i) Pay-Back Period Method :

Statement to calculate Pay-Back period

Year	Ι	Machine 'X'		Machine 'Y'
	Cash Inflows	Cumulative Cash Inflows	Cash Inflows	Cumulative Cash Inflows
	(₹)	(₹)	(₹)	(₹)
1	30,000	30,000	10,000	10,000
2	40,000	70,000	30,000	40,000
3	50,000	1,20,000	40,000	80,000
4	30,000	1,50,000	60,000	1,40,000
5	20,000	1,70,000	40,000	1,80,000

Financial Management-II (a) Pa

(a) Pay-Back Period of Machine 'X' :

Cash Outflow or cost of Machine 'X' = ₹ 1,00,000 i.e. The Pay-Back Period lies between 2^{nd} and 3^{rd} year. Pay-Back Period = 2 Years and 1,00,000 - 70,000 50,000Pay-Back Period = 2 Years and 30,000 50,000Pay-Back Period = 2 Years and 3/5 Years Pay-Back Period = 2 Years and 3/5 X 12 Months = 2 Years and 7.2 Months = 2 Years 7 Months and 0.2 X 30 Days

Pay-Back Period of Machine 'X' = 2 Years 7 Months and 15 Days

(b) Pay-Back Period of Machine 'Y':

Cash Outflow or cost of Machine 'Y' = ₹ 1,00,000

i.e. The Pay-Back Period lies between 3rd and 4th year.

Pay-Back Period = 3 Years and $\frac{1,00,000 - 80,000}{60,000}$

= 3 Years and $\frac{20,000}{60,000}$

Pay-Back Period = 3 Years and 1/3 Years

Pay-Back Period = 3 Years and $1/3 \times 12$ Months

```
Pay-Back Period of Machine 'Y' = 3 Years and 4 Months
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Accept or Reject Decision :

The investment proposal of machine having lower Pay-back period, i.e. Machine 'X' will be accepted. As the Pay-back Period of Machine 'X' is less than of Machine 'Y', the investment in Machine 'X' is more profitable for the company as per the Pay-back Period Method.

(ii) Pay-Back Profitability :

Particulars	Machine 'X'	Machine 'Y'
Total Cash Inflows (₹)	1,70,000	1,80,000
[1]		
Less : Initial investment in	(1,00,000)	(1,00,000)
machine i.e. Total Cash		
Outflows OR Cost of the		
Machine (₹)		
[2]		
Net Present Value (₹)	70,000	80,000
[3 = 1 - 2]		
Profitability Index	1.42	1.25
[4 = 1/2]		
Rank	1	2

Statement to calculate Net Present Value and Profitability Index

Accept or Reject Decision :

Both projects (investment proposal of both machines) have Profitability Index more than (>) 1.

So, in this case of mutually exclusive investment proposals, the selection of project i.e. investment in Machine 'X' will be done as it has the highest Profitability Index (1^{st} rank) .

(ii) Net Present Value Method :

(Profitability) Statement to calculate Net Present Value (at 9%) Discount Factor)

Year	Present Value	Machir	ie 'X'		Machine 'Y'
	Factor at 9% Discount (1)	Cash inflow (₹) (2)	Present value (₹) (3 = 1 X 2)	Cash inflow (₹) (4)	Present value (₹) (5 = 1 X 4)
1	0.92	30,000	27,600	10,000	9,200
2	0.84	40,000	33,600	30,000	25,200
3	0.77	50,000	38,500	40,000	30,800
4	0.71	30,000	21,300	60,000	42,600
5	0.65	20,000	13,000	40,000	<u>18,000</u>
Total Discounted Cash Inflows (I) Less : Cash Outflow or Cost of Machine (II)		1,34,000		1,25,800	
		(1,00,000)		(1,00,000)	
Net Pr	esent Value	(III = I - II)	34,000		25,800

Financial Management-II Accept or Reject Decision :

As per the Net Present Value Method, the investment in Machine 'X' is profitable as its Net Present Value is more than Machine 'Y'.

Problem 5)

Vipul enterprises is foreseeing an cash outflow of \gtrless 5,00,000 for a project whose annual cash inflows are shown in the following table -

Year	1 st	2 nd	3 rd	4 th	5 th	6 th
Cash inflow	1,50,000	1,00,000	1,40,000	2,00,000	2,00,000	1,25,000
(₹)						

Calculate the Discounted Pay-back Period, Profitability Index and Net Present Value keeping in mind the discounting factor @ 15%.

Solution :

a) Statement for Computation of Cash flow and Discounted Pay-Back period

Year	Cash inflow (₹)	Discount-ing factor @	Discounted Cash inflow	Cumulative Discounted
		15%	(₹)	Cash inflow
	(1)	(2)	(3 = 1 X 2)	(₹)
1.	1,50,000	0.870	1,30,500	1,30,500
2.	1,00,000	0.756	75,600	2,06,100
3.	1,40,000	0.658	92,120	2,98,220
4.	2,00,000	0.572	1,14,400	4,12,620
5.	2,00,000	0.497	99,400	5,12,020
6.	1,25,000	0.432	54,000	5,66,020
	Tot	al Discounted	Cash inflow (₹)	5,66,020

Initial outflow : \gtrless 5,00,000. And this investment recovery falls between 4th and 5th year. So the Pay-back period falls between year 4 and 5.

Pay-back Period = 4 Years and [(Original Investment – Cumulative CFAT of the 3^{nd} year) / CFAT of 4^{th} year] years

- = 4 years and (5,00,000 4,12,620)/99,400
- = 4 years and (87,380) /99,400
- = 4 years and 0.88 years
- = 4 years and 0.88 X 12 months
- = 4 years and 10.55 months
- = 4 years 10 months and 0.55 months
- = 4 years 10 months and 0.55×30 days

Pay-back Period = 4 Years 10 months and 16 days

b) Calculation of Profitability Index

Profitability Index = Total of Present Value of Discounted Cash Inflows / Cash Outflow

Profitability Index = 5,66,020 / 5,00,000

Profitability Index = 1.13, i.e. more than (>) 1

Accept or Reject Decision :

As the investment proposal has the Profitability Index more than (>) 1, it will be accepted.

c) Calculation of Net Present Value

NPV = Total Present Value of Discounted Cash Inflow - Total Present Value of Cash Outflow

NPV = 5,66,020 - 5,00,000

NPV = ₹ 66,020

Accept or Reject Decision :

As per the Net Present Value Method, Vipul enterprises should accept the project as it will provide positive ('+' ve) Net Present Value from it.

Problem 6)

A business concern whose cost of capital is 10% is considering two mutually exclusive projects 'L' and 'M', the details of which are :

	Project 'L' (₹)	Project 'M' (₹)
Investment	70,000	70,000
Cash Inflow :		
1st year	10,000	50,000
2nd year	20,000	40,000
3rd year	30,000	20,000
4th year	45,000	10,000
5th year	60,000	10,000
Total	1,65,000	1,30,000

Compute the net Present Value at 10%, Profitability Index and Internal Rate of Return for the two Projects.

(i) NPV Method :

a) Statement to calculate Net Present Value (at 10% Discount Factor) for both projects

Year	PV	Projec	ct 'L'	Project 'M'	
	Factor	Cash	Present	Cash	Present
	@10%	Inflow (₹)	Value (₹)	Inflow (₹)	Value (₹)
	(1)	(2)	(3 = 1 X 2)	(4)	(5 = 1 X 4)
1.	0.909	$ \begin{array}{r} 10,000\\ 20,000\\ 30,000\\ 45,000\\ 60,000 \end{array} $	9,090	50,000	45,450
2.	0.826		16,520	40,000	33,040
3.	0.751		22,530	20,000	15,020
4.	0.683		30,735	10,000	6,830
5.	0.621		37,260	10,000	6,210
Total Discounted Cash inflow (₹)		1,16,135		1,06,550	
Less : Cash Outflow		(70,000)		(70,000)	
Net Present Value		46,135		36,550	

Accept or Reject Decision :

Here, the Net Present Value of both projects is positive.

So, in this case of mutually exclusive investment proposals, the selection of project i.e. investment in the project 'L' should be done as it has higher Net Present Value than project 'M', which would be profitable for the business concern.

b) Profitability Index :

Particulars	Project 'L'	Project 'M'
Profitability Index = Sum of Present Value of Cash Inflows OR Discounted Cash Inflows / Initial Investment	1,16,135 / 70,000	1,06,550 / 70,000
	=1.659	=1.522
Rank	I	П

Accept or Reject Decision :

Here, the Profitability Index of both projects is positive, i.e. more than (>) 1.

So, in this case of mutually exclusive investment proposals, the selection of project i.e. investment in the project 'L' should be done as it has the highest Profitability Index (1st rank), which would be profitable for the business concern.

c) Internal Rate of Return for two Projects :

Year	Cash	PV factor	PV of Cash	PV factor	PV of Cash
	inflow (₹)	@ 25%	inflow (₹)	@ 30%	inflow (₹)
	(1)	(2)	(3 = 1 X 2)	(4)	(5 = 1 X 4)
0	(- 70,000)	1.000	(- 70,000)	1.000	(- 70,000)
1.	10,000	0.800	8,000	0.769	7,690
2.	20,000	0.640	12,800	0.592	11,840
3.	30,000	0.512	15,360	0.455	13,650
4.	45,000	0.410	18,450	0.350	15,750
5.	60,000	0.328	19,680	0.269	16,140
Net Pr	esent Value	NPV at	+ 4,290	NPV at	- 4,930
(NPV)	LDR		HDR	

Project 'L' :

Internal Rate of Return (IRR) =

	NPV at LDR	
IKK - LDK +		X HDR-LDR
	NPV at LDR - NPV at HDR	

Where,

LDR = Lower Discount Rate at which NPV is Positive

HDR = Higher Discount Rate at which NPV is Negative

Here :

LDR = 25%

HDR = 30%

NPV at LDR = +4,290

NPV at HDR = (- 4,930)

IRR = 27.32%

By substituting values in the formula :

Internal Rate of Return (IRR) =

$$\mathbf{IRR} = 25\% + \frac{4,290}{4,290 - (-4,930)} \times 30 - 25$$
$$\mathbf{IRR} = 25\% + \frac{4,290}{9,220} \times 5$$

Financial Management-II

Project 'M' :

Yea	Cash	PV for store (PV of	PV fractor	PV of Cash
r	$\frac{1}{(1)}$	1actor @	Casn inflow (₹)	1actor(a) 30%(4)	$(5 = 1 \times 4)$
	(1)	(2)	(3 = 1 X 2)	5070 (4)	(5 1 1 1)
0	(-	1,000	(- 70,000)	1,000	(- 70,000)
	70,000)				
1.	50,000	0.741	37,050	0.714	35,600
2.	40,000	0.549	21,960	0.510	20,400
3.	20,000	0.406	8,120	0.364	7,280
4.	10,000	0.301	3,010	0.260	2,600
5.	10,000	0.223	2,230	0.183	1,860
Net Present Value		NPV at	+ 2,370	NPV at	- 2,260
	(NPV)	LDR		HDR	

Here :

LDR = 25%

HDR = 30%

NPV at LDR = +2,370

NPV at HDR = (- 2,260)

By substituting values in the formula :

Internal Rate of Return (IRR) =

 $\mathbf{IRR} = 25\% + \frac{+2,370}{+2,370 - (-2,260)} \times 30 - 5$

 $\mathbf{IRR} = 25\% + \frac{2,370}{4,630} \qquad X \ 5$

IRR = 25% + 0.5112 X 5

IRR = 25 % + 2.559

IRR = 27.56%

Accept or Reject Decision :

While taking the decision for accepting or rejecting the project, the Internal Rate of Return is compared with the opportunity cost or Required Rate of Return. If the Internal Rate of Return exceeds the opportunity cost or required rate, the project would be accepted.

Here, the estimated value of IRR for both projects 'L' and 'M' are higher than opportunity cost or Required Rate of Return (10%).

So in such case of mutually exclusive projects, the estimated value of IRR for both projects are compared with the cost of capital and the project having higher difference is adopted and other one is rejected.

The estimated value of IRR of project 'L' is : 27.32% and that of project 'M' is : 27.56%. The difference between estimated value of IRR of project 'M' and the cost of capital is higher than the difference between estimated value of IRR of project 'L' and the cost of capital. So project 'M' would be selected.

Problem 7)

'Hindvalley Stone Crusher Company Ltd.' is considering two mutually exclusive projects 'Black' and 'Grey', the details of which are :-

	Year	Project Black	Project Gray (₹)
		(₹)	
Cost	0	2,00,000	2,00,000
	1	20,000	1,00,000
Cash Inflow (₹)	2	40,000	80,000
	3	60,000	40,000
	4	90,000	20,000
	5	1,20,000	20,000

Its cost of capital is 10%. Figure out the Net Present Value at 10%, Profitability Index, an IRR for the two projects. Interpolate between 13% and 15% for both the proposals.

Solution :

(i) NPV Method :

<u>a) Statement to calculate Net Present Value (at 10% Discount Factor)</u> <u>and Profitability Index for both projects</u>

Year	PV	Project	'Black'	Project 'Grey'		
	Factor	Cash	Present	Cash	Present	
	<u>(a)</u> 10%	Inflow (₹)	Value (₹)	Inflow (₹)	Value (₹)	
	(1)	(2)	(3 = 1 X 2)	(4)	(5 = 1 X 4)	
1	(1)	20.000	10,100	1 00 000	00.000	
1.	0.909	20,000	18,180	1,00,000	90,090	
2.	0.826	40,000	33,040	80,000	66,080	
3.	0.751	60,000	45,060	40,000	30,040	
4.	0.683	90,000	61,740	20,000	13,660	
5.	0.621	120,000	74,520	20,000	12,420	
Total Discounted Cash inflow (₹)		2,32,270		2,13,100		
[1]						

Cash Outflow (₹) [2]	(2,00,000)	(2,00,000)
Net Present Value (\mathbf{E}) $[3 = 1 - 2]$	32,270	13,100
Profitability Index [P. I. = 1 / 2]	1.16	1.07
Rank	Ι	II

Accept or Reject Decision :

Here, the Net Present Value of both projects is positive as well as the Profitability Index of both projects is positive, i.e. more than (>) 1.

So, in this case of mutually exclusive investment proposals, the selection of project i.e. investment in the project 'Black' should be done as it has higher Net Present Value as well as higher Profitability Index (1st rank) than project 'Grey', which would be profitable for the business concern.

(ii) Internal Rate of Return for two Projects :

a) Statement to calculate Net Present Value (at 13% and 14% Discount Factor) And Profitability Index for both projects

Particulars	Year	Cash Inflow	PVF (13%)	PV of Cash inflow (₹)	PVF (15%)	PV of Cash
		(1)	(2)	(3 = 1 X 2)	(4)	$({\overline{\xi}})$ (5 = 1 X 4)
PV of Outflows (₹)	0.	(2,00,000)	1.000	(2,00,000)	1.000	(2,00,000)
Add : P. V.	1.	20,000	0.885	17,700	0.870	17,400
of Cash Inflow of	2.	40,000	0.783	31,320	0.756	30,240
each year	3.	60,000	0.693	41,580	0.658	39,480
(₹)	4.	90,000	0.613	55,170	0.572	51,480
	5.	120,000	0.543	65,160	0.497	59,640
= Net Present Value (₹)		NPV at LDR	10,930	NPV at HDR	(1,760)	

Project 'Black' :

Internal Rate of Return (IRR) =

$\mathbf{IRR} = \mathbf{LDR} + \frac{\mathbf{A} + \mathbf{A} + \mathbf$		NPV at LDR
NPV at LDR - NPV at HDR	$\mathbf{IKR} = \mathbf{LDR} +$	PV at LDR - NPV at HDR

Where,

LDR = Lower Discount Rate at which NPV is Positive HDR = Higher Discount Rate at which NPV is Negative

Here :

LDR = 13%

HDR = 15%

NPV at LDR = + 10,930

NPV at HDR = (-1,760)

By substituting values in the formula :

Internal Rate of Return (IRR) =

	10,930	
IRR = 13% +		X 15 - 13
	10,930 - (-1,760)	

$$\mathbf{IRR} = 13\% + \frac{10,930}{10,930 + 1,760} \times 15 - 13$$

$$\mathbf{IRR} = 13\% + \frac{10,930}{12,690} \qquad X\ 2$$

IRR = 13% + 0.8613 X 2

$$IRR = 13 \% + 1.7226$$

IRR = 14.72%

Project 'Grey' :

Particulars	Year	Cash	PVF	PV of	PVF	PV of
		Inflow	(13%)	Cash	(15%)	Cash
		(₹)		inflow		inflow
		(1)	(2)	(₹)	(4)	(₹)
				(3 = 1 X 2)		(5 = 1 X 4)
PV of	0.	(2,00,000)	1.000	(2,00,000)	1.000	(2,00,000)
Outflows (₹)						
Add : P. V.	1.	100,000	0.885	88,500	0.870	87,000
of Cash	2.	80,000	0.783	62,640	0.756	60,480
Inflow of	3.	40,000	0.693	27,720	0.658	26,320
each year (₹)	4.	20,000	0.613	12,260	0.572	11,440
	5.	20,000	0.543	10,860	0.497	9,940
= Net Present Value (₹)		NPV at	1,980	NPV at	(4,820)	
			LDR		HDR	

Financial Management-II

Internal Rate of Return (IRR) =



Where,

LDR = Lower Discount Rate at which NPV is Positive

HDR = Higher Discount Rate at which NPV is Negative

Here :

LDR = 13% HDR = 15% NPV at LDR = + 1,980 NPV at HDR = (-4,820)

By substituting values in the formula :

Internal Rate of Return (IRR) =

 $\mathbf{IRR} = 13\% + \frac{1,980}{1,980 - (-4,820)} \times 15 - 13$

$$\mathbf{IRR} = 13\% + \frac{1,980}{1,980 + 4,820} \times 15 - 13$$

IRR =
$$13\% + \frac{1,980}{6,800}$$
 X 2

IRR = 13% + 0.2911 X 2 IRR = 13 % + 0.5823

Accept or Reject Decision :

While taking the decision for accepting or rejecting the project, the Internal Rate of Return is compared with the cost of capital. If the Internal Rate of Return exceeds the opportunity cost or required rate, the project would be accepted.

Capital Budgeting Decisions

Here, for 'Hindvalley Stone Crusher Company Pvt. Ltd.', the estimated value of IRR for both projects 'Black' and 'Grey' are higher than cost of capital (10%).

So in such case of mutually exclusive projects, the estimated value of IRR for both projects are compared to the cost of capital and the project having higher difference is adopted and other one is rejected.

The estimated value of IRR of project 'Black' is : 14.72% and that of project 'Grey' is : 13.58%. The difference between estimated value of IRR of project 'Black' and the cost of capital is higher than the difference between estimated value of IRR of project 'Grey' and the cost of capital. So project 'Black' would be selected.

2.8 SUMMARY

Finance comprises of blend of knowledge of credit, securities, financial related legislations, financial instruments, financial markets and financial system.

Capital Budgeting is budgeting for capital projects. It analyses investment opportunities and cost of capital simultaneously while evaluating worthiness of a project.

Capital Budgeting is the most important decision for a finance manager. As it involves buying expensive assets for long term use, Capital Budgeting decisions may have a role to play in the future success of the company.

Capital Budgeting is the process of evaluating capital projects which has cash flows more than one year. It involves huge investment in capital assets hence it becomes necessary to make in depth analysis of the options available to the finance manager of the business. In Capital Budgeting decisions a project is accepted if it has positive net cash flows. Positive cash flow means Excess of present Value of Cash inflows over the Present investment value.

The process involves ascertaining or estimating cash inflows and outflows, matching the cash inflows with the outflows appropriately and evaluation of desirability of the project. It is a managerial technique of meeting capital expenditure with the overall objectives of the firm. Capital Budgeting means planning for capital assets.

Capital Budgeting provides useful tool with the help of which the management can reach judicious investment decision. Capital projects involve huge outlay and long years.

The overall objective of Capital Budgeting is to maximise the profitability of a firm or the return on investment. This objective can be achieved either by increasing the revenues or by reducing costs. Thus, Capital Budgeting decisions can be broadly classified into two categories: a) those which increase revenue, and b) those which reduce costs. It is significant because it deals with the vital decision of evaluation and selection of efficient project. Many criteria has been suggested to judge the worth commendability of investment projects. Capital projects need to be thoroughly evaluated as to costs and benefits.

The Capital Budgeting process begins with collecting innumerable alternative investment proposals or projects from different departments of a firm which would meet the requirements of the business concern. The best alternative from among the conflicting proposals is selected using appropriate Capital Budgeting techniques. This selection is made after estimating return on the projects and comparing the same with the cost of capital. Investment proposal which gives the highest net marginal return will be chosen.

Following are the steps involved in the evaluation of an investment:1) Estimation of cash flows, 2) Estimation of the required rate of return and 3) Application of a decision rule for making the choice. A sound appraisal technique should be used to measure the economic worth of an investment project.

Further, in view of the investment proposals under consideration, Capital Budgeting decisions may also be classified as. i) Accept / Reject Decisions, ii) Mutually Exclusive Project Decisions and iii) Capital Rationing Decisions.

The various techniques of investment appraisal methods include : Nondiscounted Cash Flow Criteria includes (i) Pay-back period, (ii) Discounted pay-back period and (iii) Accounting rate of return (ARR).

Discounted Cash Flow (DCF) Criteria includes (i) Net present value (NPV), (ii) Profitability index (PI) and (iii. Internal rate of return (IRR)

2.9 EXERCISE

Q. 1) State with reason whether the following statements are True or False :

- 1. Capital Budgeting is same as financing decision
- 2. Capital Budgeting decisions are reversible in nature..
- 3. If NPV is zero, IRR will be more than its the cost of capital.
- 4. Both NPV and IRR cannot be zero.
- 5. Pay-back period takes into account all cash inflows.

Answers :

- 1. False : Capital Budgeting is same as investment decision.
- 2. **False** : Capital Budgeting decisions are irreversible in nature as huge investment is involved and reversing decisions would involve additional costs and losses

3. **False** : If NPV is zero, IRR will be same as cost of capital.

- 4. **True** : NPV can be zero but IRR cannot be zero.
- 5. **False** : Pay-back period takes into account cash inflows upto the period within which initial cash outflow is expected to be recovered

Q.2) Answer the following :

- 1) What is Capital Budgeting?
- 2) Explain the significance of budgeting.
- 3) What are the various kinds of Capital Budgeting decisions?
- 4) What is meant by Capital Budgeting process?
- 5) Analyse the importance steps involved in Capital Budgeting.
- 6) Explain need for investment decisions.
- 7) Explain the process involved in Capital Budgeting.
- 8) What is meant by Pay-back method? State its advantages.
- 9) How do you calculate the accounting rate of return? What are its limitations?
- 10) What are the mutually exclusive projects? Explain the conditions when conflicting ranking would be given by the internal rate of return and net present value methods to such projects.
- 11) What is profitability index? Which is a superior ranking criterion, profitability index or the net present value?
- 12) Write short note on (i) Time adjusted rate of return, (ii) Profitability index

Q.3) Practical Problems :

1) Bhakti Electronics Ltd., is considering the purchase of a machine. Two machines A and B are available, each costing ₹ 50,000. In comparing the profitability of the machine, a discount rate of 10% is to be used. Earnings after taxation are expected to be as follows :

Year	Cash Flow (₹)		
	Machine A	Machine B	
1	15,000	5,000	
2	20,000	15,000	
3	25,000	20,000	
4	15,000	30,000	
5	10,000	20,000	

Indicate which machine would be the more profitable investment under the various methods of ranking investment proposals.

[Ans :- NPV : Machine 'A' = ₹ 65,385 and Machine 'B' = ₹ 64,865; PBP : Machine 'A' = 2 & 3/5 years and Machine 'B' = 3 & 1/3 years; RoI : Machine 'A' = 34% and Machine 'B' = 36%]

2) Pradnya Engineering Ltd., is considering two proposal projects for investment, each of which requires on initial investment of \gtrless 1,80,000.

The total cash inflow i.e. profit after taxes and depreciation charges for each project are :

Year	Project 'X' (₹)	Project 'Y' (₹)
1	30,000	60,000
2	50,000	1,00,000
3	60,000	65,000
4	65,000	45,000
5	40,000	
6	30,000	
7	16,000	

The cost of capital is 8%. Rank there profits under Net Present Value Method. Which is most profitable?

[Ans :- NPV : Project 'X' = ₹ 41,513 and Project 'Y' = ₹ 45,945]

3) Mogra Ltd. is considering the purchase of a new machine which will carry out some operations performed by labour. 'L' and 'M' are alternative models. From the following information, you are required to prepare a profitability statement and workout the pay-back period in respect of each machine.

	Machine 'L'	Machine 'M'
Estimated life of Machine (years)	(₹)	(₹)
Cost of machine	1,50,000	2,50,000
Cost of indirect materials	6,000	8,000
Estimated savings in scrap	10,000	15,000
Additional cost of maintenance	19,000	27,000
Estimated savings in direct wages :		
Employees not required	150	200
Wages per employee	600	600

Taxation is to be considered @ 50% of profit (Ignore depreciation for calculation of tax), which model would you recommend? State your reasons.

[Ans :- Cash Savings : Machine 'L' = \gtrless 37,500 and Machine 'M' = \gtrless 50,000; PBP : Machine 'L' = 4 years and Machine 'M' = 5 years]

4) Antara stationers is looking for an investment of \gtrless 15,00,000 which will offer annual revenue as per the table below :

Year	Cash inflow (₹)
1	3,00,000
2	3,80,000
3	7,40,000
4	3,40,000
5	2,50,000
6	1,25,000

Calculate the discounted pay-back period, profitability index and net present value considering discounting rate at 12%.

[Ans :- Discounted Pay-back period = 5 Years 8 Months 12 Days; Profitability Index = 1.01; NPV = \gtrless 19,005]

5) Mediproof pharmaceuticals is bearing in mind two mutually exclusive investment proposals. Their expected cash flows are given as follows :

Year	Proposal 'X' (₹)	Proposal 'Y' (₹)
0	(-) 5,00,000	(-) 7,00,000
1	1,45,000	1,00,000
2	1,45,000	1,10,000
3	1,45,000	1,20,000
4	1,45,000	1,50,000
5	1,45,000	1,60,000
6	1,45,000	1,50,000
7		1,20,000
8		1,20,000
9		1,10,000
10		1,00,000

The company employs the risk adjusted method of evaluating risky projects and select the appropriate required rate of return as follows :

Project pay-back	Required Rate of Return
Less than 1 year	8%
1 to 5 years	10%
5 to 10 years	12%
Over 10 years	15%

Which proposal should be accepted by the Company?

[Ans :- PBP : Proposal 'X = 3.45 years and Proposal 'Y' = 5 years 4 months; RoR : Proposal 'X' = 10% and Proposal 'Y' = 12%; NPV : Proposal ' $X' = \notin 1,31,475$ and Proposal ' $Y' = \notin 6,330$]

6) Directors of 'HimJal' water purification plant are looking for a development proposal having an initial outlay amounting to \gtrless 1,20,000. The estimated net cash inflows are as follows :-

Year	Net Cash inflows (₹)	
1.		21,000
2.		21,000
3.		21,000
4.		21,000
5.		21,000
6.		24,000
7.		30,000
8.	6	45,000
9.		30,000
10.		12,000

Determine the IRR for the proposal by considering discounting factor : 14% and 15%. Cost of capital is 10%.

[Ans :- $NPV = \gtrless 3,291$ and (-1,740) with discounting factor : 14% and 15% resp.; IRR = 14.65%]

3

CAPITAL RATIONING AND RISK ANALYSIS

Unit Structure

- 3.0 Objectives
- 3.1 Introduction of Capital Rationing
- 3.2 Need of Capital Rationing
- 3.3 Advantages and Disadvantages of Capital Rationing
- 3.4 Types of Capital Rationing
- 3.5 Factors leading to Capital Rationing
- 3.6 Situations of Capital Rationing
- 3.7 Solved Problems of Capital Rationing
- 3.8 Introduction of Risk Analysis in Capital Budgeting
- 3.9 Sources of Risk
- 3.10 Techniques of Risk Analysis
- 3.11 Summary
- 3.12 Exercise

3.0 OBJECTIVES

After studying the unit the students will be able to :

- Understand the concept of Capital Rationing
- Know the Need of Capital Rationing
- Understand the Advantages & Disadvantages of Capital Rationing
- Discuss the various Types of Capital Rationing
- Analyse the Factors leading to Capital Rationing
- Realize the Situations of Capital Rationing
- Explain the concept of Risk Analysis in Capital Budgeting
- Describe different Sources of Risk
- Analyse the various Techniques of Risk Analysis

3.1 INTRODUCTION

3.1.1 : Meaning of Capital Rationing :

Capital Rationing is the situation where funds available for executing some project are limited.

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

Capital rationing is a strategy used by companies or investors to limit the number of projects they take on at a time. If there is a pool of available investments that are all expected to be profitable, capital rationing helps the investor or business owner choose the most profitable ones to pursue.

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

Capital rationing is necessarily an approach of management in allocating the funds available across various opportunities of investment, thereby enhancing the bottom line of the company. The company will go on to accept the blend of projects that have the net present value (NPV) on the higher side.

Capital rationing is a process or a method applied to select and allocate a combination of project mix in a manner made of shareholder's wealth with limited initial investment amount available for investing in several projects under consideration that will provide the maximum profit by investing the limited capital available in various projects.

These limited funds are to be utilised in the best possible or optimum manner by using Profitability Index technique.

3.2 NEED OF CAPITAL RATIONING

Capital rationing is used by many investors and companies in order to ensure that only the most feasible investments are made. It helps ensure that businesses will invest only in those projects that offer the highest returns.

Companies that employ a capital rationing strategy typically produce a relatively higher return on investment (ROI). This is simply because the company invests its resources where it identifies the highest profit potential.

The primary intention of the capital rationing is to make sure that a company is not going to invest heavily in assets. With insufficient rationing, a company may go on to witness the returns provided by their investments going on the lower side and may even reach a scenario where the company enters the stage of financial insolvency.

The typical goal of capital rationing is to direct a company's limited capital resources to the projects that are likely to be the most profitable.

It may appear that all investments with high projected returns should be taken.

In case the projects are interdependent or linked to each other in any way, then capital rationing will help in avoiding putting too much funds in one at the cost of the other, thus ensuring proper division of resource.

Capital Rationing and Risk Analysis

Capital rationing is about putting restrictions on investments and projects taken on by a business. To illustrate this better, let's consider the following example:

Suppose that based on its borrowing costs and other factors, 'Vivek Inc.' has set 10% as the minimum rate of return it desires from its capital investments. This is sometimes referred to as a hurdle rate.

As 'Vivek Inc.' weighs its various investment opportunities, it will look at both its likely return and the amount of capital it require, ranking them according to what's known as a profitability index.

For example, if one project is expected to return 17% and another 15%, then 'Vivek Inc.' may fund the 17% project first and fund the 15% one only to the extent that it has capital left over. If it still has capital available, it might then consider projects returning 14% or 13% until its capital has been fully allocated.

3.3 ADVANTAGES AND DIS ADVANTAGES OF CAPITAL RATIONING

A) Advantages of Capital Rationing :

When a company invests in a large number of projects simultaneously, the sharing of funds means less capital available for each individual project. This typically translates to more time and effort being required to monitor and manage each project. Also, allocating limited resources across several projects may actually threaten the success of the projects, if, for example, the projected budget for one or more projects turns out to have significantly underestimated costs. Wise capital rationing can help a company avoid such problems.

Investment opportunities are constantly changing. Portfolio managers usually keep a significant portion of available investment funds in the form of cash. Maintaining a ready supply of excess cash, first of all, provides greater financial stability and makes it easier for investors to adjust to sudden adverse circumstances that may arise.

Keeping some excess cash in reserve accomplishes something else as well. It ensures that if a particularly attractive unseen golden opportunity should suddenly arise, the investor has funds available to take immediate advantage of the situation. The ability to act quickly may be the difference between a good investment opportunity and a great one.

B) Disadvantages of Capital Rationing:

1. High capital requirements :

Because only the most profitable investments are taken on under a capital rationing scenario, rationing can also spell high capital requirements.

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2. Goes against the efficient capital markets theory :

Instead of investing in all projects that offer high profits, capital rationing only allows for selecting the projects with the highest estimated returns on investment. But the efficient markets theory holds that it is virtually impossible, over time, to continually select superior investments that significantly outperform others. Capital rationing may, in fact, expose an investor to greater risk by failing to hold a diversified investment portfolio.

3. **Based on assumption** :

The concept of capital rationing is based on the assumption that the project will yield a particular return. Any miscalculation of the same would result in the project generating lesser profits.

4. May lead to ambiguity :

Projects that are selected may be of smaller duration, which would lead to discarding certain long-term projects, which may be healthy for the company's stability.

3.4 TYPES OF CAPITAL RATIONING

Capital rationing decisions can be segregated based on two types. The first is known as hard rationing, and others are referred to as soft rationing.

1. Hard Capital Rationing :

Hard capital rationing occurs based on external factors. Such rationing denotes rationing that is being imposed on a company by circumstances beyond its control. For example, to finance new projects a company may be restricted from borrowing money or may be finding it difficult to raise additional capital, either through equity or debt. Or, its lenders may impose rules on how it can use its capital because it has downgraded in terms of its credit rating. Ultimately it may be difficult or effectively impossible for the company for financing or it may only be able to do so at excessive interest rates. These situations will limit the company's ability to invest in future projects and may even mean that it must reduce spending on current ones.

The rationing happens from an external dependence in order to cut down on expenses and may result in the shortage of capital to raise enough money for projects in future.

2. Soft Capital Rationing :

Soft capital rationing occurs based on internal factors based on the internal policies of the company. Such rationing refers to a situation where a company has freely chosen to impose some restrictions on its capital expenditures, even though it may have the ability to make much higher capital investments than it chooses to. The company may choose from any of a number of methods for imposing investment restrictions on itself. For example, it may temporarily require that a project offer a higher rate of return than is usually required in order for the company to consider pursuing it. Or the company may simply impose a limit on the number of new projects that it will take on during the next 12 months.

This happens because of the internal policies of an organisation. A company that is financially conservative will have a high required return on the capital invested in taking up projects in the coming days, thereby imposing self capital rationing.

3.5 FACTORS LEADING TO CAPITAL RATIONING

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

I. External Factors :



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

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

II. Internal Factors :

Capital rationing is also caused by internal factors which are as follows:

- 1) Reluctance to take resort to financing by external equities in order to avoid assumption of further risk.
- 2) Reluctance to broaden the equity share base with the fear of losing control.
- 3) Reluctance to accept some viable projects because of its inability to manage the firm in the scale of operation resulting from inclusion of all the viable projects.

3.6 SITUATIONS OF CAPITAL RATIONING

Situation I - Projects are divisible (size of investment can be reduced, if necessary in relation to availability of funds/ comparable) and constraint is a single period :

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

- i) Calculate the profitability index of each project
- ii) Rank the projects on the basis of the profitability index calculated in (a) above.
- iii) Choose the optimal combination of the projects.

Situation II - Projects are indivisible (uncomparable / special/ unique/ complimentary) and constraint is a single period :

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

- i) Construct a table showing the feasible combinations of the projects (whose aggregate of initial outlay does not exceed the fund available for investment.
- ii) Choose the combination whose aggregate NPV is maximum and consider it as the optimal project mix.

3.7 SOLVED PROBLEMS OF CAPITAL RATIONING

Problem 1)

AKS Ltd is engaged in the business of installation of car elevators (car parking lifts) for residential and commercial purposes which has proposals for Project A, B, and C.

AKS Ltd has a total budget of ₹ 10,00,000. Project Akash, Bhuvan, and Chaman are expected to yield total value (present value of cash flows) of ₹ 7,00,000, ₹ 8,00,000 and ₹ 6,00,000 respectively against the initial investment required for each being ₹ 5,00,000, ₹ 6,00,000 and ₹ 5,00,000 respectively. Apply the capital rationing and find the optimal combination.

Solution :

First, let's tabulate the information provided to us for ease of reference.

Particulars	Initial investment (₹ in lakh)	Expected revenue (₹ in lakh)
Project 'Akash'	5	7
Project 'Bhuvan'	6	8
Project 'Chaman'	5	6
Total cash available for investment	10	

Capital Rationing and Risk Analysis

AKS Ltd has \gtrless 10,00,00 for investment. To maximize the investors' wealth, it will have to accept projects to receive the highest amount of profits within the limited budget of \gtrless 10,00,00. Accordingly, it will have to find out the expected rate of return for all the projects and then rank them according to profitability index.

Particulars	Initial invest- ment (₹ in lakh) [1]	Expect- ed revenue (₹ in lakh) [2]	Expect- ed return (₹ in lakh) [3] = [2 – 1]	Expect- ed Rate of Return (%) [4] = [3/ 1]	Rank
Project 'Akash'	5	7	2	0.40	1
Project 'Bhuvan'	6	8	2	0.33	2
Project 'Chaman'	5	6	1	0.20	3
Total cash available for investment			10		

Statement to calculate Expect-ed Rate of Return and Rank

Based on the ranks, AKS Ltd must select Project 'Akash' and 'Bhuvan', as they have the highest profitability. However, the total initial investment required if it chooses Project 'Akash' and 'Bhuvan', would exceed the available funding, i.e., it will require $\gtrless 11,00,000 \ (\gtrless 5,00,000 + \gtrless 6,00,000)$ compared to the available investment amount $\gtrless 10,00,000$.

In such a situation, it will have to discard one project and move to the next ranking project which suits its investment needs. Thus, AKS Ltd will have the option to go ahead with Project 'Akash' and 'Chaman', which will require an investment within the available capital of ₹ 10,00,000 and will have to give up investing in Project 'Bhuvan'.

Problem 2)

The total available budget for a company is \gtrless 20 crores and the total cost of the projects is \gtrless 25 crores. The projects listed below have been ranked in order of profitability.

There is possibility of submission of project 'X' whose cost is assumed to be \gtrless 13 crores and it has the Profitability Index of 140.

Project	Cost (₹ crores)	Profitability index (P.V. of cashinflow/ PV of cash outflows)
А	6	1.50
В	5	1.25
С	7	1.20
D	2	1.15
Е	5	1.10
	25	

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

Solution :

Project	Cost (₹ crores)	P.I.	P.V. of cash inflow (₹ crores)	NPV (₹ crores)
[1]	[2]	[3]	$[4] = [2 \times 3]$	[5] = [4 - 2]
А	6	1.5	9.00	3.00
В	5	1.25	6.25	1.25
С	7	1.20	8.40	1.40
D	2	1.15	2.30	0.30
Е	5	1.10	5.50	0.50
Х	13	1.40	18.20	5.20

a) Statement to calculate NPV of projects

Note :

i) P. I. = P.V. of cash inflow/ PV of cash outflow

ii) PV of cash outflow = Cost

So,

iii) P.V. of cash inflow = PV of cash outflow X P. I.

iv) NPV = P.V. of cash inflow - PV of cash outflow

b) Determination of feasible combination in Capital Rationing Situation (Budget ₹ 20 lakhs)

Combi- nation	Project	NPV (₹ crores)	Project cost (₹ crores)
(i)	X	5.20	13
	А	3.00	6
	Total	8.20	19
(ii)	X B	5.20 1.25	13 5
	Total	6.45	18
(iii)	X C	5.20 1.40	13 7
	Total	6.60	20
(iv)	Х	5.20	13
	В	1.25	5
	D	0.30	2
	Total	6.75	20

<u>c) Selection of project based on NPV, subject to the availability of</u> <u>total funds ₹ 20 crores :</u>

Project	NPV (₹ crores)	Project cost (₹ crores)
Х	5.20	13
А	3.00	6
	8.20	19

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

Problem 3)

S. Ltd., has \gtrless 10,00,000 allocated for capital budgeting purpose. The following proposal and associated profitability indices have been determined :

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

Which of the above investment should be undertaken?

Assume that projects are indivisible and there is no alternative use of the money allocated for capital budgeting.

Solution :

<u>a) Statement showing Ranking of Projects on the basis of</u> <u>Profitability Index (P.I.)</u>

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

b) Statement showing NPV of Projects (₹)

Project	Cost (₹)	P.I.	P.V. of cash inflow (₹)	NPV (₹)
[1]	[2]	[3]	$[4] = [2 \times 3]$	[5] = [4 - 2]
1	3,00,000	1.22	3,66,000	66,000
2	1,50,000	0.95	1,42,500	(7,500)
3	3,50,000	1.20	4,20,000	70,000
4	4,50,000	1.18	5,31,000	81,000
5	2,00,000	1.20	2,40,000	40,000
6	4,00,000	1.05	4,20,000	20,000

Selection of Projects :

A) **Profitability Index method :**

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

Note :

As S. Ltd., has \gtrless 10,00,000 allocated for capital budgeting purpose and the total of cost of projects 1, 3 & 5 is \gtrless 8,50,000.

B) Net Present Value method :

As per this method projects 3, 4 and 5 can be undertaken which will give N.P.V. of \gtrless 1,91,000 and no money will remain unspent.

Suggestion :

From the above analysis, we can observe that, selection of projects under Profitability Index method will give NPV of \gtrless 1,76,000 whereas by NPV method \gtrless 1,91,000 which will ultimately maximize S Ltd.'s net cash inflow by \gtrless 15,000 (i.e., 1,91,000 – 1,76,000).

Hence, it is suggested to undertake investment in project 3, 4 and 5.

Problem 4)

Alpha Limited is considering five capital projects for the year 2019 and 2020. The company is financed by equity entirely and its cost of capital is 12%. The expected cash flow of the projects is as below:

Year ended Cash flows in thousand rupees are as follows:

Projects	2019	2020	2021	2022
А	(70)	35	35	20
В	(40)	(30)	45	55
С	(50)	(60)	70	80
D	-	(90)	55	65
Е	(60)	(20)	40	50

Note : Figures in brackets represent cash outflows.

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

Calculate which projects Alpha Limited should undertake if the capital available for investment is limited to \gtrless 1,10,000 in 2019 and with no limitation in subsequent years. For your analysis, use the following present value factors:

Years	2019	2020	2021	2022
Factors	1.00	0.89	0.80	0.71

Solution :

a) Statement showing calculation of NPV and Profitability Index (PI)

Project	Year / Discounted Cash flows with DiscountFactor @ 12%			Total Cash In-	Total Cash Out-	NPV	PI	
	2019 (1.00)	2020 (0.89)	2021 (0.80)	2022 (0.71)	flows	flows		
	[1]	[2]	[3]	[4]	[5]	[6]	[7] = [5 - 6]	[8] = [5/ 6]
А	(70)	31.15	28	14.20	73.35	70.00	3.35	1.048
В	(40)	(26.70)	36	39.05	75.05	66.70	8.35	1.125
С	(50)	(53.40)	56	56.80	112.80	103.40	9.40	1.091
D		(80.10)	44	46.15	90.15	80.10	10.05	1.125
E	(60)	(17.80)	32	35.50	67.50	77.80	25.30	1.422

b) Ranking of Projects Based on Profitability Index

Rank	Ι	II	III	IV	V
Project	Е	D	В	С	Α

Analysis and Selection:

Conditions:

- i) Capital available for investment is limited to ₹ 1,10,000 in 2019, with no limitation in subsequent years.
- ii) All projects are divisible i.e., size of investment can be reduced if necessary in relation to availability of funds.
- iii) None of the projects can be delayed or undertaken more than once.

Project D's cash outflow will start in the year 2004, and hence this will not form as a constraint in selection of projects. Since there is no scarcity of funds from the year 2004 onwards, this can be taken up in 2020.

Project	Rank	Initial investment (₹)
E	Ι	60,000
В	II	40,000
С	IV	10,000*

<u>c) Evaluation of projects based on</u> <u>requirement of Initial investment in 1st year (excluding project 'D')</u>

Note :

Rank 'II' for project 'B' because actually it stands at 2nd rank itself having same NPV as of project 'D'

Since like all projects, even project 'C' is divisible, the balance funds of \gtrless 10,000 (i.e., 1,10,000–60,000–40,000) can be allocated to project 'C'. One of the conditions in the problem is that, none of the projects can be undertaken more than once. Hence project 'C' will continue with initial investment of \gtrless 10,000. Project 'D' can be undertaken in the year 2020 since there is no scarcity of funds from the year 2020.

<u>d) Ranking of Projects excluding 'D' which is to start in 2020</u> when no limitation on capital availability :

Project	E	В	С	Α
Rank	Ι	Π	III	IV

Problem 5)

Five Projects M, N, O, P and Q are available to a company for consideration. The investment required for each project

and the cash flows it yields are tabulated below. Projects N and Q are mutually exclusive. Taking the cost of capital @ 10%, which combination of projects should be taken up for a total capital outlay not exceeding \gtrless 3 lakhs on the basis on NPV and Benefit-Cost Ratio (BCR)?

Project	Investment (₹)	Cash flow p.a. (₹)	No of years	P.V. @ 10%
М	50,000	18,000	10	6.145
Ν	1,00,000	50,000	4	3.170
0	1, 20,000	30,000	8	5.335
Р	1, 50,000	40,000	16	7.824
Q	2,00,000	30,000	25	9.077

Solution :

Total Capital outlay < ₹ 3.00 lakhs

a) Statement showing calculation of NPV and

Proj- ect	Invest- ment (₹) [1]	Cash Flow p.a. [2]	No. of yrs. [3]	P.V. @ 10% [4]	P.V. of Cash Inflow [5] =	NPV [6] =	BCR [7] =
					[2 X 3 X 4]	[5 – 1]	[5/1]
М	50,000	18,000	10	6.145	1,10,610	60,610	2.212
N	1,00,000	50,000	4	3.170	1,58,500	58,500	1.585
0	1,20,000	30,000	8	5.335	1,60,050	40,050	1.334
Р	1,50,000	40,000	16	7.824	3,12,960	1,62,960	2.086
Q	2,00,000	30,000	25	9.077	2,72,310	72,310	1.362

Benefit – cost Ratio for 5 Projects

Note :

i) NPV = P.V. of Cash Inflow - PV of cash outflow i.e. Investment

ii) Benefit-Cost Ratio (BCR) = Present Value Cash Inflow / Investment

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

b) Statement showing Feasible Combinations of Projects and NPV and BCR

3.8 INTRODUCTION OF RISK ANALYSIS IN CAPITAL BUDGETING

While discussing the capital budgeting techniques in earlier chapter, we have assumed that the investment proposals do not involve any risk and cash flows of the project are known with certainty. This assumption was taken to simplify the understanding of the capital budgeting techniques. However, in practice, this assumption doesn't stand true.

In reality, investment projects are exposed to various degrees of risk.

Financial Management-II **3.8.1 : Meaning of Risk :**

Risk Refers to a situation in which there are several possible outcomes, each outcome occurring with a probability that is known to the decision-maker.

Risk is the variability in terms of actual returns comparing with the estimated returns. There is a thin difference between risk and uncertainty. In case of risk, probability distribution of cash flow is known. When no information is known to formulate probability distribution of cash flows, the situation is referred as 'Uncertainty'. However, these two terms are used interchangeably.

3.8.2 : Types of Decision Making Related to Risk & Uncertainty:



There can be three types of decision making:

- i. Decision making under certainty When cash flows are certain.
- ii. **Decision making involving risk** When cash flows involve risk and probability can be assigned.
- iii. **Decision making under uncertainty** When the cash flows are uncertain and probability cannot be assigned.

3.8.3 : Benefits of Risk Analysis in Capital Budgeting:

Risk Analysis in Capital Budgeting helps a firm to take better investment decisions. It considers incorporating the element of risk in Capital Budgeting decisions.

Risk analysis gives management better information about the possible outcomes that may occur so that management can use their judgment and experience to accept an investment or reject it. Since risk analysis is costly, it should be used relatively in costly and important projects.

3.8.4 : Reasons for Adjustment of Risk in Capital Budgeting Decisions:

Main reasons for considering risk in capital budgeting decisions are as follows :

1. There is an opportunity cost involved while investing in a project for the level of risk. Adjustment of risk is necessary to help make the decision as to whether the returns out of the project are proportionate with the risks borne and whether it is worth investing in the project over the other investment options available.

2. Risk adjustment is required to know the real value of the Cash Inflows. Higher risk will lead to higher risk premium and also expectation of higher return.

3.9 SOURCES OF RISK

Risk arises from different sources, depending on the type of investment being considered, as well as the circumstances and the industry in which the organization is operating. Some of the sources of risk are as follows :

- 1. **Project-specific risk** The risks which are related to a particular project and affect the project's cash flows are called as 'Project-Specific risks'. It includes completion of the project in scheduled time, error of estimation in resources and allocation, estimation of cash flows, etc. For example, a nuclear power project of a power generation company has different risks than hydro projects.
- Company-specific risk The risks which arise due to company specific factors affecting Cash-flows of a business and its access to funds for capital investments are called as 'Company-Specific risks'. It includes downgrading of credit rating, changes in key managerial persons, cases for violation of intellectual property rights (IPR) and other laws and regulations, dispute with workers, etc. For example, two banks have different exposures to default risk.
- 3. **Industry-specific risk** The risks which affect the whole industry in which the company operates are called as 'Industry-Specific risks'. It includes regulatory restrictions on industry, changes in technologies, etc. For example, regulatory restriction imposed on leather and breweries industries.
- 4. **Market risk** The risks which arise due to market related conditions are called as 'Market risks'. It includes entry of substitute, changes in demand conditions, availability and access to resources, etc. For example, a thermal power project gets affected if the coal mines are unable to supply coal requirements of a thermal power company, etc.
- 5. **Competition risk-** The risks related with competition in the market in which a company operates are called as 'Competition risks'. It includes the risk of entry of rival, product dynamism, exit of some company and change in taste and preference of consumers, etc.
- 6. **Risk due to Economic conditions** The risks which are related with prevailing macro-economic conditions or micro factors are called as 'Risks due to Economic conditions'. It includes changes in monetary policies by central banks, changes in fiscal policies like introduction of new taxes and cess, inflation, changes in GDP, changes in savings and net disposable income, etc.

7. **International risk** – The risks which are related with conditions which are caused by global economic conditions are called as 'International Risks'. It includes restriction on free trade, restrictions on market access, recessions, bilateral agreements, political and geographical conditions, etc. For example, restriction on outsourcing of jobs to overseas markets.



Here we are going to learn following techniques of Risk Analysis :

- 1. Simulation Analysis
- 2. Decision Tree
- 3. Sensitivity Analysis
- 4. Scenario Analysis
- 5. Break-Even Analysis

3.10.1 : Simulation Analysis :

Simulation is a mathematical model that represents the actual decision making under conditions of uncertainty for evaluating alternative courses of action. Such a model involves conducting a series of organized experiments to predict the probable outcome of the process in a given period of time. Simulation provides a trial and error movement towards an optimal solution.
Steps:

Step 1: Define the problem and lay down the model

- Step 2: Identify the parameters and the exogenous variables.
- Step 3: Specify Rupee value and probability.
- Step 4: Generate random number class intervals.
- Step 5: Assign random numbers

Step 6: Solve the Model

3.10.2 : Decision Tree Model :

A) Meaning of Decision Tree Model :

In the capital budgeting process, the decision-maker has to identify and evaluate the various alternative courses of action leading to the investment decision. A decision tree captures these alternatives in the form of a diagram and is useful for clarifying the range of alternative courses of action, assessing possible outcomes, i.e. multiplicity of choices and outcomes.

In a nutshell, 'Decision Tree' is a graphic device that shows a sequence of strategic decisions and expected consequences under each possible situation.

Decision tree analysis is another technique which is helpful in tackling risky capital investment proposals. Decision tree is a graphic display of relationship between a present decision and possible future events, future decisions and their consequence. The sequence of event is mapped out over time in a format resembling branches of a tree. In other words, it is pictorial representation in tree from which indicates the magnitude probability and inter-relationship of all possible outcomes.

Decision tree technique is a method to evaluate risky proposals. A decision tree shows the sequential outcome of a risky decision. The decision tree approach gets its name because of resemblance with a tree having number of branches. A capital budgeting decision tree shows the cash flows and Net Present Value of the project under differing possible circumstances.

B) Steps to design Decision Tree :

There are two stages in preparing a decision tree.

Step 1: Drawing the decision tree itself, in such a manner that reflects all the choices and outcomes.

Step 2: Incorporate probabilities, relevant values and derive expected monetary values.

C) Rules for drawing a decision tree diagram :

Some basic rules in drawing the decision tree are:

Rule 1: A decision tree begins with a decision point. A decision point (also known as decision node) is represented by a rectangle. An outcomes point (also known as chance node) is denoted by a circle.

Rule 2: Decision alternatives (e.g., sales volume in the preceding example) are shown by a straight line originating from the decision node.

Rule 3: A decision tree diagram is drawn from left to right. The rectangles and the circles are sequentially numbered.

Rule 4: Values and probabilities for each branch are then incorporated.

D) Illustration: A company has made following estimates of the CFAT of the proposed project. The company use decision tree analysis to get clear picture of project's cash inflow. The project cost \gtrless 80,000 and the expected life of the project is 2 years.

The net cash inflows are:

In Year 1, there is 0.4 probability that CFAT will be ₹ 50,000 and 0.6 probability that CFAT will be ₹ 60,000.

<i>If CFAT</i> = ₹ <i>50,000</i>		<i>If CFAT</i> = ₹ 60,000		
₹	Probability	₹	Probability	
24,000	0.2	40,000	0.4	
32,000	0.3	50,000	0.5	
44,000	0.5	60,000	0.1	

The probabilities assigned to CFAT for the Year 2 are as follows:

The firm uses 10% discount rate for this type of investments.

Solution: Decision Tree:



Net present value of cash flows:

Capital Rationing and Risk Analysis

Combi-	CFAT ₁	PV	PV ₁ (₹)	CFAT ₂	PV	PV ₂ (₹)
nation	(₹)	Factor		(₹)	Factor	
Α	50,000	0.909	45,450	24,000	0.826	19,824
В	50,000	0.909	45,450	32,000	0.826	26,432
С	50,000	0.909	45,450	44,000	0.826	36,344
D	60,000	0.909	54,540	40,000	0.826	33,040
E	60,000	0.909	54,540	50,000	0.826	41,300
F	60,000	0.909	54,540	60,000	0.826	49,560

Combi- nation	Total PV (₹) (PV1 + PV2)	Initial investment (₹)	NPV (₹)	Joint Probabi- lities	Expected NPV (₹)
ABCDEF	65,274	80,000	- 14,276	0.08	- 1,178
	71,882	80,000	- 8,118	0.12	- 974
	81,794	80,000	1,794	0.20	358
	87,850	80,000	7,580	0.24	1,819
	95,840	80,000	15,840	0.30	4,752
	1,04,100	80,000	24,100	0.06	1,446
					6,223

3.10.3 : Sensitivity Analysis :

A) Meaning of Sensitivity Analysis :

Sensitivity analysis is one of the methods of analysing the risk involving the capital expenditure decision and enables an assessment to be made of how responsive the project's NPV is to the changes in those variables based on which NPV is computed.

In a project, several variables like Weighted Average Cost Of Capital, Consumer Demand, Price of the Product, Cost Price Per Unit, Selling Price, Sales Volume, Cash Inflows, Cash Outflows, Number of Years, Discounting Rate, Initial Cost, Operating Costs or Estimated Benefits, etc. operate simultaneously. The changes in these variables impact the outcome of the project. It therefore becomes very difficult to assess the change in which variable impacts the project outcome in a significant way.

We know that NPV is computed based on the set of above mentioned critical variables. During a project's life, any one or more of these input parameters may undergo a change resulting in change in NPV accordingly.

Such changes are natural because each of these elements is only an estimate. An adverse change can result in originally computed NPV turning zero. If this happens, the decision-maker would be held for the consequences. Hence the decision-maker gets extremely aware to ensure that estimates contain a reasonable safeguard or defence technique to absorb unforeseen changes in the critical variables of the project.

In Sensitivity Analysis, the project outcome is studied after taking into change in only one variable. The more sensitive is the NPV, the more critical is that variable. So, Sensitivity analysis is a way of finding impact on the project's NPV (or IRR) for a given change in one of the variables.

Sensitivity analysis in a nutshell, is a modelling technique which is used in Capital Budgeting decisions which is used to study the impact of changes in the variables on the outcome of the project.

B) Definition of Sensitivity Analysis :

As per CIMA terminology," A modelling and risk assessment procedure in which changes are made to significant variables in order to determine the effect of these changes on the planned outcome. Particular attention is thereafter paid to variables identified as being of special significance."

C) Advantages of Sensitivity Analysis :

Sensitivity Analysis helps the management in identifying that factor, to which the NPV is most sensitive, as the name given to this Analysis technique.

Following are the main advantages of Sensitivity Analysis :

- 1. **Critical Issues** This analysis identifies critical factors that impact on a project's success or failure.
- 2. Simplicity It is a simple technique.

D) Disadvantage of Sensitivity Analysis :

Following are the main disadvantages of Sensitivity Analysis :

- 1. Assumption of Independence This analysis assumes that all the variables are independent i.e. they are not related to each other, which is unlikely in real life.
- 2. **Ignore probability** This analysis does not consider the probability of changes in the variables.

E) Method of computation :

Sensitivity is computed as the ratio of downside change in input parameter to the value of initial parameter.

In this method, one variable is changed at a time and the impact of that change on the NPV is calculated.

F) Procedure :

1. Each input variable is considered separately and all other assumptions are held constant.

- 2. The extent of change in an input parameter that would result in turning NPV (or IRR) of the project into zero is computed.
- 3. The extent of change so determined is expressed as a percentage (%) by establishing mathematical relationship between the variables.
- 4. Analyse the effect of the change in each of the critical variables on the NPV (or IRR) of the project to test their sensitivity by repeating the process.

G) Steps :

Step 1 - Calculate Expected NPV.

Step 2 - Shock each risk factor in the adverse direction in a certain percentage and find percentage fall in NPV.

Step 3 - Conclusion : Maximum percentage fall in NPV : Critical factor

H) Certain Factors – Shock in the direction :

- Annual $CF : \downarrow$
- Kc : ↑
- Initial Investment : ↑
- Number of unit sold/produced : ↓
- Selling price : ↓
- VC p.u. : ↑
- FC p.a. : ↑
- Discounting Rate : ↑
- Life(n) : No shock

I) Decision Rule:

The lower the change percentage, the higher is the sensitivity of the project to the input parameter. This is because a small change in input parameter leads to a reversal of investment decision.

J) Illustration (1) :

'Dev graphic solutions' Ltd is considering its New Product with the following details:

S/N	Particulars	Numerals
1	Initial capital amount	₹ 400 Cr
2	Annual unit sales	5 Cr
3	Selling price per unit	₹ 100
4	Variable cost per unit	₹ 50
5	Fixed costs per year	₹ 50 Cr
6	Discount Rate	6%

Financial Management-II

You are required to:

- 1. Calculate the NPV of the project.
- 2. Compute the impact on the project's NPV of a 2.5 % adverse variance in each variable. Which variable is having maximum effect? Consider Life of the project as 3 years.

Solution :

S/N	Particulars	Amount (₹)
А	Selling Price Per Unit (A)	100
В	Variable Cost Per Unit (B)	50
С	Contribution Per Unit ($C = A-B$)	50
D	Number of Units Sold Per Year	5 Cr.
Е	Total Contribution ($E = C \times D$)	₹ 250 Cr.
F	Fixed Cost Per Year	₹ 50 Cr.
G	Net Cash Inflow Per Year ($G = E - F$)	₹ 200 Cr.

a) Calculation of Net Cash Inflow per year

b) Calculation of Net Present Value (NPV) of the Project

Year	Annual Cash Flow (₹ in Cr.)	Discounting Factor @ 6%	Present Value (PV) (₹ in Cr.)
0	(400.00)	1.000	(400.00)
1	200.00	0.943	188.60
2	200.00	0.890	178.00
3	200.00	0.840	168.00
Net Prese	nt Value [(0) – (1 +	134.60	
[400 - (18	8.60 + 178 + 168)] =	=	

Here NPV represent the most likely outcomes and not the actual outcomes. The actual outcome can be lower or higher than the expected outcome.

c) Sensitivity Analysis considering 2.5 % Adverse Variance in each variable

S/N	Changes in varia- ble	Base	Initial Cash Flow increa- sed to ₹ 410 crore	Selling Price per Unit Redu- ced to ₹ 97.5	Varia- ble Cost Per Unit increa- sed to ₹ 51.25	Fixed Cost Per Unit increa- sed to ₹ 51.25	Units sold per year Reduc- ed to ₹ 4.875 crore
	Particu- lars	Amo- unt (₹)	Amo- unt (₹)	Amo- unt (₹)	Amo- unt (₹)	Amo- unt (₹)	Amo- unt (₹)
A	Selling Price Per Unit	100	100	97.5	100	100	100

able Cost Unit tribution Unit (C =)	Amo- unt (₹) 50	Amo- unt (₹) 50	Amo- unt (₹) 50	Amo- unt (₹) 51.25	Amo- unt (₹)	Amo- unt (₹)
able Cost Unit tribution Unit (C =)	50	50	50	51.25	50	
able Cost Unit tribution Unit (C =)	50	50	50	51.25	50	
tribution Unit (C =)	50				50	50
		50	47.5	48.75	50	50
iber of s Sold Year Crores)	5	5	5	5	5	4.875
l Contri- on ($E = C$)	250	250	237.5	243.75	250	243.75
d Cost Year Crores)	50	50	50	50	51.25	50
Cash ow Per r = E - F)	200	200	187.5	193.75	198.75	193.75
2.673)	534.60	534.60	501.19	517.89	531.26	517.89
al Cash v	400	410	400	400	400	400
7	134.60	124.60	101.19	117.89	131.26	117.89
enta-ge nge in		-7.43%	-24.82%	-12.41%	-2.48%	-12.41%
	Year Crores) I Contri- on (E = C) d Cost Year Crores) Cash ow Per = E - F) 2.673) al Cash y r enta-ge nge in y r et able shoet by yary	YearCrores)I Contri-250I Contri-250on (E = C)d CostyearCrores)Cash200w PerCash2.673)534.60al Cash400y134.60enta-genge inye table shows that	Year Crores)2501 Contri- on (E = C)250250250on (E = C)200d Cost50Year Crores)200Cash200200200ow Per crores2002.673)534.60534.60534.60al Cash400400410 $\frac{7}{134.60}$ 124.60enta-ge nge in $\frac{7}{134.60}$ e table shows that the impa	Year Crores) Image: Crores (Crores) Contri- 250 250 237.5 I Contri- 250 250 237.5 237.5 200 207.5 200 207.5 <td>Year 250 250 237.5 243.75 I Contri- on (E = C 250 237.5 243.75 on (E = C 200 200 187.5 243.75 of Cost 50 50 50 50 Year 200 200 187.5 193.75 Orres) 200 200 187.5 193.75 Ow Per 2673) 534.60 501.19 517.89 al Cash 400 410 400 400 V 134.60 124.60 101.19 117.89 enta-ge -7.43% -24.82% -12.41% retable shows that the impact in percentage term 24.82% -12.41%</td> <td>Year Crores) 250 250 237.5 243.75 250 1 Contri- on (E = C 250 237.5 243.75 250 on (E = C 200 200 50 50 50 51.25 d Cost 50 50 50 50 51.25 Year 200 200 187.5 193.75 198.75 Orres) 200 200 187.5 193.75 198.75 Ow Per 2.673) 534.60 501.19 517.89 531.26 al Cash 400 410 400 400 400 V 134.60 124.60 101.19 117.89 131.26 enta-ge -7.43% -24.82% -12.41% -2.48% nge in -7.43% -24.82% -12.41% -2.48%</td>	Year 250 250 237.5 243.75 I Contri- on (E = C 250 237.5 243.75 on (E = C 200 200 187.5 243.75 of Cost 50 50 50 50 Year 200 200 187.5 193.75 Orres) 200 200 187.5 193.75 Ow Per 2673) 534.60 501.19 517.89 al Cash 400 410 400 400 V 134.60 124.60 101.19 117.89 enta-ge -7.43% -24.82% -12.41% retable shows that the impact in percentage term 24.82% -12.41%	Year Crores) 250 250 237.5 243.75 250 1 Contri- on (E = C 250 237.5 243.75 250 on (E = C 200 200 50 50 50 51.25 d Cost 50 50 50 50 51.25 Year 200 200 187.5 193.75 198.75 Orres) 200 200 187.5 193.75 198.75 Ow Per 2.673) 534.60 501.19 517.89 531.26 al Cash 400 410 400 400 400 V 134.60 124.60 101.19 117.89 131.26 enta-ge -7.43% -24.82% -12.41% -2.48% nge in -7.43% -24.82% -12.41% -2.48%

Selling

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per Unit Per Unit Per Unit

increa-

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year

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Illustration (2) :

S/N Changes

ble

in varia-

Base

Initial

Cash

Flow

increa-

From the following details relating to a project, analyse the sensitivity of the project to changes in initial project cost, annual cash inflow and cost of capital:

Capital Rationing and Risk Analysis

Initial Project Cost (₹)	1,20,000
Annual Cash Inflow (₹)	45,000
Project Life (Years)	4
Cost of Capital	10%

Identify which of the three factors, the project is most sensitive if the variable is adversely affected by 10%? (Use annuity factors: for 10% 3.169 and 11% 3.103).

Solution :

a) Calculation of NPV through Sensitivity Analysis

Particulars	₹
PV of cash inflows (₹ 45,000 × 3.169)	1,42,605
Initial Project Cost	1,20,000
NPV	22,605

Situation	NPV	Changes in NPV
Base (present)	₹ 22,605	
If initial project cost is varied adversely by 10%	(₹1,42,605) - (₹1,32,000) = ₹10,605	(₹ 22,605 - ₹ 10,605) / ₹ 22,605 = (53.08%)
If annual cash inflow is varied adversely by 10%	[₹40,500 (revised cash flow) × 3.169) - (₹ 1,20,000)] = ₹ 8,345	(₹ 22,605 - ₹ 8,345) / ₹ 22,605 = 63.08%
If the Cost of Capital is varied adversely by 10% i.e. it becomes 11%	(₹ 45,000 × 3.103) – ₹ 1,20,000 = ₹19,635	(₹22,605 - ₹19,635) / ₹ 22,605 = 13.14%

Conclusion: Project is most sensitive to 'annual cash inflow'.

3.10.4 : SCENARIO ANALYSIS :

A) Meaning of Scenario Analysis :

Despite being the most widely used risk analysis technique, Sensitivity analysis has some limitations. Therefore, we need to extend sensitivity analysis to deal with the probability distributions of the inputs. In addition, it would be useful to vary more than one variable at a time so that we could see the combined effects of changes in the variables.

Scenario analysis provides answer to these additional situations. This analysis brings in the probabilities of changes in key variables and also allows us to change more than one variable at a time.

This provides information about cash flows under three assumptions: i) pessimistic, ii) most likely and iii) optimistic outcomes associated with the

Capital Rationing and Risk Analysis

project. It is superior to other techniques as the manager can forecast as it gives a more precise idea about the variability of the return. This explains how sensitive the cash flows are under the above mentioned different situations. The larger is the difference between the pessimistic and optimistic cash flows, the more risky is the project.



This analysis begins with base case or most likely set of values for the input variables. Then, go for worst case scenario (low unit sales, low sale price, high variable cost and so on) and best case scenario.

Alternatively scenarios analysis is possible where some factors are changed positively and some factors are changed negatively.

Conclusively, scenario analysis examines the risk in investment, so as to analyse the impact of alternative combinations of variables, on the project's NPV (or IRR).

Find NPV in each Scenario.

Management can suggest different combinations of CF, life, Kc and initial investment from different Scenario.

B) Illustration :

'Lucky Ltd.' is considering a project 'X' with an initial outlay of \gtrless 14,00,000 and the possible three cash inflow attached with the project as follows:

Particulars	Year 1	Year 2	Year 3
	(₹ in thousand)	(₹ in thousand)	(₹ in thousand)
Worst case	450	400	700
Most likely	550	450	800
Best case	650	500	900

Assuming the cost of capital as 9%, determine NPV in each scenario. If 'Lucky Ltd.' is certain about the most likely result but uncertain about the third year's cash flow, ANALYSE what will be the NPV expecting worst scenario in the third year.

Solution :

The possible outcomes will be as follows:

Ye- ar	PVF @ 9%	Wors	t Case	Most	likely	Best	case
		Cash Flow (₹ in thousa- nds)	PV (₹ in thousa- nds)	Cash Flow (₹ in thousa- nds)	PV (₹ in thousa- nds)	Cash Flow (₹ in thousa- nds)	PV (₹ in thousa- nds)
0	1	(1400)	(1400)	(1400)	(1400)	(1400)	(1400)
1	0.917	450	412.65	550	504.35	650	596.05
2	0.842	400	336.80	450	378.90	500	421.00
3	0.772	700	540.40	800	617.60	900	694.80
NPV			-110.15	6	100.85		311.85

Now suppose that CEO of 'Lucky Ltd.' is little confident about the estimates in the first two years, but not sure about the third year's high cash inflow. He is interested in knowing what will happen to traditional NPV if 3rd year turn out the bad contrary to his optimism.

The NPV in such case will be as follows:

 $= - \{ \overline{14,00,000} + [(5,50,000) / (1+0.09)] + [(4,50,000) / (1+0.09)^2] + [(7,00,000) / (1+0.09)^3] \}$ = - (\vec{14,00,000} + \vec{15,04,587} + \vec{15,78,756} + \vec{15,40,528}) = \vec{12,871}

C) Scenario Analysis Vs. Sensitivity Analysis :

Sensitivity analysis and Scenario analysis both help to understand the impact of the change in input variable on the outcome of the project. However, there are certain basic differences between the two.

Sensitivity analysis calculates the impact of the change of a single input variable on the outcome of the project viz., NPV or IRR. The sensitivity analysis thus enables to identify that single critical variable that can impact the outcome in a huge way and the range of outcomes of the project given the change in the input variable.

Scenario analysis, on the other hand, is based on a scenario. The scenario may be recession or a boom wherein depending on the scenario, all input variables change. Scenario Analysis calculates the outcome of the project considering this scenario where the variables have changed simultaneously. Similarly, the outcome of the project would also be considered for the normal and recessionary situation.

The variability in the outcome under the three different scenarios would help the management to assess the risk a project carries. Higher deviation in the outcome can be assessed as higher risk and lower to medium deviation can be assessed accordingly.

Scenario analysis is far more complex than sensitivity analysis because in scenario analysis all inputs are changed simultaneously considering the situation in hand while in sensitivity analysis only one input is changed and others are kept constant.

3.10.5 : Break-Even Analysis :

A) Meaning of Break-Even Analysis :

A Break-Even analysis is a financial tool which helps a company to determine the stage at which the company or a new service or a product will be profitable. In other words, it is a financial calculation for determining the number of products or services a company should sell or provide to cover its costs (particularly fixed costs).

Break-Even analysis is used by businesses to identify the point at which they will start making a profit. This is achieved by calculating the number of units that need to be sold or the level of sales that must be reached to cover all fixed and variable costs. By understanding this point, businesses can assess the level of risk associated with their operations and the potential return on investment.

B) Break-Even Point (BEP) :

Break-Even Point (BEP) is a pivotal concept in the financial analysis of a business. However, like any other aspect of business, there are risks when applying the BEP concept.

Break-Even Point is the point at which the revenue from the sale of a product or service equals the total production cost. At this point, the net profit from the business operation is zero. Break-Even is a situation where an organisation is neither making money nor losing money, but all the costs have been covered.

The Break-Even Point, also called the critical point, is the volume of production at which total costs are equal to the proceeds from the sale of goods, where the result is zero. Economic activity becomes profitable after its result exceeds this point.

Understanding BEP is crucial as it provides insight into the sales volume needed for a business to reach the Break-Even point and generate profit.

C) Components of Break Even Point :

There are three main components in the calculation of BEP:

- Financial Management-II 1. **Fixed Costs** These are costs that do not change depending on the production or sales volume. Fixed costs are also called overhead costs. These overhead costs occur after the decision to start an economic activity is taken and these costs are directly related to the level of production, but not the quantity of production. Fixed costs include (but are not limited to) interest, taxes, salaries, rent, depreciation costs, labour costs, energy costs etc. These costs are fixed irrespective of the production. In case of no production also the costs must be incurred.
 - 2. Variable Costs These are costs that change with changes in production or sales volume. Variable costs are costs that will increase or decrease in direct relation to the production volume. These costs include cost of raw material, packaging cost, direct labour costs, fuel and other costs that are directly related to the production.
 - 3. **Selling Price** The price at which the product or service is sold to customers.

D) Example to understand the concept of Break Even Point :

Break-Even analysis is useful in studying the relation between the variable cost, fixed cost and revenue. Generally, a company with low fixed costs will have a low Break-Even point of sale.

To illustrate this better, let's consider the following example:

'Active Ltd.' has fixed costs of ₹ 10,000 whereas 'Lazy Ltd.' has fixed costs of ₹ 1,00,000 selling similar products, 'Active Ltd.' will be able to Break-Even with the sale of lesser products as compared to 'Lazy Ltd.'.

E) Factors Influencing Break Even Point Risk :

- 1. **Variability in Production Costs** Variability in Production Costs can be a significant source of risk for BEP. Changes in the prices of raw materials or fluctuations in direct labour costs can have a significant impact on BEP.
- 2. Fluctuations in Selling Price Changes in the selling price of products or services can also affect BEP. A decrease in selling price can increase BEP, while a price increase can decrease it.
- 3. **Sales Volume** Fluctuations in sales volume are also a crucial risk factor. A sudden drop in market demand can make it challenging for a business to reach its BEP.

F) Methods of Break Even Point Risk Analysis :

The first step in BEP risk analysis is identifying the factors influencing BEP. This may include variability in production costs, fluctuations in selling prices, and unstable sales volumes. Once the risk factors are identified, the next step is to measure the potential impact of each of these factors on BEP. This can be done through sensitivity analysis and simulations.

After measuring the risks, the next step is to evaluate whether the risks are acceptable or if mitigation measures need to be taken. For example, controlling production costs or diversifying products to reduce risk.

G) Calculation of Break-Even Analysis :

Break-Even analysis also deals with the contribution margin of a product. The excess between the Selling Price (SP) and total Variable Costs (VC) is known as Contribution Margin.

For an example, if the price of a product is $\gtrless 100$, total variable costs are $\gtrless 60$ per product and fixed cost is $\gtrless 25$ per product, the Contribution Margin of the product is $\gtrless 40$ ($\gtrless 100 - \gtrless 60$). This $\gtrless 40$ represents the revenue collected to cover the fixed costs. In the calculation of the Contribution Margin, fixed costs are not considered.

The basic formula for Break-Even analysis is derived by dividing the total fixed costs of production by the contribution per unit (price per unit less the variable costs).

Contribution Per Unit = Selling Price Per Unit (SP) – Variable Cost Per Unit (VC)

Break-Even Point in Quantity = Fixed Cost / Contribution Per Unit

OR

Break-Even Point in Quantity = Fixed Cost / (Selling Price Per Unit – Variable Cost Per Unit)

Break-Even Point in Rupees = Break-Even Point in Quantity X Selling Price Per Unit

For example:

Variable costs per unit: ₹ 400; Sale price per unit: ₹ 600; Desired profits: ₹ 4,00,000; Total fixed costs: ₹ 10,00,000.

First we need to calculate the Break-Even point per unit, so we will divide the \gtrless 10,00,000 of fixed costs by the \gtrless 200 which is the contribution per unit (\gtrless 600 – \gtrless 200).

Break-Even Point (in quantity) = ₹ 10,00,000/ ₹ 200 = 5000 units.

Next, this number of units can be shown in rupees by multiplying the 5,000 units with the selling price of \gtrless 600 per unit. We get Break-Even Sales at 5000 units x \gtrless 600 = \gtrless 30,00,000. (Break-Even point in rupees).

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H) Situations at necessity to analyse the Break-Even point :

- 1. **During Current activity** Analysing the Break-Even point is necessary when changing the level of activity / production.
- 2. While studying the consequences of increased sales or turnover -Considering the Break-Even point is essential while studying the consequences of increased sales or turnover.
- 3. At the times of studying methods and plans for modernization or refurbishment of production Evaluating the Break-Even point is indispensable at the times of studying methods and plans for modernization or refurbishment of production.
- 4. **Starting a new business -** To start a new business, a Break-Even analysis is a must. Not only it helps in deciding whether the idea of starting a new business is viable, but it will force the start-up to be realistic about the costs, as well as provide a basis for the pricing strategy.
- 5. **Creating a new product -** In the case of an existing business, the company should still perform a Break-Even analysis before launching a new product; particularly if such a product is going to add a significant expenditure.
- 6. **Changing the business model -** If the company is about to the change the business model, like, switching from wholesale business to retail business, then a Break-Even analysis must be performed. The costs could change considerably and Break-Even analysis will help in setting the selling price.

I) Advantages of Break-Even Analysis :

- 1. Break-Even Analysis allows to determine the moment when production becomes profitable.
- 2. It indicates the volume of production required to obtain a certain profit.
- 3. This analysis highlights the correlations between the dynamics of production, revenues and the dynamics of income on variable and fixed costs.
- 4. It allows to determine the degree of production capacity in correlation with a desired profit.
- 5. It helps to determine the impact on profit on changing to automation from manual (a fixed cost replaces a variable cost).
- 6. It helps to determine the change in profits if the price of a product is altered.

It helps to determine remaining/unused capacity of the company once the breakeven is reached. This will help to show the maximum profit on a particular product/service that can be generated.

- 8. It helps to determine the amount of losses that could be sustained if there is a sales downturn.
- 9. Once the Break-Even analysis is complete, you will get to know how much you need to sell to be profitable. This will help you and your sales team to set more concrete sales goals, i.e. to set revenue targets.
- 10. Finding the Break-Even point will help in pricing the products better. This tool is highly used for providing the best price of a product that can fetch maximum profit without increasing the existing price.
- 11. Doing a Break-Even analysis helps in covering all fixed cost.

J) Strategies for Managing Break-Even Point Risk :

7.

- 1. **Product Diversification** It can help reduce the risk of fluctuations in selling prices or market demand. By offering a range of products or services, a business can minimize the impact of changes in a particular product.
- 2. **Controlling Production Costs** It is a key step in managing BEP risk. Ensuring operational efficiency and finding ways to reduce production costs can help a business stay competitive.
- 3. Enhancing Operational Efficiency It can help a business reach its BEP more quickly. This can be achieved through process automation, employee training, or new technologies.

K) Efficacy of Break-Even Point Analysis :

Break-Even analysis aids in assessing risk and return by determining the point at which revenues equal costs.

Risk analysis of Break-Even points is crucial in managing a business's finances. By understanding the risk factors and taking appropriate mitigation measures, businesses can reduce the likelihood of losses and increase profit potential.

Conducting risk analysis on Break Even Point is important because it helps businesses identify risk factors that can affect profitability and take appropriate mitigation measures.

Break-Even analysis is very useful for knowing the overall ability of a business to generate a profit. In the case of a company whose breakeven point is near to the maximum sales level, this signifies that it is nearly impractical for the business to earn a profit even under the best of circumstances. Therefore, it's the management responsibility to monitor the breakeven point constantly. This monitoring certainly reduces the breakeven point whenever possible.

In conclusion, Break-Even analysis is a valuable tool in assessing risk and return. It provides businesses with a clear understanding of their cost structure and the sales volume required to cover these costs, thereby aiding in strategic decision-making and risk management.

3.11 SUMMARY

Companies are limited in how much capital they have available to invest in new projects at any given time. Capital rationing is a way for them to decide how to allocate their capital among those projects. The goal is typically to maximize the return on their investment.

When availability of capital to a firm is limited the firm is constrained in its choice of projects. Capital rationing is restricting capital expenditure to certain amount, even when projects with positive NPV need be rejected (which would be accepted in unlimited funds case).

Capital rationing is a process that companies use to decide which investment opportunities make the most sense for them to pursue.

Hard capital rationing refers to restraints put on a company by outside entities, such as banks or other lenders.

Soft capital rationing results from a company's own policies relating to how it wishes to use its capital.

Risk denotes variability of possible outcomes from what was expected. Standard Deviation is perhaps the most commonly used tool to measure risk. It measures the dispersion around the mean of some possible outcome.

A method that assigns a probability distribution to each of the key variables and uses random numbers to simulate a set of possible outcomes to arrive at an expected value and dispersion is called as the Simulation Analysis.

When the Cash Inflows of a particular year are dependent on the Cash Inflows of the previous year, then Decision Tree method is to be used. This method takes in consideration the concept of Joint probabilities.

Sensitivity Analysis is also known as "What if" Analysis. This analysis determines how the distribution of possible NPV or internal rate of return for a project under consideration is affected consequent to a change in one particular input variable. This is done by changing one variable at one time, while keeping other variables (factors) unchanged.

Net Present Value (NPV) is the result of various factors like Selling Price, Sales Volume, Cash Inflows, Cash Outflows, Number of years, Discounting Rate, Initial Cost, Operating Costs or Estimated Benefits, etc. If any one of these factors change, NPV also changes accordingly. Sensitivity Analysis In this method, one variable is changed at a time and the impact of that change on the NPV is calculated.

Although sensitivity analysis is probably the most widely used risk analysis technique, it does have limitations. Therefore, we need to extend sensitivity analysis to deal with the probability distributions of the inputs. In addition, it would be useful to vary more than one variable at a time so we could see the combined effects of changes in the variables. Scenario Analysis is the solution to overcome the limitations of Sensitivity Analysis.

In terms of risk assessment, Break-Even analysis provides a clear indication of the minimum sales volume required to avoid losses. If the Break-Even point is high, it suggests that the business is taking on a significant amount of risk because it needs to achieve substantial sales to cover its costs. Conversely, if the Break-Even point is low, the business is less risky as it can cover its costs with a lower level of sales. This information can be particularly useful when launching a new product or entering a new market, as it gives an indication of the level of demand required to make the venture profitable.

3.12 EXERCISE

Q. 1) State with reason whether the following statements are True or False :

- 1. Capital Rationing is the situation where funds available for executing some project are abundant.
- 2. Companies that employ a capital rationing strategy typically produce a relatively higher return on investment (ROI).
- 3. Capital rationing may arise due to internal factors like imperfections of capital market.
- 4. Simulation provides a trial and error movement towards an optimal solution.
- 5. Decision tree technique is a method to evaluate safe proposals.
- 6. In Sensitivity Analysis, the project outcome is studied after taking into change in only one variable.
- 7. Scenario analysis begins with worst case scenario set of values for the input variables.
- 8. Break-Even analysis is used by businesses to identify the point at which they will start making a profit.

Answers :

- 1. **False** : Capital Rationing is the situation where funds available for executing some project are limited.
- 2. **True** : Companies that employ a capital rationing strategy typically produce a relatively higher return on investment (ROI) because the company invests its resources where it identifies the highest profit potential.
- 3. **False** : Imperfections of capital market is the external factor leading to Capital Rationing.
- 4. **True** : Simulation model involves conducting a series of organized experiments to predict the probable outcome of the process in a given period of time.
- 5. **False** : Decision tree analysis is another technique which is helpful in tackling risky capital investment proposals.
- 6. **True** : Sensitivity analysis is a way of finding impact on the project's NPV (or IRR) for a given change in one of the variables.
- 7. **False** : Scenario analysis begins with base case or most likely set of values for the input variables. Then, go for worst case scenario.
- 8. **True** : By understanding Break-Even point, businesses can assess the level of risk associated with their operations and the potential return on investment.

Q.2) Answer the following :

- 1) Explain the meaning of Capital Rationing.
- 2) What are the various needs of Capital Rationing?
- 3) Analyse the factors leading to Capital Rationing.
- 4) Explain the advantages of Capital Rationing.
- 5) Analyse the situations of Capital Rationing.
- 6) Enumerate the steps involved in Simulation Analysis.
- 7) Write the rules for designing the Decision Tree.
- 8) State the two approaches to Sensitivity Analysis.
- 9) Justify the cases when Sensitivity Analysis used for.
- 10) Explain Scenario Analysis.
- 11) Explain the different scenarios under which Scenario Analysis is considered.
- 12) Distinguish between Scenario Analysis & Sensitivity Analysis.

13) Explain the components in the calculation of Break-Even Point.

14) List out the advantages of Break-Even Analysis.

Q.3) Practical Problems :

1) Determine which project offers the greatest potential profitability for a Diamond cutter company which is looking at five possible projects to invest in, as shown below:

Project	Investment capital (₹ in lakh)	NPV (₹ in lakh)
1	2	2
2	4	4
3	5	3
4	4	2
5	6	5

(Ans. :- PI: Project 1 = 1, 2 = 1, 3 = 0.6, 4 = 0.5 and 6 = 0.83)

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

Project	Net cash flow (₹ lakhs)	NPV (₹ lakhs)
А	15	6
В	10	4.5
С	7.5	3.6
D	6	3

Project 'B' and 'C' are mutually exclusive.

(Ans.:- NPV: Combination of project 'A' & 'B' = 10.50, 'A' & 'C' = 9.60, 'A' & 'D' = 9.00, 'B' & 'D' = 7.50 and 'C' & 'D' = 6.60)

3) A firm has an investment proposal requiring an outlay of ₹ 80,000. The investment proposal is expected to have two years' economic life with no salvage value. In year 1, there is a 0.4 probability that cash inflow after tax will be ₹ 50,000 and 0.6 probabilities that cash inflow after tax will be ₹ 60,000. The probability assigned to cash inflow after tax for the year 2 is as follows:

Year	Cash	Probability	Cash Flows	Probability
	Flows		(₹)	
	(₹)			
1	50,000	0.6	60,000	0.4
2	24,000	0.2	40,000	0.4
	32,000	0.3	50,000	0.5
	44,000	0.5	60,000	0.1

The firm uses a 10% discount rate for this type of investment.

You are required to :

- i) Construct a Decision Tree for the proposed investment project and calculate the expected Net Present Value (NPV).
- ii) What net present value will the project yield, if worst outcome is realized? What is the probability of occurrence of this NPV?
- iii) What will be the best outcome and the probability of that occurrence?
- iv) Will the project be accepted?

(Note: 10% discount factor for 1st year : 0.909; for 2nd year : 0.826)

[Ans.:- i) Expected NPV = \gtrless 6,223.76, ii) If Worst outcome realised then project will yield NPV = \gtrless 14,726 and profitability of occurrence of this NPV = 8%, iii) Best outcome = Path 6 when NPV = \gtrless 24,100, and Probability of occurrence of this NPV = 6%, iv) Yes, since NPV is positive at \gtrless 6.223.76, The project will be accepted]

4) A project with an initial outflow of \gtrless 1,00,000 has a four year life and a 10% discount rate. The annuity cash inflow is \gtrless 40,000.

Compute :

a) NPV, b) Measure the sensitivity of the project to size, c) Years of Cash Flow and d) Discounting factor.

(Ans.:- NPV= ₹ 26,800, Size = 26.80%, Cash Flow = ₹ 21.13%, Life=24.52%, Discounting factor = 12%)

Initial Investment (₹)125,000Selling price per Unit (₹)100Variable costs per unit (₹)30Fixed costs for the period (₹)100,000Sales volume2,000 unitsLife5 yearsDiscount rate10%

5) The following information applies to a new project:

You are required to calculate the Project's NPV and show how sensitive the results are to various input factors.

(Ans.:- Project's NPV = \gtrless 26,640 and selling price fall of 3.51%, variable cost = 11.71%, volume fall of 5%, initial cost = 21.31% and Fixed cost = 7.03%, Discount rate = 8%)

6) 'Gates India Ltd.' is considering launching a new Product with the following details :

S/N	Particulars	Figures
1	Initial capital cost	₹ 400 Cr
2	Annual unit sales	₹ 5 Cr
3	Selling price per unit	₹ 100
4	Variable cost per unit	₹ 50
5	Fixed costs per year	₹ 50 Cr
6	Discount Rate	6%

Calculate the NPV of the project.

Find the impact on the project's NPV of a 2.5 % adverse variance in each variable. Which variable is having maximum effect?

[Ans.:- a) NPV = ₹ 134.60, b) At 24.82%]

7) 'Hansini Ltd.' is considering a project 'Peacock' with an initial outlay of $\gtrless14,00,000$ and the possible three cash inflow attached with the project as follows: (\gtrless in thousands)

Particular	Year 1	Year 2	Year 3
Worst case	450	400	700
Most likely	550	450	800
Best case	650	500	900

Assuming the cost of capital as 9%, determine NPV in each scenario. If XYZ Ltd is certain about the most likely result but uncertain about the third year's cash flow, what will be the NPV expecting worst scenario in the third year.

[Ans.:- NPV : Worst case = (110.15), Most likely =100.85, Best case =311.85]

8) 'Hitesh Ltd.' finds an opportunity to invest in a 2 year project and will cost $\gtrless 1$ lakh. The estimated cash flows for the first year are given in the following table:

- Year 1 ₹ 40,000 with probability of 30% (Scenario 1)
- Year 1 ₹ 60,000 with probability of 40% (Scenario 2)
- Year 1 ₹ 80,000 with probability of 30% (Scenario 3)

The second year cash flows with conditional probability are :

Scenario 1 - ₹ 20,000 with probability of 20%

Scenario 1 - ₹ 50,000 with probability of 60%

Scenario 1 - ₹ 80,000 with probability of 20%

Scenario 2 - ₹ 70,000 with probability of 30%

Scenario 2 - ₹ 80,000 with probability of 40%

Scenario 2 - ₹ 90,000 with probability of 30%

Scenario 3 - ₹ 80,000 with probability of 10%

Scenario 3 - ₹ 1,00,000 with probability of 80%

Scenario 3 - ₹ 1,20,000 with probability of 10%

If the relevant cost of capital to evaluate is 8% (risk free rate), find the project NPV. Also calculate Standard deviation.

(Ans.:- Expected NPV : ₹ 21,571, -18,623)

CAPITAL STRUCTURE THEORIES

Unit Structure

- 4.0 Learning Objectives
- 4.1 Introduction to Capital Structure
- 4.2 Theories on Capital Structure
- 4.3 Exercise

4.0 LEARNING OBJECTIVES

After learning this unit, learner will be able to:

- State the meaning and significance of capital structure.
- Discuss the various capital structure theories i.e. Net Income Approach, Traditional Approach, Net Operating Income (NOI) Approach, Modigliani and Miller (MM) Approach, Trade- off Theory and Pecking Order Theory.
- Describe concepts and factors for designing an optimal capital structure.
- Discuss essential features of capital structure of an entity.
- Discuss optimal capital structure.
- Analyse the relationship between the performance of a company and its impact on the earnings of the shareholders i.e. EBIT-EPS analysis.
- Discuss the meaning, causes and consequences of over and under capitalisation to an entity.

4.1 INTRODUCTION TO CAPITAL STRUCTURE

4.1.1 Meaning of Capital Structure

The capital structure includes various sources from which the company obtains the essential long-term capital. It is distinct from financial structure. The capital structure is the company's long-term funding, which is represented principally by long-term debt and equity.

4.1.2 Objectives of Capital Structure

Decision of capital structure aims at the following two important objectives:

1. Maximize the value of the firm.

2. Minimize the overall cost of capital.

4.1.3 Forms of Capital Structure

Capital structure pattern varies from company to company and the availability of finance. Normally the following forms of capital structure are popular in practice.

- Equity Shares only.
- Equity and Preference Share only.
- Equity and Debentures only.
- Equity shares, Preference Shares and Debentures



4.1.4 Features of Capital Structure

It is the finance manager's responsibility to establish the most favourable capital structure for the organisation. The capital structure should be carefully constructed with the interests of the equity shareholders in mind, as they are the ultimate owners of the company in mind. It is not an easy undertaking to develop and build an appropriate capital structure. However, when constructing the capital structure, keep in mind that a sound or acceptable capital structure should contain the following characteristics:

a. Profitability: The capital structure of the company should be most advantageous to its stockholders. Its goal should be to maximise earnings per share while lowering financing costs.

- b. Solvency: The use of debt in excess throughout the capital structure jeopardises the company's solvency. As a result, borrowed capital should only be employed when the financial risk is manageable.
- c. Flexibility: The capital structure should be adaptable to the changing conditions of the organisation, allowing the corporation to provide funds whenever necessary to finance any profitable activity.
- d. Conservatism: The capital structure of the company should be cautious in the sense that the firm's debt component should not exceed the firm's debt capability. The ability of the corporation to generate adequate future cash flows to satisfy interest payments and repay principle when it becomes due determines its debt capacity.
- e. Control: The capital structure should be designed such that existing shareholders retain as much control of the company as possible.

The following are the general characteristics of an optimal capital structure. The proportional importance of these factors varies from firm to company. For example, one company may value flexibility above conservatism, whilst another may value solvency over profitability. However, one could argue that the company's financing structure should be easily adaptable.

4.1.5 Optimum Capital Structure

Every firm requires investment cash. These monies can be raised in several ways. The corporation can raise cash by issuing stock, preferred shares, debentures, long-term loans, and other instruments. The capital structure is the total of all these funds. A company's capital structure is deemed optimal when the proportion of debt and equity in its capital structure maximises the return on equity. The nature and breadth of operation, the availability of cash from diverse sources, management efficiency, and other factors would all influence a corporation's structure. Every company or organisation will strive to have the best capital structure available. As a result, having the most optimal capital structure in practise is not possible; instead, we can have the most appropriate capital structure.

Features of the optimum capital structure

Some of the major features of sound capital structure are as follows:

A sound capital structure should possess the following features:

- a. Maximum Return: The financial structure of a company should be guided by clear- cut objective. Its objective can be maximisation of the wealth of the shareholders or maximisation of return to the shareholders.
- b Less Risky: The capital structure should represent a balance between different types of ownership and debt securities. This is essential to reduce risk on the use of debt capital.
- c. Safety: A sound capital structure should ensure safety of investment. It should be so determined that fluctuations in the earnings of the company do not have heavy strain on its financial structure.

- d. Flexibility: A sound capital structure should facilitate expansion and contraction of funds. The company should be able to procure more capital in times of need and should be able to pay all its debts when it does not require funds.
- e. Economy: The capital structure should ensure the minimum costs of capital which in turn would increase its ability to generate more wealth for the company.
- f. Capacity: The financial structure of a company should be dynamic. It should be revised periodically depending upon the changes in the business conditions. If it has surplus funds, the company should have the capacity to repay its debt and reduce interest obligations.
- g. Control: The capital structure of a company should not dilute the control of equity shareholders of the company. That is why; convertible debentures should be issued with great caution.



4.1.6 Determinants of Capital Structure

- a. Trading on equity and EBIT EPS analysis: Financial leverage or trading on equity refers to the use of long-term debt and preference share capital, which are fixed income bearing assets, in conjunction with equity share capital. Long-term debt raises earnings per share (EPS) as long as the return on investment (ROI) exceeds the cost of debt. However, the leverage impact is more pronounced in the case of debt for two reasons:
 - i. cost of debt is usually lower than the other sources of capital, and
 - ii. the interest paid on debt is allowed as an expense in Income Tax

Because of these factors, financial leverage is a crucial consideration when building a company's capital structure. Companies with high Earnings Before Interest and Taxes (EBIT) levels can profitably use high levels of debt to increase the return on shareholders' equity. The EBIT - EPS analysis is a valuable tool in the financial manager's arsenal for gaining insight into the firm's capital structure planning. As a result, under various financing options, one should examine the potential changes in EBIT and their influence on EPS. Financial leverage boosts EPS in favourable situations; nevertheless, it can also increase financial risk to shareholders. As a result, a company should use debt in such a way that the financial risk does not detract from the leverage impact.

- b. Sales stability and growth: This is another crucial component that determines a company's financial structure. Sales stability ensures steady earnings, allowing the company to meet its set obligations, such as interest payments and debt repayment, and so raise a larger amount of debt. Similarly, the rate of sales growth influences the capital structure selection. Typically, the larger the rate of sales growth, the bigger the use of debt in funding the organisation. On the other hand, if the firm's revenues are highly changing and dropping, it should exercise extreme caution while using debt financing.
- c. Cost of capital: The cost of capital is another key issue to consider when developing a company's capital structure. Equity capital is the most expensive source of capital since equity stockholders carry the most risk. Debt capital, on the other hand, is the cheapest source of capital because interest on debt capital is tax deductible, making debt capital cheaper when compared to other kinds of capital. Preference share capital is also less expensive than equity capital since dividends on preference shares are fixed. Because the overall cost of capital is the sum of all specific costs of capital, the capital structure should be carefully planned such that the overall cost of capital is minimised.
- d. Cash flow capability: A company that can generate greater and more consistent cash inflows will be able to use more loan capital. When fixed charges such as interest on loan capital, fixed preference dividends, and principal become due, the firm must satisfy them. The firm can only meet these set obligations if it has sufficient financial inflows. When a company wishes to raise additional funds, it should forecast future cash inflows to guarantee that fixed charges are covered. As a result, the fixed charge coverage and interest coverage ratio computations are significant for this purpose.
- e. Control: The desire of the incumbent management to retain control over the firm can sometimes impact the design of a corporation's capital structure. When extra funds are required, the firm's management wishes to raise the funds without losing control of the firm. If equity shares are issued to raise funds, current shareholders' influence is eroded; therefore, they may raise funds by issuing fixed charge bearing debt and preference share capital, as preference

shareholders and debt holders have no voting rights. Debt financing is advantageous in terms of control, but excessive reliance on debt capital may result in a significant weight of interest and fixed changes and may lead to bankruptcy.

- f. Flexibility: The ability of a firm to adapt its capital structure to changing situations is referred to as flexibility. To maximise the utilisation of funds, the firm's capital structure must be constructed in such a way that it is possible to swap one type of financing for another. Preference shares and debentures provide the most flexibility in the capital structure because they can be redeemed at the firm's discretion. As a result, the capital structure should be adaptable enough to generate new money as needed, with minimal delay and cost.
- g. Size of the firm: A firm's capital structure is influenced by its size. Small businesses find it difficult to obtain long-term finance because they must prepare to pay higher interest rates and on uncomfortable conditions. As a result, small businesses have relatively restrictive financial structures and must rely more on equity capital and retained earnings to meet their needs. As a result, small businesses may occasionally limit their business's expansion and meet any extra funding needs only through the issuance of shares or retained earnings.
- h. Marketability and Timing Capital market conditions are not changed from time to time. Sometimes there may be depression and at other 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 situations into consideration. In the case of depressed conditions, 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 mobilize the funds by issuing equity shares. The internal conditions of a firm may determine the marketability of securities. For example, a highly levered firm may find it difficult to raise additional debt.
- i. Floatation costs Though this is not a very significant factor in the determination of capital structure, but these costs are incurred when the funds are raised externally. They include cost of the issue of prospectus, brokerage, commissions, etc. Generally, the floatation costs are less in case of debt rising rather than equity issue, which causes a temptation for debt capital. 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.
- j. Purpose of funding: When designing the capital structure, the purpose for which funds are raised should also be addressed. If money is raised for productive purposes, debt capital is preferable because interest can be paid from investment gains. However, if it is for an ineffective goal, equity should be chosen.

k. Legal constraints: When calculating a firm's capital structure, keep in mind the numerous rules provided by the government from time to time on the issuance of shares and debentures. These legal constraints are significant because they provide a context within which capital structure decisions should be made.

4.1.7 Concept of Capitalization, Capital Structure and Financial Structure

- a. Capitalisation: Capitalization is the process of funding a corporation using a combination of equity and debt finance to determine its financial structure. Market capitalization, often known as market cap, calculates a company's entire market worth by multiplying its stock price by the number of outstanding shares. Capitalization is a fundamental financial term that influences a company's financial decisions as well as its perceived worth by investors.
- b. Financial Structure: The terms financial structure and capital structure are not interchangeable. The financial structure depicts the complete finance arrangement. It quantifies the amount of total money available to finance the total assets of the business.

In terms of equation, it can be expressed as:

Financial Structure = Total liabilities

Or

Financial Structure = Capital Structure + Current liabilities.

The following points distinguish the financial structure from the capital structure.

Financial Structures	Capital Structures		
1. It comprises both long-term and short-term funding sources.	1. It solely includes long-term funding sources.		
2. It refers to the entirety of the liabilities side of the balance sheet.	2. It only refers to the company's long-term liabilities.		
3. Financial structures include all capital sources.	3. It is made up of equity, preferred stock, and retained earning capital.		
4. It will not be more essential in assessing the firm's worth.	4. It is one of the primary determinants of the firm's value.		

Illustration 01:

Liabilities	Amount	Assets	Amount
Equity Shares	20,00,000	Land	16,00,000
Preference Shares	6,00,000	Building	4,00,000
Retained Earnings	8,00,000	Machinery	12,00,000
Debentures	6,00,000	Vehicles	8,00,000
Creditors	4,00,000	Inventory	2,00,000
Bills payable	6,00,000	Cash	8,00,000
	50,00,000		50,00,000

You are required to calculate the:

i. Capitalisation; ii. Capital Structure and iii. Financial Structure

Solution 01:

i. Statement Showing Calculation of Capitalisation

Sr.	Source	Amount
No.		
1.	Equity share capital	20,00,000
2.	Preference share capital	6,00,000
3.	Debentures	6,00,000
	Capitalization	32,00,000

ii. Statement Showing Calculation of Capital Structure

Sr.	Source	Amount
No.		
1	Equity share capital	20,00,000
2	Preference share capital	6,00,000
3	Debentures	6,00,000
4.	Retained Earnings	8,00,000
	Capital Structure	40,00,000

iii. Statement Showing Calculation of Financial Structure

Sr.	Source	Amount
No.		
1	Equity share capital	20,00,000
2	Preference share capital	6,00,000
3	Debentures	6,00,000
4.	Retained Earnings	8,00,000
5.	Creditors	4,00,000
6.	Bills payable	6,00,000
	Financial Structure	50,00,000

Author's Note:

- a. The term capitalisation only includes only marketable securities i.e. which can be traded.
- b. Capital Structure includes the net worth of the shareholders or Total Shareholders Fund.
- c. Financial Structure includes all the liabilities i.e. Short Term and Long Term.

I hope the difference between Capitalisation, Capital Structure and Financial Structure is clear.

Test your understanding:

- 1. Distinguish between financial structure and capital structure.
- 2. State whether true or false?

Bills payable is considered as a part of capital structure.

- 3. What are the components of capital structure?
- 4. What do you mean by capital structure in financing decisions?

4.2 THEORIES ON CAPITAL STRUCTURE

The following approaches describe the relationship between the firm's value and its cost of capital:



Let us understand each of the approach in a detailed manner.

4.2.1 Net Income Approach

According to the Net Income Approach, there is a relationship between capital structure and firm value, and so the firm can change its value by raising or decreasing the proportion of debt in the overall financing mix. This method demonstrates the importance of capital structure in determining firm value.



(The diagram could be better understood in illustration 04)

The Net Income Approach is predicated on the following key assumptions:

1. There are no corporate taxes.

2. The cost debt is less than the cost of equity.

3. The use of debt does not change the risk perception of the investor.

Given these assumptions a Firm's value is calculated by adding value of equity and value of debt. As shown below:

Formulae/Equation:

V = S + B

Where,

V = Value of firm

S = Market value of equity

B = Market value of debt

Market value of the equity can be ascertained by the following formula:

$$S = \frac{Ni}{Ke}$$

Where,

S = Value of the Equity

Ni = Earnings available to equity shareholder

Ke = Cost of equity or equity capitalization rate

$$\mathrm{Ko} = \frac{\mathrm{EBIT}}{s} x \ 100$$

Where,

Ko = Overall Capitalization Rate EBIT = Earnings Before Interest and Tax S = Value of the Equity

Format for calculating value of the firm on the basis of NI approach:

Sr. No.	Particulars	Amount
А	Net operating income (EBIT)	XXX
В	Less: interest on debenture	XXX
C = B - A	Earnings available to equity holder (NI)	XXX
D	Equity capitalization rate (Ke (%))	XXX
E = C/D	Market value of equity (S)	XXX
F	Market value of debt (B)	XXX
G = E + F	Total value of the firm (V) (S+B)	XXX
H = A/G	Overall cost of capital = $Ko = EBIT/V(\%)$	XXX

Author's Note: The Earnings available to the Shareholders ideally should be Earnings After Tax, however, here we assume there are no corporate tax, so for us EBT = EAT in this situation.

Illustration 02:

- a. A Company expects a net operating income of Rs. 5,00,000. It has is ₹ 4,00,000, 6% debentures. The equity capitalization rate of the company is 12.50%. Calculate the value of the firm and overall capitalization rate according to the net income approach (ignoring income tax).
- b. If the debenture debts are increased to ₹ 5,00,000. What shall be the value of the firm and the overall capitalization rate?
- c. If the debenture debts are decreased to ₹ 3,00,000. What shall be the value of the firm and the overall capitalization rate?

Solution 02:

a. Statement Showing calculation of Value of Firm and Overall Capitalization rate

Particulars	Amount
Earnings Before Interest and Tax (EBIT)	5,00,000
(-) Interest on Debentures (4,00,000 x 6%)	(24,000)
Net Profit available for Equity Shareholders (Net Income)	4,76,000
(÷) Cost of Equity	12.50%
Value of Equity	38,08,000
Value of Debt	4,00,000
Value of Firm = Value of Debt + Value of Equity	42,08,000
Overall Capitalization Rate (Ko) = $\frac{EBIT}{Value \ of \ Firm} x \ 100$	11.88%

b. Statement Showing calculation of Value of Firm and Overall Capitalization rate

Particulars	Amount
Earnings Before Interest and Tax (EBIT)	5,00,000
Less: Interest on Debentures (5,00,000 x 6%)	(30,000)
Earnings available to Equity Shareholders	4,70,000
(÷) Cost of Equity Capitalization	12.50%
Value of Equity	37,60,000
Value of Debt	5,00,000
Value of the Firm	42,60,000
Overall cost of Capitalization (Ko) = $\frac{EBIT}{Value \ of \ Firm} x \ 100$	11.74%

c. Statement Showing calculation of Value of Firm and Overall Capitalization rate

Particulars	Amount
Earnings Before Interest and Tax (EBIT)	5,00,000
Less: Interest on Debentures (3,00,000 x 6%)	(18,000)
Earnings available to Equity Shareholders	4,82,000
(÷) Cost of Equity Capitalization	12.50%
Value of Equity	38,56,000
Value of Debt	3,00,000
Value of the Firm	41,56,000
Overall cost of Capitalization (Ko) = $\frac{EBIT}{Value \ of \ Firm} x \ 100$	12.03%

Conclusion:

Situation	Value of Debt	Value of Firm	Rank	Overall Cost	Rank
a.	4,00,000	42,08,000	2	11.88%	2
b.	5,00,000	42,60,000	1	11.75%	1
c.	3,00,000	43,56,000	3	12.03%	3

In these three situations, the value of the firm is highest when we finance maximum capital by the way of Debt.

We can observe that, as the debt increases, the value of the firm is increases and also the overall all cost is lowest. This phenomenon is termed as Trading on Equity.

Our criteria for ranking for the value of the firm is Higher the better, whereas for the overall cost of capital the lower the cost is considered as higher rank.

Illustration 03:

Krupa Ltd.'s EBIT is \gtrless 8,00,000. The company has 10%, \gtrless 20 lakh debentures. The equity capitalization rate i.e. Ke is 12%.

You are required to calculate:

- a. Market value of equity and value of firm
- b. Overall cost of capital

Solution 03:

a. Statement Showing calculation of Value of Firm and Overall Capitalization rate

Particulars	Amount
Net Operating Income (EBIT)	8,00,000
(-) Interest on Debentures (20,00,000 x 10%)	(2,00,000)
Net Profit available for Equity Shareholders (Net Income)	6,00,000
(÷) Cost of Equity	12.00%
Value of Equity	50,00,000
Value of Debt	20,00,000
Value of Firm = Value of Debt + Value of Equity	70,00,000
Overall Capitalization Rate (Ko) = $\frac{EBIT}{Value \ of \ Firm} x \ 100$	11.43%

Illustration 04:

Rohit Ltd, has an EBIT of \gtrless 10,00,000. The management wants to find the value of Equity, Firm and Overall cost of capital under each different situation. The other information given are:

The interest rate on debentures will be 12%, the cost of equity will be 20%. The Management wants the explanation in tabular as well as in graphical format.

Sr. No.	12 % Debentures
1	12,00,000
2	14,00,000
3	16,00,000
4	18,00,000
5	20,00,000
6	22,00,000
7	24,00,000
8	26,00,000
9	28,00,000
10	30,00,000

Financial Management-II

Solution 04:

AB (Given)C (Given) $D = B \times 12\%$ $E =$ Sr. No.12 % DebenturesEBITInterestE	C - D bt
Sr. No. 12 % Debentures EBIT Interest E	RТ
	DI
1 12,00,000 10,00,000 1,44,000 8,	56,000
2 14,00,000 10,00,000 1,68,000 8,	32,000
3 16,00,000 10,00,000 1,92,000 8,	08,000
4 18,00,000 10,00,000 2,16,000 7,5	34,000
5 20,00,000 10,00,000 2,40,000 7,0	50,000
6 22,00,000 10,00,000 2,64,000 7,	36,000
7 24,00,000 10,00,000 2,88,000 7,	12,000
8 26,00,000 10,00,000 3,12,000 6,5	38,000
9 28,00,000 10,00,000 3,36,000 6,	64,000
10 30,00,000 10,00,000 3,60,000 6,	40,000

•	E - E/20%	G = B	H - F + G	Ι	J	K =
A	$\Gamma = E/2070$	(Given)	$\Pi = \Gamma + \mathbf{U}$	(Given)	(Given)	C/H
Sr.	Value of	Value of	Value of	K d	Ka	Ko
No.	Equity	Debt	Firm	Ku	ĸc	KU
1	42,80,000	12,00,000	54,80,000	12.00%	20.00%	18.25%
2	41,60,000	14,00,000	55,60,000	12.00%	20.00%	17.99%
3	40,40,000	16,00,000	56,40,000	12.00%	20.00%	17.73%
4	39,20,000	18,00,000	57,20,000	12.00%	20.00%	17.48%
5	38,00,000	20,00,000	58,00,000	12.00%	20.00%	17.24%
6	36,80,000	22,00,000	58,80,000	12.00%	20.00%	17.01%
7	35,60,000	24,00,000	59,60,000	12.00%	20.00%	16.78%
8	34,40,000	26,00,000	60,40,000	12.00%	20.00%	16.56%
9	33,20,000	28,00,000	61,20,000	12.00%	20.00%	16.34%
10	32,00,000	30,00,000	62,00,000	12.00%	20.00%	16.13%


Capital Structure Theories

18.25% 17.99% 17.73% 17.48% 17.24% 17.01% 16.78% 16.56% 16.34% 16.13 12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00%	18.25% 17.99% 17.73% 17.48% 17.24% 17.01% 16.78% 16.56% 16.34% 16.1 $12.00% 12.00%$		CON 20.00%	IPARI 20.00%	SON O 20.00%	F DIFF 20.00%	EREN 20.00%	T COS	Г О Г С 20.00%	CAPITA 20.00%	L 20.00%	20.00
12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00%	12.00% 12.00%		18.25%	17.99%	17.73%	17.48%	17.24%	17.01%	16.78%	16.56%	16.34%	16.13
	1 2 3 4 5 6 7 8 9 10 12 009/ 12 009/ 12 009/ 12 009/ 12 009/ 12 009/ 12 009/ 12 009/ 12 009/ 12 009/ 12 009/ 12 009/ 12 009/ 12 009/	1	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00
12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00% 12.00%			10.050/	17.000/	17 720/	17.400/	17.040/	17.010/	16 700/	16.560/	16.240/	16.1

4.2.2 Traditional Approach

This strategy believes that, up to a degree, financial leverage reduces the cost of capital while increasing the firm's value. Beyond that point, however, reverse patterns arise. The main implication of this method is that the cost of capital is determined by the capital structure, and that there is an optimal capital structure that minimises the cost of capital.

- 1. The rate of interest on debt remains constant for a specific length of time, and then increases as leverage increases.
- 2. The expected rate of return for equity stockholders remains constant or gradually increases. Following that, equity shareholders begin to perceive a financial risk, and the expected rate rapidly increases from the optimal position.
- 3. As the interest rate and projected rate of return fluctuate, the WACC lowers and then increases. The optimal capital structure is represented as the lowest point on the curve.



The firm should strive for optimal capital structure and total valuation by judicious use of debt and equity in capital structure. The best capital structure will have the lowest total cost of capital and the highest firm value.

Financial Management-II Illustration 05:

Indra Ltd. has EBIT of \gtrless 10,00,000. The company makes use of debt and equity capital. The firm has 12% debentures of \gtrless 8,00,000 and the firm's equity capitalization rate is 16%.

You are required to calculate:

a. Current value of the firm

b. Overall cost of capital.

Solution 05:

a. Statement Showing Calculation of Total Value of the Firm and Overall cost of capital.

Particulars	Amount (₹)
EBIT	10,00,000
Less: Interest (@12% on ₹ 8,00,000)	(96,000)
Earnings available for equity holders	9,04,000
(÷) Equity capitalization rate i.e. Ke	16%
Value of the Equity	56,50,000
Value of the Debt	8,00,000
Value of the Firm	64,50,000
Overall Cost of Capital	15.50%

OR

Overall Cost of Capital (Ko) = $Kd \times Wd + Ke \times We$

$$= 12 \times 0.12 + 16 \times 0.88$$

$$= 1.44 + 14.08$$

= 15.52%

The difference under two methods is only due to rounding off difference.

Statement Showing calculation of weights

Particulars	Total Values	Weights
Value of the Equity	56,50,000	0.88
Value of the Debt	8,00,000	0.12
Value of the Firm	64,50,000	1.00

Particulars	Total Values	Weights	Cost	Weight x Cost
Value of the Equity	56,50,000	0.88	16	14.08
Value of the Debt	8,00,000	0.12	12	1.44
Value of the Firm	64,50,000	1.00		15.52

Capital Structure Theories

Author's Note: This may appear to be exactly same as the Net Income Approach if we look at first solution. The calculation part is similar to it. However, the technique differs in that it is a balance between the two extremes of the Net Income Approach and the Net Operating Income Approach. A good combination of debt and equity, the cost of capital can be reduced or the firm's value can be boosted, according to this strategy. However, there will be stage beyond which the use of more debt may not lead to lowering of overall cost of capital and thus it may not lead to optimal capital structure. Let's understand it in a better way with Illustration 06.

Illustration 06:

Determine the optimal capital structure of a company from the undermentioned information:

Alternative	Cost of Debt (Kd) in %	Cost of Equity (Ke) in %	Percentage of Debt on total value (Debt +Equity)
А	16.00	18.00	0
В	15.00	17.00	10
С	14.00	17.00	20
D	15.00	14.00	25
Е	18.00	19.00	30
F	12.00	16.00	40
G	14.00	15.50	60

Solution 06:

А	В	С	D	E = 100 - D	F = (B x D) + (C x E)
Alt	Cost of Debt (Kd)	Cost of Equity (Ke)	Weight of Debt (Wd)	Weight of Equity (We)	WACOC/WACC (KdxWd+KexWe)
А	16.00	18.00	0	100	18.00
В	15.00	17.00	10	90	16.80
С	14.00	17.00	20	80	16.40
D	15.00	14.00	25	75	14.25
Е	18.00	19.00	30	70	18.70
F	12.00	16.00	40	60	14.40
G	14.00	15.50	60	40	14.60

So here the Alternative D will be selected, since it has lowest Overall Cost of Capital. The Net Income approach believes that overall cost of capital will be less when there is more debt applied, which is not the case with Traditional Approach.



4.2.3 Net Operating Income Approach

Durand proposed yet another modern theory of capital structure. This is the completely antithesis of the Net Income approach suggested by him. This viewpoint holds that the Capital Structure decision has no bearing on the firm's worth. The capital structure adjustments have no effect on the firm's market value.

According to this method, a change in capital structure will have no effect on the firm's total value, share market price, or overall cost of capital.



The diagram above illustrates that Ko (Overall capitalization rate) and (debt - capitalisation rate) are constant, but Ke (Cost of equity) rises with leverage.

NOI approach is based on the following assumptions;

a. The overall cost of capital remains constant;

b. There are no corporate taxes;

c. The market capitalizes the value of the firm as a whole;

Value of the firm (V) can be calculated with the help of the following formula

V=EBIT/Ko

Where,

V = Value of the firm

EBIT = Earnings before interest and tax

Ko = Overall cost of capital

Format for calculating value of the firm on the basis of NOI approach:

Sr. No.	Particulars	Amount
А	Net operating income (EBIT)	XXX
В	(÷) Ko (Overall Capitalization)	XXX
C = B/A	Value of the Firm	XXX
D	(-) Value of Debt	XXX
E = C - D	Market value of equity (S)	XXX
Н	Cost of Equity = $Ke = EBIT - Interest/V(\%)$	XXX

Illustration 07:

XYZ expects a net operating income (EBIT) of \gtrless 20,00,000. It has \gtrless 75,00,000, 14% debentures. The overall capitalization rate is 16%.

- a. Calculate the value of the firm and the equity capitalization rate (Cost of Equity) according to the net operating income approach.
- b. If the debentures debt is increased to \gtrless 80,00,000. What will be the effect on value of the firm and the equity capitalization rate?
- c. If the debentures debt is decreased to \gtrless 70,00,000. What will be the effect on value of the firm and the equity capitalization rate?

Solution 07:

Particulars	Amount
EBIT	20,00,000
(÷) Overall Cost of Capital	16.00%
Value of Firm	1,25,00,000
(-) Value of Debt	(75,00,000)
Value of Equity	50,00,000
Cost of Equity = $\frac{EBIT - Interest}{Value of Equity} x 100$ (Refer WN. 1)	19.00%

a. Statement Showing Calculation of Value of Equity and Cost of Equity

WN. 1

Particulars	Amount
EBIT	20,00,000
(-) Interest (75,00,000 x 14%)	(10,50,000)
EBT	9,50,000
(÷) Value of Equity	50,00,000
Cost of Equity	19.00%

b. Statement Showing Calculation of Value of Equity & Cost of Equity

Particulars	Amount
EBIT	20,00,000
(÷) Overall Cost of Capital	16.00%
Value of Firm	1,25,00,000
(-) Value of Debt	(80,00,000)
Value of Equity	45,00,000
Cost of Equity = $\frac{EBIT - Interest}{Value of Equity} x 100$ (Refer WN. 2)	19.56%

WN. 2

Particulars	Amount
EBIT	20,00,000
(-) Interest (75,00,000 x 14%)	(11,20,000)
EBT	8,80,000
(÷) Value of Equity	45,00,000
Cost of Equity	19.56%

c. Statement Showing Calculation of Value of Equity & Cost of Equity

Capital Structure Theories

Particulars	Amount
EBIT	20,00,000
(÷) Overall Cost of Capital	16.00%
Value of Firm	1,25,00,000
(-) Value of Debt	(70,00,000)
Value of Equity	55,00,000
Cost of Equity = $\frac{EBIT - Interest}{Value of Equity} x 100$ (Refer WN. 3)	18.55%

WN. 3

Particulars	Amount
EBIT	20,00,000
(-) Interest (70,00,000 x 14%)	(9,80,000)
EBT	10,20,000
Value of Equity	55,00,000
Cost of Equity	18.55%

Option	Ko	Kd	Ke
А	16%	14%	19.00%
В	16%	14%	19.56%
С	16%	14%	18.55%



Illustration 08:

Shamita Ltd's operating income (EBIT) is \gtrless 60,00,000. The firm's cost of debt is 10% and currently the firm employs \gtrless 1,50,00,000 of debt. The overall cost of capital of the firm is 15%.

You are required to CALCULATE:

a. Total value of the firm.

b. Cost of equity.

Solution 08:

Statement Showing Calculation of Value of Equity & Cost of Equity

Particulars	Amount
EBIT	60,00,000
(÷) Overall Cost of Capital	15.00%
Value of Firm	4,00,00,000
(-) Value of Debt	(1,50,00,000)
Value of Equity	2,50,00,000
Cost of Equity	18.00%

WN. 1

Particulars	Amount
EBIT	60,00,000
(-) Interest (1,50,00,000 x 10%)	(15,00,000)
EBT	45,00,000
Value of Equity	2,50,00,000
Cost of Equity	18.00%

4.2.4 Modigliani - Miller Theory

The Modigliani-Miller hypothesis and the Net Operating Income Approach are the same thing. Modigliani and Miller contended that in the absence of taxes, changes in capital structure had no effect on the cost of capital or the value of the enterprise. In other words, capital structure decisions are meaningless, and the firm's value is irrespective of the debt-equity balance.

Basic Propositions:

M-M Hypothesis can be explained with the help of two propositions of Modigliani and Miller.

(Please note, these two propositions are envaulted in further two categories, which are a. Without Taxes. b. With Taxes. We are first starting with the explanation of two propositions without taxes followed by two propositions without taxes)



I. MODIGLIANI AND MILLER APPROACH: TWO PROPOSITIONS WITHOUT TAXES

Assumptions of MM Approach

This proposition is based on certain assumptions. These assumptions mainly relate to the behavioural pattern of investors, capital markets, firms and tax environment.

- 1. Perfect Capital Markets: Capital markets are termed as perfect when
 - a. Investors can freely buy or sell the securities;
 - b. Investors behave rationally;
 - c. Investors can borrow without any restriction as firms;
 - d. Transaction cost does not exist.

Out of the all, the third assumption is holds much importance as, if the firms can borrow at a cheaper rate than the investors, only then they can increase firm value by borrowing (debt).

- 2. Homogeneous Risk: The operating risk is the variability of net operating income of the firm. It is assumed that firms from same industry also have homogeneous risk classes.
- 3. Homemade Leverage (or personal leverage) is a perfect substitute for corporate leverage: It implies that investors can borrow unlimited amount at the same interest rate as the companies can.
- 4. No Taxes: Another important assumption is that, there are no corporate taxes. Thus, there are no tax savings for firms on the payment of interest on debts.

5. Full Payout: Firms distributes all their earnings after interest as dividends. Thus, the dividend payout is 100%.

A. PROPOSITION 1

The total cost of capital (Ko) and the firm's worth are unaffected by the capital structure. The overall market value of the firm is calculated by multiplying the predicted net operating income by the risk-adjusted rate.

Let us understand this concept with a case study.

Implication 01:

An all-equity firm has a market value of \gtrless 3,00,000 and 50,000 shares outstanding. It is thinking of changing its capital structure by borrowing \gtrless 1,20,000 in debt and repurchasing shares. Ignore taxes.

Scenario 1: All Equity Finance Company's Balance Sheet

Liabilities	Market Value	Assets	Market Value
Equity [50,000]	3,00,000	Total Assets	3,00,000
Debt	0		
	3,00,000		3,00,000

Here, the company has all Equity, so the total assets = all liabilities, hence we can say that firm has value of $\gtrless 3,00,000$.

The value per share $=\frac{3,00,000}{50,000} = ₹ 6$

Scenario 2: The Company is planning to change it's capital structure by borrowing ₹ 1,20,000. The company will use this money to repurchases its share. Thus, it will repurchase $=\frac{1,20,000}{6} = 20,000$. So now the shares remaining will be 30,000. The value of the remaining equity will be

 $= (50,000 - 20,000) \ge 6 = 30,000 \ge 6 = ₹ 1,80,000$

Debt and Equity Finance based Company's Revised Balance Sheet

Liabilities	Market Value	Assets	Market Value
Equity [30,000]	1,80,000	Total Assets	3,00,000
Debt	1,20,000		
	3.00,000		3,00,000

Thus, we can conclude that, since the value of assets in not going to change due to change in the capital structure, the value of the firm in both the cases will remain the same.

Hence Proved that,

Value of Levered Firm = Value of Unlevered Firm

Vl = Vu

B. PROPOSITION 2:

Further, will be equal to:

Value of any firm (Vf) (Value of Debt + Equity)	=	Present Value of all the future cash inflows. Earnings for the entire firm = EBIT For present value we will require the discounting factor, which will be equal to WACC.
Vf	=	$\frac{EBIT(1-t)}{WACC}$
Since the assumptions is of no tax, the equation will be further changed to	=	EBIT WACC
WACC	=	$\frac{D}{Vf}x Kd + \frac{E}{Vf}xKe$
		Where, D = Debt; E = Equity Kd = Cost of Debt Ke = Cost of Equity.

- a. The EBIT of any firm remains unaffected to any type of capital structure.
- b. The Value of Firm will always remain constant irrespective of the capital structure.
- c. Hence, The WACC(Ko) will remain constant irrespective of the capital structure.

Implication of Proposition 1

- i. Share Price will remain constant.
- ii. WACC is always constant.

b. The financial risk increases with more debt content in the capital structure. As a result, cost of equity (Ke) increases in a manner to offset exactly the low - cost advantage of debt. Hence, overall cost of capital remains the same.

$$Ke = Ko + (Ko - Kd)\left(\frac{D}{E}\right)$$

Where, Ke= Cost of equity

Ko = Average cost of capital

D/E = Debt - Equity ratio



Arbitrage Process under Proposition 1: Why Proposition 1 works?

The straightforward logic of Proposition I, according to M-M, is that two enterprises that are similar in all aspects except capital structure cannot have different market values or cost of capitals. If the market values of these enterprises diverge, arbitrage will occur, and market value equilibrium will be restored in no time. Arbitrage refers to the process of moving investments from one firm to another when market values fluctuate, so that investors can profit by selling their shares at a high market price and buying securities at a low market price. Personal leverage or home manufactured leverage is the utilisation of debt by investors. Because of this arbitrage process, the market price of securities in the higher valued market falls and the market price of securities in the lower valued market rises, and this switching process is repeated until the market values of both enterprises reach equilibrium. As a result, the M and M stated that different market valuations for identical enterprises are impossible. The arbitrage mechanism likewise works in the opposite direction. Leverage has no advantages or disadvantages. If the unlevered firm has a larger market value than the levered firm, the arbitrage process reverses, and investors want to switch their investments from the unlevered firm to the levered firm so that equilibrium is established in no time.

Thus, the M-M proved in terms of their proposition I that the value of the firm is not affected by debt -equity mix in the capital structure.

Illustration 09: (When value of levered firm is more than the value of unlevered firm)

Let us suppose there are two companies, X Ltd. and Y Ltd., having same earnings before interest and taxes i.e. EBIT of \gtrless 33,000. Y Ltd. is a levered company having a debt of \gtrless 1,25,000 with the interest rate of 6% p.a. The cost of equity of X Ltd. is 12.00% and that of Y Ltd. is 10.00%.

Compute how arbitrage process will be carried on?

Solution 09:

Particulars	X (Levered)	Y (Unlevered)
EBIT	33,000	33,000
Less: Interest (1,25,000 x 6%)	(7,500)	-
EBT	25,500	33,000
Ke	0.12	0.10
Kd	0.06	-
Value of Debt (Vd) (Given)	1,25,000	-
Value of Equity(Ve) = (NOI - Int)/Ke	2,12,500	3,30,000
Value of Firm $(Vf) = ((Vd) + (Ve))$	3,37,500	3,30,000

Statement Showing Calculation of Value of Firm.

Arbitrage Process:

How to gain advantage using the leverage?

Our strategy will be to sell the shares in high value firm (in this case X Ltd. (Levered) and to invest that amount in Low valued firm (in this case Y Ltd.) (Unlevered) and gain advantages. Let us calculate the same.

Suppose you are holding 10% shares in X Ltd.

10% Share in Value of the Equity (2,12,500 x 10%)	21,250
10% Share in EBT (25,500 x 10%)	2,550

Step 1: Raising of Funds

Sell shares of X Ltd. @ 10%	21,250
Borrow 12,500 with interest rate of 6%	12,500
Total Amount Available	33,750

The Question is why should we borrow only 12,500 and why at 6% rate?

The reason is we should have the funds which is similar to the capital structure of the existing firm (Vf = Vd + Ve; 3,37,500 = 1,25,000 + 2,12,500). So, here we mention, we are holding 10% in X ltd, the firm has debt present in the capital structure, as before. So, we borrow fund equivalent to 10% of 1,25,000 i.e. of ₹ 12,500.

However due to this decision there will be some effect on the cashflow.

Transactions	Amount
Loss of Revenue as we have sold the shares (EBT x 10%)	2,550
Interest to be paid on amount borrowed	750
Total loss of Revenue (A)	3,300

Financial Management-II

Arbitrage Strategy

Now with this amount available of \gtrless 33,750, purchase 10% holdings of Y Ltd.

Total Funds Available	33,750
Total Value of Y Ltd.	3,30,000
10% of the Value (3,60,000 x 10%)	33,000
Excess Unutilised Funds	750
Gain (Earnings of Shareholders x 10%) (B)	3,300

Now the overall Scenario

Gain/Fall in Revenue		Difference in Cash Flow	
X Ltd. (Loss of Revenue) (A) (3,300)		X Ltd. (Funds Available)	33,750
Y Ltd. (Gain in Revenue) (B)	3,300	Y Ltd. (Funds Invested)	33,000
Net Gain (A) – (B)	NIL	Excess Funds	750

So here by the process of Arbitrage we are able to earn the same returns will lesser funds.

In the above example, what will happen if we invest the entire funds in the Y Ltd?

Alternate Arbitrage Strategy

Now with this amount available of \gtrless 33,750, purchase equivalent holdings of Y Ltd.

Particulars	Amount
Value of Y Ltd.	3,30,000
EBT	33,000
ROI	10.00%
Funds Invested	33,750
Returns (33,750 x 10%)	3,375

Now the overall Scenario

Gain/Fall in Revenue		Difference in Cash Flow	
X Ltd. (Loss of Revenue)	(3,300)	X Ltd. (Funds Available)	33,750
Y Ltd. (Gain in Revenue)	3,375	Y Ltd. (Funds Invested)	33,750
Net Gain	75	Excess Funds	NIL

So here, we have gained excess \gtrless 75 by investing in the shares of Y Ltd by selling the shares of X Ltd.

Illustration 10: (When value of unlevered firm is more than the value of levered firm)

There are two companies X Ltd. and Y Ltd., having same NOI of \gtrless 20,000 except that X Ltd. is a levered company having a debt of \gtrless 1,25,000 @ 7.5% and cost of equity of X Ltd. & Y Ltd. are 12.50% and 10.00% respectively. Compute how arbitrage process will work?

Solution 10:

Statement Showing Calculation of Value of Firm.

Particulars	X (Levered)	Y (Unlevered)
EBIT	33,000	33,000
Less: Interest (1,25,000 x 7.5%)	(9,375)	-
EBT	23,625	33,000
Ke	0.125	0.10
Kd	0.075	
Value of Debt (Vd) (Given)	1,25,000	-
Value of Equity(Ve) = (NOI - Int)/Ke	1,89,000	3,30,000
Value of Firm $(Vf) = ((Vd) + (Ve))$	3,14,000	3,30,000

Arbitrage Process:

How to gain advantage using the leverage?

Our strategy will be to sell the shares in high value firm (in this case Y Ltd. (Unlevered) and to invest that amount in Low valued firm (in this case X Ltd.) (Levered) and gain advantages. Let us calculate the same.

Suppose you are holding 10% shares in Y Ltd.

10% Share in the Value of the Equity (3,30,000 x 10%)	33,000
10% Share in the NOI (33,000 x 10%)	3,300

Step 1:

Sell the shares of Y Ltd.

Funds Available	33,000
Loss of Revenue (Earnings of Shareholders x 10%)	(3,300)

Arbitrage Strategy:

Buy Shares of X Ltd.

Funds Available	33,000
Total Equity Value of X Ltd.	1,89,000
Buy 10% Shares of X Ltd	18,900
Lend equivalent to the 10% Value of Debt (1,25,000 x 10%) at 7.5%	12,500
Funds Utilised	31,400
Excess Unutilised Funds	1,600

We lend money at 10% of the total debt to maintain the funds equivalent to existing capital structure.

Gains	
10% of the Value of Equity of X Ltd. (23,625 x 10%)	2,362.50
Interest receivable on Funds Lent (12,500 x 7.5%)	937.50
Gain (Earnings of Shareholders x 10%)	3,300.00

Now the overall Scenario

Gain/Fall in Revenue		Difference in Cash Flow	
X Ltd. (Loss of Revenue)	(3,300)	X Ltd. (Funds	33,000
(A)		Available)	
Y Ltd. (Gain in Revenue)	3,300	Y Ltd. (Funds Invested)	31,400
(B)			
Net Gain (A) – (B)	NIL	Excess Funds	1,600

In the above example, what will happen if we invest the entire funds in the X Ltd?

Alternate Arbitrage Strategy

Now with this amount available of \gtrless 33,000, purchase equivalent holdings of X Ltd. considering the existing capital structure.

Particulars	Amount
Value of Y Ltd.	3,30,000
EBT	33,000
ROI	10.00%
Funds Invested	33,750
Returns (33,750 x 10%)	3,375

Now the overall Scenario

Gain/Fall in Revenue		Difference in Cash Flow	
X Ltd. (Loss of Revenue)	(3,300)	X Ltd. (Funds Available)	33,750
Y Ltd. (Gain in Revenue)	3,375	Y Ltd. (Funds Invested)	33,750
Net Gain	75	Excess Funds	NIL

So here, we have gained excess \gtrless 75 by investing in the shares of Y Ltd by selling the shares of X Ltd.

Illustration 11:

There are two firms, U and L. Firm U is the Unlevered Firm and Firm L is the Levered Firm. Firm U has 10,000 shares @ ₹ 15 per share. Firm L has 5,000 shares @ ₹ 15 per share and 6% debentures worth ₹ 75,000. Operating income of both the firms is ₹ 20,000. Compute cost of equity of both the firms as per MM Hypothesis. Also calculate EPS of both the firms.

Solution 11:

Cost of equity of Firm U:

 $Keu = \frac{EBIT}{Market Value of Equity}$ $Ke = \frac{20,000}{1,50,000}$ Ke = 0.1333 or 13.33%

In case of Firm U, the cost of equity will be same as cost of capital because of zero debts.

Earnings Per Share = $\frac{EBIT - Int}{No.of Equity Shares}$

Earnings Per Share $=\frac{20,000}{10,000}$

Earnings Per Share = \gtrless 2 per share.

Value of Levered Firm

As per Proposition 1 $Vu = V_L$

Hence Ko = 13.33

$$K_{eL} = K_0 + (K_0 - K_d) \left(\frac{Debt}{Equity}\right)$$

$$K_{eL} = 13.33 + (13.33 - 0.06) \left(\frac{75,000}{75,000}\right)$$

$$K_{eL} = 13.33 + (13.33 - 0.06) (1)$$

$$K_{eL} = 13.33 + 0.0733$$

$$K_{eL} = 0.2066 \text{ i.e., } 20.66\%$$
Earnings Per Share = $\frac{EBIT - Int}{No.of Equity Shares}$
Earnings Per Share = $\frac{20,000 - 4,500}{5,000}$

Earnings Per Share = $\frac{10,000}{5,000}$

Earnings Per Share = ₹ 3.1 per share.

Criticism of MM Approach

MM Hypothesis, although sounds theoretically correct but has many practical limitations. The propositions given by MM mainly holds true because of the arbitrage process of investors. But this arbitrage process may take place only when the underlying assumptions hold true. However, in reality these assumptions are hardly valid. Therefore, MM Hypothesis is severely criticised due to its unrealistic assumptions. In reality-

- 1. Capital markets are not perfect. Investors are not fully rational.
- 2. Securities are not infinitely divisible.
- 3. There are transactions costs for buying and selling shares
- 4. Personal leverage is not a perfect substitute for corporate leverage. Individual investors cannot borrow at the same rate of interest as companies.
- 5. There exist corporate and personal taxes.

Hence due to its unrealistic assumptions MM hypothesis is severely criticised.

Summary:

Assume no taxes and perfect capital markets

FIRM VALUE: M&M PROPOSITION I	$V_{L} = V_{U} = \frac{EBIT}{K_{0}}$
COST OF CAPITAL: M&M PROPOSITION II	$K_{eL} = Ko + (Ko - Kd) \left(\frac{Debt}{Equity}\right)$
	$WACC = \frac{D}{Vf}x Kd + \frac{E}{Vf}xKe$

II. MODIGLIANI AND MILLER APPROACH: TWO PROPOSITIONS WITH TAXES

The MM hypothesis of capital structure irrelevance is mostly correct because it assumes that corporate taxes do not exist. As a result, the levered and unlevered enterprises are on equal footing. In fact, however, this is not the case. Firms must pay corporate taxes, and as we all know, the interest paid on debentures is tax deductible. As a result, having leverage (debt) becomes more beneficial for a corporation because it saves taxes, and hence the value of such a firm rises. Thus, in the presence of corporation taxation, MM hypothesises that the value of a firm increases as leverage increases.

PROPOSITION 1

The first proposition asserts that tax benefits resulting from tax-deductible interest payments increase the value of a leveraged company over the value of an unlevered company. The theorem's basic premise is that tax-deductible interest payments have a favourable impact on a company's cash flows. Because the value of a firm is defined by the present value of future cash flows, the value of a levered corporation rises.

Capital Structure Theories

MM has developed the formulae for computation of cost of capital (Ko), cost of equity (Ke) for the levered firm.

(i) Value of a levered company = Value of an unlevered company + Tax benefit

$$V_{L} = Vu + TB \ x \ D$$
$$V_{L} = \frac{EBIT(1 - TB)}{Ko} + TB \ x \ D$$

Where,

Vu = Vu = Value of Unlevered Firm

 $T_B = Tax$ Shield or Tax Benefit

D = Debt

 $Vu = \frac{Earnings After Tax}{Ke}$

How proposition 1 of MM's hypothesis works in the presence of corporate taxes?

PROPOSITION 2

The second proposition for the real-world condition states that the cost of equity has a directly proportional relationship with the leverage level. Nonetheless, the presence of tax shields affects the relationship by making the cost of equity less sensitive to the leverage level. Although the extra debt still increases the chance of a company's default, investors are less prone to negatively reacting to the company taking additional leverage, as it creates the tax shields that boost its value.

Cost of equity in a levered company

 $Ke_L = Ke_u + (Ke_u - Kd) Debt/Equity$

Where,

Ke_L = Cost of equity in a levered company

 $Ke_U = Cost$ of equity in an unlevered company

Kd = Cost of debt

$$t = Tax rate$$

WACC in a levered company

$$Kog = \frac{D}{Vf} x \, Kd \, (1-t) + \frac{E}{Vf} x Ke$$
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Where,

Kog = WACC of a levered company

- D = Value of Debt
- E = Value of Equity
- Vf = Value of Firm
- Kd = Cost of Debt
- Ke = Cost of Equity
- t = Tax rate

Illustration 12:

Company A and B are homogeneous in all respects except that Company A is levered while Company B is unlevered. Company A has debt of $\overline{\xi}$ 5,00,000. All the assumptions of MM Approach are met and the tax rate is 50%. EBIT is $\overline{\xi}$ 50,000 and that equity-capitalisation rate for Company B is 12%. What would be the value for each firm according to M— M's approach?

Solution 12:

Value of Unlevered Company (Company B)

$$Vu = \frac{Earnings Before Tax (1-t)}{Ke}$$
$$Vu = \frac{50,000(1-0.50)}{0.12}$$
$$Vu = \frac{50,000(0.50)}{0.12}$$

Vu = 2,08,333

Value of Levered Company (Company A)

 $V_{L} = Vu + TB \ x \ D$ $V_{L} = 2,08,333 + (1 - 0.50) \ x \ 5,00,000$ $V_{L} = 2,08,333 + (0.50) \ x \ 5,00,000$ $V_{L} = 2,08,333 + 2,50,000$ $V_{L} = 4,58,333$

1.2.5 Trade off Theory

The Trade-Off Theory of Capital Structure is a financial theory which suggests an optimal capital structure for a firm in which the benefits of debt financing (tax benefits and reduced cost of capital) are balanced against the costs of debt financing (financial distress and agency costs). According to the hypothesis, there is a trade-off between the tax benefits of debt and the expenses associated with financial distress. Let's break down the key components of the Trade-Off Theory:

1. Tax Shields: When a company uses debt to finance its operations, it incurs interest payments on that debt. The interest payments are considered a tax-deductible expense. This means that the company can subtract the interest payments from its taxable income, reducing the amount of income on which it must pay taxes. As a result, the tax shield provides a financial advantage to the company.

Illustration: Suppose a company has ₹ 10,00,000 as its taxable income and incurs ₹ 1,00,000 in interest expenses. If the corporate tax rate is 30%, the company can deduct the interest expenses, reducing its taxable income to ₹ 9,00,000 and saving ₹ 30,000 in taxes (30% of ₹ 1,00,000).

2. Financial Distress Costs: The risk of financial distress increases as a company incurs more debt. When a corporation is unable to satisfy its debt obligations, it enters financial trouble, which can lead to bankruptcy. Legal fees, bankruptcy fees, and the potential loss of business are all examples of financial distress costs. As debt levels rise, so do these costs.

Explanation: X Ltd. a company with high levels of debt that faces financial difficulties. It may need to spend significant amounts on legal and financial advisors during bankruptcy proceedings. Moreover, the uncertainty surrounding the company's future may lead to a loss of customer trust and business.

3. Agency Costs: When a company has both equity and debt holders, conflicts of interest can arise. Shareholders may take actions that benefit them but harm debtholders, or vice versa. These conflicts can result in agency costs such as monitoring and enforcement to ensure that both parties are treated fairly.

Explanation: Consider a situation where shareholders prioritize their interests over debt holders, leading to decisions that increase the risk of financial distress. Debt holders may then incur additional costs to monitor the company's actions and protect their interests.



Source: https://icmai.in/upload/Students/Syllabus2016/Inter/Paper-10-January-2021.pdf

A diagram depicting the relationship between the total value of the firm and the level of debt can be used to visually represent the trade-off. The benefits of tax shelters are eventually offset by the rising costs of financial hardship and agency charges, resulting in an optimal capital structure.

Optimal Capital Structure: The optimal capital structure is the point at which the total value of the firm is maximized. It's the balance between the tax benefits of debt and the costs associated with financial distress and agency. Companies aim to find this equilibrium to maximize shareholder wealth.

Variation Across Companies: It's important to note that the optimal capital structure is not a one-size-fits-all concept. Different companies in different industries and economic conditions may have different optimal levels of debt. Factors such as business risk, growth opportunities, and industry norms all play a role in determining the appropriate capital structure for a particular company.

In summary, the Trade-Off Theory provides a framework for companies to consider when determining their capital structure. It involves weighing the tax advantages of debt against the increasing costs of financial distress and agency costs, ultimately aiming to find the optimal balance that maximizes the overall value of the firm.



Source: https://www.taxmann.com/post/blog/guide-to-capital-structure-definition-theories-and-approach7777

4.2.6 Pecking Order Theory

The Pecking Order Theory suggests that companies have a preference for financing their investments in a specific order, and this order is based on the costs associated with different sources of financing.

1. Internal Financing (Retained Earnings): The Pecking Order Theory starts with the idea that companies prefer to use internal financing first. Internal financing comes from retained earnings, which are the profits that a company has earned and kept rather than distributed as dividends. Firms prefer this source because there are no information asymmetry or signaling issues associated with using their own funds.

Explanation: If a company has positive retained earnings, it can use those funds to fund new projects or investments without having to seek outside funding. This avoids the costs and signals associated with seeking outside capital.

2. Debt Financing: If internal financing is insufficient, debt financing is the next best option. Because debt does not dilute ownership, it is considered a less expensive choice than issuing additional equity. According to the Pecking Order Theory, firms prefer debt over stock because debt issuing has less information asymmetry.

Explanation: Assume a company requires additional funds in addition to its retained earnings. Instead of issuing new shares (equity), it may decide to borrow via loans or issue bonds. Debt has the benefit of not sending potentially negative signals to the market because it does not imply that the company believes its stock is overpriced.

3. Equity Financing (As a Last Resort): Equity financing, such as issuing new shares, is considered a last resort according to the Pecking Order Theory. The theory suggests that companies are reluctant to issue new equity because it can be perceived by investors as a signal that the company's stock is overvalued or that the company lacks internal funds and has exhausted debt options.

Illustration: If a company cannot cover its financing needs through internal funds or debt, it might reluctantly turn to equity financing. This could lead to signalling problems, as investors may interpret the need for equity as a lack of confidence in the company's future prospects.

Implications:

- 1. Information Asymmetry: The Pecking Order Theory highlights the importance of knowledge asymmetry in financing decisions. Firms choose financing methods that provide less ambiguous information about their financial health.
- 2. Avoidance of Signalling Costs: Companies want to avoid the signalling costs that come with raising external money. When opposed to stock issues, internal funds and debt are thought to be less likely to convey negative signals to the market.

3. Organic Growth Emphasis: According to the principle, organic growth should be preferred over external financing, with cash created internally first. This shows a conservative capital structure strategy.

To summarise, the Pecking Order Theory explains how corporations prioritise finance sources. It implies that corporations follow a pecking order, with internal finances coming first, followed by debt, and stock issue coming last. In the decision-making process, this theory highlights the necessity of avoiding information asymmetry and signalling costs.



Source: https://www.taxmann.com/post/blog/guide-to-capital-structure-definition-theories-and-approach#7777

4.4 EXERCISE

Q1. Select the most appropriate alternative:

1. Which of the following is not an assumption of Modigliani-Miller approach?

a. Capital market is perfectb. Heterogenous riskc. dividend payout is 100%d. Homogenous risk

2. Which of the following approach suggests careful use of leverage.

- a. MM Approach b. Trade- off Theory
- c. Net Income Approach d. Traditional Approach

3. According to which approach, the overall capitalization rate and the cost of debt remain constant for all degrees of leverage.

a. MM Approach	b. Net Income Approach
c. Pecking Order Theory	d. Traditional Approach

4. The tax savings of the firm derived from the deductibility of interest expense is termed as

a. Interest rate

b. Interest deduction

d. All of the above

Capital Structure Theories

c. Interest Tax shield

d. Operating Leverage

5. Which of the following approach assumes that change in the degree of leverage will alter the WACC.

a. Net Income Approach

b. MM Approach

c. Net operating Income Approach

Answers:

|--|

State whether true or false:

1. The Modigliani-Miller Proposition with taxes states that the value of a firm is unaffected by its capital structure.

2. The Trade-off Theory suggests that there is an optimal capital structure where the tax benefits of debt are balanced with the costs of financial distress.

3. According to the Pecking Order Theory, firms prefer to use internal financing (retained earnings) over external financing to avoid information asymmetry.

4. The Static Trade-off Theory argues that firms continuously adjust their capital structure to maintain an optimal debt-to-equity ratio.

5. According to the Agency Cost Theory, conflicts of interest between shareholders and management may lead to an optimal capital structure that minimizes agency costs.

Answers:

1. False	2. True	3. True	4. False	5. True	6. False

Answer in Brief

1. What do you mean by the term 'capital structure'? What are the salient features of an optimum capital structure?

2. State the major determinants of capital structure planning.

3. Briefly explain with an illustration the Net Income (NI) and Net Operating Income (NOI) approaches.

4. What is the Traditional View on capital structure?

5. What is M&M hypothesis on capital structure? Does the existence of corporate taxes have impact on it?

6. Critically examine the Modigliani Miller Hypothesis on capital structure.

7. What is arbitrage? How does it work?

Unsolved illustrations:

1. The expected Earnings before interest and taxes (EBIT) of a Black Ltd. is \gtrless 4,00,000. It has issued equity share capital and the cost of equity is assumed to be 10%. It has also issued 8% debt of \gtrless 5,00,000. Find out the value of firm and overall cost of capital (WACC) as per Net Income Approach.

What would be your answer if the debt issued are

- a. ₹6,00,000
- b. ₹3,50,000

Answer:

Debt Issued	5,00,000	6,00,000	3,50,000
Value of the Firm	41,00,000	41,20,000	40,70,000
WACC	9.76%	9.71%	9.83%

2. A firm has an EBIT of ₹ 50,00,000 and belongs to a risk class of 10% (it means that its overall cost of capital is 12.5% (Ko = 10%). What will be the value of equity, if it employees 6% debt to the extent of 30%, 40% or 50% of the total value of the firm? Assume that Net Operating Income approach applies.

Answer:

Debt Employed	30%	40%	50%
Value of the Equity	2,80,00,000	2,40,00,000	2,00,00,000
Cost of Equity	15.29%	16.83%	19.00%

3. A firm has an EBIT of \gtrless 4,00,000. The company is planning to employ debt as mentioned in the table below as a percentage of the total capital of \gtrless 50,00,000.

Debt Proportion	30%	50%	60%	80%
Cost of Equity	14%	16%	15%	13%
Cost of Debt	8.5%	9.75%	11%	9%

What is the value of the firm and its overall cost of capital as per Traditional approach?

Answer:

Debt Employed	30	50	60	80
WACC	12.35%	12.88%	12.6%	9.8%

4. There are 2 firms "A" and "B" having same earnings before interest and tax Rs. 20,000. Firm A is a levered company having a debt of Rs. 1,00,000 at 8% interest. The cost of equity for B Company is 11.5% and for A is 13.5%. Find out Value of firm?

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DIVIDEND DECISIONS - I

Unit Structure

- 5.0 Learning Objectives
- 5.1 Need and Importance of Dividend
- 5.2 Determinants/Constraints of Dividend Policy
- 5.3 Legal and Procedural Aspects in Dividend
- 5.4 Exercise

5.0 LEARNING OBJECTIVES

After learning this unit, learner will be able to:

- Understand the Meaning of Dividend Decision
- Understand the needs and importance of Dividend Decision
- Discuss various Forms of Dividends
- Discuss various Determinants of Dividend
- Identify the legal and procedural aspects for declaration of dividend.

5.1 NEED AND IMPORTANCE OF DIVIDEND

5.1.1 Introduction

Dividends are the portion of a company's profit after taxes that is paid to its shareholders. In other terms, a company's profit after taxes can be used for the following purposes:

- a. Dividend distribution or;
- b. Surplus maintained for future growth

Dividends are a significant monetary outlay for many businesses. At first look, it appears that a firm can distribute as much as it wants to its shareholders. It may appear equally evident that a company may invest money for its shareholders rather than pay dividends.

Dividend decisions are frequently mixed in with other financing and investment decisions for a company. Some companies pay minimal dividends because management is enthusiastic about the company's future and wants to keep money for expansion. Another company may borrow heavily to fund capital expenditures. This frees up funds for dividends. Dividend policy must be separated from other financial management issues. The dividend policy is a trade-off between retaining earnings and paying out cash and issuing shares on the one hand. Many companies pay dividends and also issue stock from time to time. They could prevent stock issues (where the firm's costs are highest) by paying lesser dividends. Many other companies limit dividends in order to avoid having to issue stock. They, on the other hand, might issue shares and raise dividends on occasion. As a result, both companies confront a dividend policy trade-off.

There are numerous reasons to pay dividends and numerous reasons not to pay dividends. As a result, dividend policy is always a source of contention.



5.1.2 Types of Dividends

1. **Cash dividends:** These are the most common type of dividends, and they are paid in cash. A company distributes a portion of its profits to shareholders as dividends.

For example, An EV Company, JKL Ltd., has made ₹ 1,000 crores in profit for the year 2023. They decided to pay their shareholders 20% of that amount as a dividend, which would be ₹ 200 Crore INR (1,000 Cr x 0.20). This would mean each shareholder would receive a certain dividend amount, depending on how much stock they own. Suppose the company has issued 100 Cr shares with the face value of ₹ 5 per share, each shareholder will receive a dividend of ₹ 10 per share. (1,000 Cr/100 Cr). The dividend rate will be $\frac{10}{5}x 100 = 200\%$.

The benefits and drawbacks of cash dividends are determined by the company's financial status. On the one hand, shareholders gain from getting a cash dividend payout; on the other hand, firms have less money to reinvest in their businesses, thereby limiting growth potential. Cash dividends provide an instant return, but they also mean that corporations have less money to reinvest and develop.

2. Stock dividends: Stock dividends, as the name implies, are paid out in the form of extra shares rather than cash.

For example, PQR Ltd. a Pharmaceuticals Company chose to pay its shareholders 20% of its income in the form of a stock dividend. This means that for every five shares owned, each shareholder will receive an additional share.

Stock dividends have the advantage of increasing a shareholder's prospective returns without requiring them to invest more money. Furthermore, unlike cash dividends, corporations will not have to part with their gains. On the negative, they don't deliver instant advantages and are riskier than cash dividends. The new shares' market value could be lower or higher than when the initial investment was made.

3. **Property dividends:** These various types of dividends are distributed in the form of assets rather than cash or shares. This can range from real estate to antiques, as well as intangible assets such as patents or copyrights. Property dividends can diversify an investment portfolio and may provide more tax benefits than other types of dividends. On the negative side, there is always the risk that the value of these assets will decline over time, reducing potential profits.

For example, ABC Ltd. FMCG company pays its shareholders 15% of its profits as property dividends. This would mean each shareholder will receive an additional asset worth ₹ 150 Crore (1,000 Cr x 0.15).

4. Scrip dividends: Scrip dividends are similar to stock dividends in that shareholders receive a scrip or voucher that can be exchanged for shares on the market rather than additional shares directly from the company.

The benefit of scrip dividends is that they give investors more freedom by allowing them to choose when and how much of their dividend money should be reinvested. On the negative, there is always the possibility that the value of these assets would drop over time, reducing possible profits.

For example, XYZ Financial Services Company decides to pay its shareholders 20% of its profits as a scrip dividend. This would mean each shareholder will receive a scrip worth ₹ 200 Crore (1,000 Cr x 0.20) that can be exchanged for market shares later.

5. Liquidating dividends: When a corporation is closing down its operations and there isn't enough money left to pay out other forms of dividends, liquidating dividends are paid out to shareholders.

The benefit of liquidation dividends is that they can give a return to shareholders even if the business is no longer in operation. On the negative side, it usually indicates that all remaining assets will be liquidated to pay the dividend, and the firm will cease to exist.

For example, MNO a construction firm decides to pay its shareholders 50% of its remaining assets as a liquidating dividend. This would mean each shareholder will receive an amount equivalent to \gtrless 500 Crore (1,000 Cr x 0.50) from the sale of the company's assets.

5.1.3 Types of Dividend Policies

Dividend policies are classified into four types. Let us cover them one by one:



- **1. Regular dividend policy:** In this form of dividend policy, investors receive dividends at the standard rate. Investors in this case are typically those seeking consistent income. This type of dividend payment can only be sustained if the company generates consistent earnings.
 - Advantages of a Regular Dividend Policy:
 - It aids in instilling trust in shareholders.
 - It helps to keep share prices stable.
 - It aids in the nurturing of the company's goodwill.
 - It aids in providing regular income to stockholders.
- 2. Stable dividend policy: Here the payment of certain sum of money is regularly made to the shareholders.

It is of three types:

- a. Constant dividend per share: In this situation, a reserve fund is established to pay a certain amount of dividends each year when the company's earnings are insufficient. It is appropriate for businesses with consistent earnings.
- b. Constant payout ratio: Every year, a fixed percentage of earnings is paid as a dividend under this form.
- c. Stable rupee dividend plus extra dividend: This type pays a low dividend per share on a consistent basis plus an additional dividend during the year when the company earns a high profit. The additional dividend may be regarded as a "bonus" paid to shareholders as a result of the firm's typically good year. This additional dividend may be paid in cash or bonus shares, depending on the firm's liquidity position.

Merits of stable dividend policy:

- It helps in creating confidence among the shareholders.
- It stabilizes the market value of shares.
- It helps in marinating the goodwill of the company.
- It helps in giving regular income to the shareholders.
- **3. Irregular dividend:** as the name suggests here the company does not pay regular dividend to the shareholders.

The company uses this practice due to following reasons:

- Due to uncertain earning of the company.
- Due to lack of liquid resources.
- The company is sometime afraid of giving regular dividend.
- Due to uncertainty of business.
- 4. No dividend: The company may use this type of dividend policy due to requirement of funds for the growth of the company or for the working capital requirement.

5.1.3 Need for Dividend Policy

Dividend policy refers to the set of principles and decisions that a corporation uses to determine how much of its earnings will be distributed to shareholders as dividends. The requirement for a well-defined dividend policy might vary depending on the company's goals, financial status, and shareholder preferences. Here are some significant dividend policy concerns and requirements:

1. Shareholder Expectations: Companies must regard their shareholders' expectations. Some investors, such as income investors, may desire regular dividend payouts, whilst others, such as growth

- 2. Financial Stability: A company's financial stability and profitability are important factors in deciding its dividend policy. To fund regular dividend payments, companies must have steady and sustained earnings. Unstable or unexpected profitability might cause anxiety and displeasure among shareholders.
- **3.** Cash Flow: A company's cash flow must be sufficient to cover dividend payments. It must carefully manage its financial position in order to pay dividends without endangering the company's operational requirements, investment goals, or debt obligations.
- 4. Investment Opportunities: Companies with appealing investment prospects may prefer to save earnings for internal growth rather than handing them out as dividends. This decision is influenced by the company's growth goal as well as the potential return on investment from retaining earnings.
- 5. Tax Implications: When determining dividend policy, companies and shareholders may be influenced by tax issues. Dividend tax rates can vary, and businesses may change their policies to maximise tax efficiency for both the firm and its shareholders.
- 6. Industry Norms: Industry norms and standards can also have an impact on dividend policies. Some industries are usually linked with bigger dividend payouts, whereas others, particularly those in the technology or biotech sectors, may emphasise reinvestment for R&D.
- 7. Market Conditions: The ability of a firm to pay dividends can be affected by economic and market conditions. Companies may reconsider their dividend policy during economic downturns or moments of financial crisis in order to conserve cash and maintain financial flexibility.
- 8. Legal and Regulatory Requirements: Companies must adhere to legal and regulatory restrictions regarding dividend distributions. These may include limitations on the maximum amount of dividends that can be paid out or the requirement for regulatory permission.
- **9. Corporate Image and Reputation:** Dividend payments might help to improve a company's reputation. Dividends paid on a regular and increasing basis may entice investors by signalling financial health, stability, and confidence in the company's future prospects.
- **10. Debt Obligations:** Companies with considerable debt obligations must assess how dividend payments will affect their capacity to meet debt servicing obligations. If certain financial parameters are not satisfied, lenders may establish covenants that limit dividend payouts.

In conclusion, a well-thought-out dividend policy is critical for aligning the interests of the firm and its shareholders, preserving financial stability, and

reacting to changing economic and market situations. To construct a sustainable and effective dividend policy, companies must carefully balance competing shareholder demands, investment opportunities, and financial commitments.

5.1.4 Significance of Dividend Policies

- 1. Reliable Income Source: To begin, it is critical to understand the position of dividends in your investment portfolio and income sources. It is vital to highlight that dividends are a consistent and predictable source of income for investors who do not make any changes to their investment portfolio. In general, the majority of your revenue comes from selling your shares or stocks. Dividends, on the other hand, provide a consistent source of income for your portfolio. Although companies are not required to pay out dividends to shareholders, significant corporations that have thrived in the markets over the years have maintained a consistent dividend sharing practise with their shareholders.
- 2. Tax-efficient: By choosing dividend choices, investors can preserve a significant portion of their earnings from high taxes. Dividends, being a consistent stream of income, are taxed differently if properly managed. The tax rates for qualifying dividends range from 5% to 20%, depending on the income range. A low-income range is typically taxed at a rate of 5%, which is extremely low when compared to the percentage of tax levied on other investments, which is typically greater than 30%. Unlike income from other assets, dividend profits provide a number of tax advantages.
- **3. Growth Opportunity:** When you invest in dividend paying companies, you are essentially expanding your return horizons. Most of the well-established companies or market players not only stay consistent with dividend payouts to their investors but also increase the dividend percentage at regular intervals (generally once every year). Although, risk cannot completely be eliminated while investing in market-related instruments, investing in dividend paying companies can assure partial returns over investments that can be better than non-profiting investments in stocks, especially in such volatile markets. Of course, there are exceptions, but only a few dividend paying companies have faltered over the years. The rest of them have been consistent in paying out dividends with a promising future ahead.
- 4. Expansion of Portfolio: Dividends provide a consistent source of income for investors, providing a good opportunity to diversify and enhance their investment portfolio. Portfolio diversity is critical to your financial health, needing a significant amount of money to be invested across industries. Even if you invest in SIPs, you will still need monthly funds. Dividends, on the other hand, provide investors with greater flexibility, allowing them to make better investment selections while extending their portfolio. Furthermore, by

reinvesting your profits, you create additional sources of income by purchasing more shares. You can always adjust the flow of money according to your needs since you can reinvest a portion of your dividend profits back into your investments. Furthermore, investors can freely reinvest their dividend returns back into the original source.

- 5. Beats Inflation: Inflation may be a pain in the neck, capable of evaporating all of your hard-earned money. When budgeting or reviewing profit earnings, investors frequently fail to account for inflation, which later undermines their core assumptions and forecasts. Dividends assist investors in offsetting the loss caused by inflation, allowing them to reap any meaningful value from their investments. For example, if you generate an average return of 8% per year on your assets and inflation is 10% in the given year, you have realistically lost 2% rather than made any profit. This, in turn, has a negative impact on the capital's purchasing power. If, on the other hand, your investments provide an 8% return on investment plus a 4% dividend distribution, you will have achieved a profit that exceeds the rate of inflation. In general, most dividend-paying assets outperform inflation, leaving the investor with a small profit.
- 6. Risk and volatility management: This may come as a surprise, but dividends can help you manage portfolio risk and volatility. Dividends assist balance out losses and decrease risk when investors suffer losses due to a drop in the stock price. A number of studies have found that dividend-paying companies and stocks outperform non-dividend-paying companies and equities. These trends have been most noticeable during the market's bearish cycles. Despite the fact that a bear market is generally unfavourable for all industries and investment instruments, dividend paying equities have outperformed their rivals rather well during these times as well.
- 7. Sustainability: Every day, a person's needs and desires rise, leaving little room for a balanced lifestyle and consistent investing. Dividends serve as a support mechanism in such situations, promoting income flow sustainability. With the many effects of inflation on the individual and the economy, a dividend producing stock is one of the most dependable go-to solutions for a solid income.

5.2 DETERMINANTS/CONSTRAINTS OF DIVIDEND POLICY

The Board of Directors of the company/organization determines dividend policy after considering a variety of criteria, including legal constraints imposed by the government to protect the interests of various parties or constituents of the company.

The main considerations are as follows:

1. Legal: As regards cash dividend policy several legal constraints bear upon it a firm may not pay a dividend which will impair capital.

Dividend must be paid out of firm's earnings/current earnings. Contract/ Agreements for bonds/loans may restrict dividend payments. The purpose of legal restriction is to ensure that the payment of dividend may not cause insolvency.

- 2. Financial: Dividend policy is constrained by financial constraints. A company can only pay dividends if it has enough cash to do so; a company cannot pay dividends if its earnings are in accounts receivables or if it has necessary liquidity.
- **3. Economic Constraints:** Furthermore, there are economic constraints. The question is whether the value of the dividend influences the firm's worth. If the answer is affirmative, then there must be an ideal level of dividend that maximises the firm's stock market price.
- 4. Nature of Business Conducted by a Company: A firm with a business that generates steady earnings may prefer to have a stable and consistent dividend policy. Consumer/consumer durable industries have a consistent dividend policy.
- 5. Existence of the Company: The length of the company's existence influences dividend policy. Because of their long history, the company may have a superior dividend policy than the new companies.
- 6. Type of Company Organisation: Dividend decisions are influenced by the type of company organisation, whether it is a private limited company or a public limited corporation. A view for acquiescence and a cautious dividend policy may be taken in a closely held firm, but for a public limited company with a wide range of shareholders, a more progressive and promising dividend policy will be the best choice.
- 7. Financial Needs of the Company: The dividend policy is influenced by the company's need for extra capital. The fundamental consideration in dividend decisions is the extent to which profits must be invested in the company for business growth. A company's working capital situation is an important aspect that influences dividend policy since no company would issue a dividend that would undermine its financial strength and risk its solvency and existence.
- 8. Market Conditions: Dividend decisions are influenced by business cycles, which include booms and depression. In a down market, bigger dividend declarations are utilised to market securities and create a stronger image of the company. During the boom, the company may want to save more, develop reserves for growth and expansion, or fulfil its working capital requirements.
- **9. Financial Arrangement:** In the event of a financial arrangement being entered into or planned, such as a merger or amalgamation with another company, a liberal dividend distribution policy is followed to make the share stock more appealing.
10. Change in Government Policies: Changes in government policies, particularly those affecting the company's earnings, are also taken into account when determining dividends. For example, a higher tax rate will undoubtedly affect firm earnings and, as a result, dividend decisions. Furthermore, fiscal, industrial, labour, and industrial policies all have varying degrees of influence on individual corporate dividend selections.

5.3 LEGAL AND PROCEDURAL ASPECTS IN DIVIDEND

5.3.1 Legal Provisions Regarding Dividend

- 1. Declaration of dividend to be out of the Profits: As per Section 123, dividend by a company for any financial year can be paid or declared only out of:
 - a. Profits of the company of that year arrived at after providing for the depreciation in accordance with the provisions of the Act, or
 - b. Profits of the company for any previous financial year or years after providing for depreciation as per the provisions of the Act, or
 - c. Out of both, or
 - d. Money provided by the Central or State Governments for the payment of dividends in pursuance of the guarantee given by that Government.
- 2. **Provision for Depreciation:** A company is required to provide for depreciation as per the provisions of the Schedule II of the Companies Act 2013 before any dividend can be paid out of profits of any financial year.
- **3. Transfer of Profits to Reserves:** A company should, prior to the declaration of any dividend in any financial year, transfer such percentage of its profits for that financial year as it deems suitable to the company's reserves.
- 4. Declaration of Dividend out of Reserves: A company can pay dividends from its 'reserve funds,' which are made up of the company's undistributed profits from any preceding fiscal year or years (arrived at after providing for depreciation as required). According to the Companies (Payment and Declaration of Dividend) Rules 2014, in the event of inadequacy or absence of earnings in any year, a business may declare dividend from free reserves if the following conditions are met:
 - a. The rate of dividend declared should not be more than the average of the rates at which dividend was declared by it in the

three previous years immediately preceding that year, provided that this rule shall not apply to a company, which has not declared any dividend in each of the three preceding financial year.

- b. The total amount to be drawn from such accumulated profits shall not exceed one-tenth of the sum of its paid-up share capital and free reserves as appearing in the latest audited financial statement.
- c. The amount so drawn shall first be utilised to set off the losses incurred in the financial year in which dividend is declared before any dividend in respect of equity shares is declared.
- d. The balance of reserves after such withdrawal shall not fall below fifteen per cent of its paid-up share capital as appearing in the latest audited financial statement.
- e. No company shall declare dividend unless carried over previous losses and depreciation not provided in previous year or years are set off against profit of the company of the current year.
- 5. Payment of Dividend out of Capital Profits: Profit arising out of the sale or revaluation of capital assets is termed as capital profit. Capital profits may be utilised for the purposes of declaration of dividend provided:
 - (a) these have been realised in cash,
 - (b) these remain as profits after revaluation of all the assets and liabilities, and
 - (c) there is nothing in the Articles of Association of the company prohibiting their distribution amongst the shareholders in the shape of cash dividends.

Revocation of Declared Dividend:

Dividends declared with shareholder approval establish a debt owed to the shareholders. In general, a declared dividend cannot be revoked without the approval of the shareholders unless

- there are intervening circumstances after the declaration, such as the outbreak of a war, a massive fire destroying the company's properties, the imposition of hard taxes, or other causes diminishing the company's assets.
- If a dividend was declared illegally or in violation of the law, the board of directors would be justified in revoking the payout.

Prohibition on Payment of Dividend

A corporation that fails to repay the deposit or a portion thereof, or any interest thereon, within the time specified (under sections 73 and 74), shall

not declare any dividend on its equity shares for the duration of the failure. [Section 123(6)]

5.3.2 Procedural Aspects in Dividend

Procedure for Declaration of Dividend

A corporation that desires to declare and pay dividends should follow the processes outlined below. Furthermore, if the company's shares are listed on the stock exchanges, extra requirements concerning Listing Agreements must be met.

- 1. Board of Directors Recommendation: A dividend can be announced solely on the recommendation of the Company's Board of Directors. The stockholders have no authority to declare dividends. After reviewing and approving the company's financial results, the Board of Directors sets the dividend rate to be distributed and recommends it to the shareholders. A Board Meeting shall be called to this end in order to pass the resolution for the purposes of
 - rate of dividend and the amount of dividend to be paid
 - book closure date for dividend
 - date of annual general meeting

– Bank with which the account shall be opened for the remittance of dividend.

2. Shareholder approval: The dividend recommended by the Board of Directors is declared by a resolution voted by the shareholders at the Annual General Meeting. The declaration of dividends should be included in the notice of the Annual General Meeting as an ordinary business item to be completed. When approving the dividend rate at the Annual General Meeting, shareholders have the authority to declare a lower rate of dividend than that suggested by the Board, but they have no authority to increase the amount or rate of dividend recommended by the Board. When a dividend is declared, it creates debt against the corporation.

Usually, dividend is declared at the annual general meeting. But a company which has not declared dividend at an annual general meeting may do so at a subsequent general meeting. A company which has declared dividend at a general meeting is not permitted to declare dividend for the second time in that year.

3. Dividend includes Interim Dividend: According to Section 2(35) of the Companies Act of 2013, dividend includes interim dividend. The Board of Directors may declare an interim dividend if they have the authority to do so. Furthermore, the restrictions on dividend payment included in Sections 123, 124, and 127 apply to interim dividends as well.

- 4. Dividend must be deposited in a Separate Bank Account: The company shall deposit the dividend amount (including interim dividend) in the separate bank account formed for this purpose within five days of its declaration. The interim dividend must be placed in a bank account within five days after the Board Meeting, while the final dividend must be deposited within five days of the Annual General Meeting at which it was authorised by the shareholders.
- 5. Dividend to be paid by cheque or warrant Section 123(5) of the Companies Act, 2013 provides that the dividend payable in cash may be paid either by cheque or warrant or in any electronic mode to the shareholder entitled to the payment of dividend.
- 6. Time frame for payment of Dividend: According to Section 127 of the Companies Act of 2013, the dividend or warrants in respect thereof must be paid or deposited within 30 days of the date of dividend declaration.
- 7. Transfer of Unpaid Dividend: According to Section 124 of the Act, if a company declares a dividend but it is not paid (or claimed) within 30 days of the date of declaration, the company must transfer the total amount of dividend that remains unpaid or unclaimed to a special account to be opened by the company in that behalf with any Scheduled Bank, known as the "Unpaid Dividend Account," within 7 days of the expiry of the period of 30 days. The corporation will pay interest at the rate of 12% per year for the delay in making the above transfer.
- 8. Transfer of unpaid or unclaimed dividend to the Investor Education and Protection Fund: The company must transfer to the Investor Education and Protection Fund any amount of dividend that remains unpaid or unclaimed for 7 years from the date it became due for payment [Section 124(5)]. When transferring funds to the Fund, the corporation must provide the details required by the Central Government to the body designated by the government. The aforementioned fund will be used to raise investor awareness and defend investors' interests.

In the event of a failure to comply with these regulations, the firm and each officer of the company who fails to comply will be fined.

Failure to pay dividends within 30 days results in a penalty.

Where a dividend has been declared by a company but has not been paid, or the warrant in respect thereof has not been posted, within 30 days from the date of the declaration, to any shareholder entitled to the payment of the dividend, every director of the company knowingly a party to the default shall be punished with simple imprisonment for a term which may extend to 2 years, and shall also be liable to a fine of \gtrless 1000 for each day such default continues. The corporation will additionally be required to pay simple interest at the rate of 18% per annum for the duration of the default (Sec. 127).

However, no offence shall be deemed to have been committed in the following cases:

1. When a dividend is not legally declared or when a dividend declaration is legally untenable.

2. where the dividend could not be paid because of the operation of any law;

3. Where a shareholder has given the company directions regarding the payment of the dividend and those directions cannot be followed;

4. Where there is a dispute regarding the right to receive the dividend;

5. where the dividend has been lawfully adjusted by the company against any sum due to it from the shareholder; or

6. where, for any other cause, the failure to pay the dividend or post the warrant within the aforementioned period was not attributable to any default on the part of the corporation.

5.4 EXERCISE

1. What is the primary purpose of dividends in a company?

- a. To increase debt obligations b. To fund capital expenditures
- c. To reduce shareholder trust d. To limit growth potential

2. Which type of dividend is paid out in the form of extra shares rather than cash?

a. Cash dividends		b. Stock dividends
c. Property dividends		d. Scrip dividends

3. What is the advantage of scrip dividends?

- a. They provide an instant return
- b. They give investors more freedom to reinvest
- c. They involve the distribution of physical assets
- d. They are not subject to market fluctuations

4. In which situation might a company pay liquidating dividends?

- a. During a period of rapid expansion
- b. When closing down its operations
- c. To fund capital investments
- d. When issuing additional shares

What is a characteristic of a stable dividend policy?

- a. Irregular dividend payments b. Variable dividend per share
- c. A constant payout ratio d. Unpredictable dividend amounts

Answers:

1. b. To fund capital expenditures 2. b. Stock dividends

3. b. They give investors more freedom to reinvest

4. b. When closing down its operations 5. c. A constant payout ratio

True or False Statements:

1. Stock dividends provide an immediate return to shareholders.

2. Scrip dividends allow investors to exchange vouchers for cash directly from the company.

3. The length of a company's existence has no influence on its dividend policy.

4. Dividend payments can be influenced by changes in government policies, such as tax rates.

5. According to Section 123(6) of the Companies Act, a company failing to repay a deposit cannot declare any dividends on its equity shares during the failure period.

1. False 2. False 3. False 4. True 5. True

Answer in Brief

1. Briefly explain the primary considerations for a company when deciding whether to pay dividends or reinvest in the business.

2. What is the main advantage of stock dividends, and why might some companies choose to issue them?

3. Describe the concept of scrip dividends and highlight one benefit and one drawback associated with this type of dividend.

4. Under what circumstances might a company decide to pay liquidating dividends, and what are the potential implications for shareholders?

5. Explain the significance of industry norms in influencing a company's dividend policies. Provide an example of how industry norms might impact dividend decisions.

Short Notes:

1. Dividend Policy Trade-Off:

2. Stable Dividend Policy:

3. Irregular Dividend Policy:

- 4. Legal Provisions for Dividend Declaration:
- 5. Investor Education and Protection Fund (IEPF):

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6

DIVIDEND DECISIONS - II

Unit Structure

- 6.0 Learning Objectives
- 6.1 Dividend Theories
- 6.2 Walter's Model
- 6.3 Gordon's Model
- 6.4 Modigliani And Miller's Hypothesis.
- 6.5 Other Dividend Models
- 6.6 Exercise

6.0 LEARNING OBJECTIVES

After learning this unit, learner will be able to:

- Explain various theories of Dividend Decisions
- Apply practically the various dividend decision models.

6.1 DIVIDEND THEORIES

Theories of dividend decisions

The following are some of the prominent dividend theories in financial management:

- 1. Walter's model
- 2. Gordon's model
- 3. Modigliani and Miller's hypothesis.

The Dividend Relevance Model and Dividend Irrelevance Model are two theoretical frameworks that explore the relationship between dividend policy and a firm's value.

Dividend Relevance Model: According to the Dividend Relevance Model, dividend policy is important and can affect a company's value. Dividend payments can alter a company's stock price, according to this concept, since investors consider dividends when making investment decisions. Under this model we have two dividend theories

- a. Walter's model
- b. Gordon's model

Dividend Irrelevance Model: The Dividend Irrelevance Model, on the other hand, claims that dividend policy has no effect on the firm's worth or the wealth of its shareholders under certain assumptions. Under this model we have

a. Modigliani Miller Approach



Let us understand each of these models in detail:

6.2 WALTER'S MODEL

Introduction:

According to Professor James E. Walter, the choice of dividend policy almost always has an impact on the enterprise's value. His model clearly demonstrates the significance of the relationship between the firm's internal rate of return (r) and its cost of capital (ke) in selecting the dividend policy that will maximise shareholder wealth.

Walter's model is based on the following assumptions:

- 1. All investments are funded by retained earnings; no debt or new equity is issued;
- 2. The firm's internal rate of return (r) and cost of capital (k) are constant;
- 3. All earnings are distributed as dividends or reinvested internally promptly.
- 4. Beginning earnings and dividends are constant. The earnings per share (E) and divided per share (D) values in the model may be adjusted to decide results, however any given value of E and D is considered to remain constant forever in determining a given value.

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Perpetual succession of the company.

Walter's formula to determine the market price per share (P) is as follows:

$$P = \frac{D}{Ke} + \frac{\left(\frac{r}{Ke}\right)(E-D)}{Ke}$$

Which is further simplified as:

$$P = \frac{D + \left(\frac{r}{Ke}\right)(E - D)}{ke}$$

Where,

5.

P = Market Price of the share.

E = Earnings per share.

D = Dividend per share.

Ke = Cost of equity/ rate of capitalization/ discount rate.

r = Internal rate of return/ return on investment

The equation above implies that the market price per share is the sum of the current values of two income sources:

i. The present value of an infinite stream of constant dividends i.e. $\frac{D}{\kappa_{e}}$ and

ii. The present value of the infinite stream of stream gains. $\frac{\frac{r}{Ke}(E-D)}{\kappa_o}$

Criticism:

Walter's model is quite useful for demonstrating the implications of dividend policy on an all-equity firm under various rate of return assumptions. However, the model's reduced character can lead to results that are net true in general, but valid for Walter's model.

The criticisms on the model are as follows:

- 1. Walter's share valuation model combines the firm's dividend policy with its investment programme. The model assumes that the firm's investment possibilities are financed only by retained earnings and that no external financing debt or equity is employed for the purpose. If this is the case, either the firm's investment or dividend policies, or both, will be sub-optimal. Only when this optimal investment is made will the owners' wealth be maximised.
- 2. Walter's approach is predicated on the assumption that r is fixed. In fact, it falls as more money is invested. This represents the idea that the most profitable investments are made first, followed by the less profitable ventures.

- 3. The firm should take a step when r = k. This is plainly an incorrect policy designed to maximise the wealth of the owners.
- 4. The cost of capital, or discount rate, of a firm, K, does not remain constant; it varies in direct proportion to the firm's risk. As a result, the present value of the firm's income moves in the opposite direction of the cost of capital. Walter's model abstracts from the influence of risk on company value by assuming that the discount rate, K, is constant.

Implication:

Company	Condition of r v/s Ke	Correlation between Size of Dividend and Market Price of share	Optimum dividend payout ratio
Growth	r > Ke	Negative	Zero
Constant	r = Ke	No correlation	Every payout ratio is optimum
Decline	r < Ke	Positive	100%

Illustration 01:

Runner Ltd. earns $\gtrless 10$ / share. Capitalization rate and return on investment are 10% and 12% respectively. DETERMINE the optimum dividend payout ratio and the price of the share at the payout.

Solution 01:

As per the implications shown in the table above of the Walter's Model, we can simply reach to the conclusion that since,

Return on Investments (r) or (IRR) i.e. 12% which is more than Return on Investment (Ke) i.e. 10%.

Price will be optimum when Dividend Payout ratio is Zero.

(There is no requirement to solve the sum to decide on this.)

However, we will verify this.

When, Dividend Payout is 0%, Dividend will be EPS x 0%; $10 \times 0\% = ₹ 0$

$$P = \frac{D + \left(\frac{r}{Ke}\right)(E - D)}{ke};$$

$$P = \frac{0 + \left(\frac{0.12}{0.10}\right)(10 - 0)}{0.10};$$

$$P = \frac{0 + (1.2)(10)}{0.10};$$

$$P = \frac{12}{0.10};$$

P = ₹ 120

What if the Dividend Pay Out would be:

- a. 25%
- b. 50%
- c. 75%
- d. 100%?

a. When, Dividend Payout is 25%, Dividend will be EPS x 25%; 10 x 25% = \gtrless 2.5

$$= ₹ 2.5$$

$$P = \frac{D + \left(\frac{r}{Ke}\right)(E - D)}{ke};$$

$$P = \frac{2.5 + \left(\frac{0.12}{0.10}\right)(10 - 2.5)}{0.10};$$

$$P = \frac{2.5 + (1.2)(7.5)}{0.10};$$

$$P = \frac{2.5 + 1.2(7.5)}{0.10};$$

$$P = ₹ 115$$

b. When, Dividend Payout is 50%, Dividend will be EPS x 50%; 10 x 50% = $\gtrless 5$

$$P = \frac{D + \left(\frac{r}{Ke}\right)(E-D)}{ke};$$

$$P = \frac{5 + \left(\frac{0.12}{0.10}\right)(10 - 5)}{0.10};$$

$$P = \frac{5 + (1.2)(5)}{0.10};$$

$$P = \frac{5 + 6}{0.10};$$

$$P = ₹ 110$$

c. When, Dividend Payout is 75%, Dividend will be EPS x 75%; 10 x 75% = ₹ 7.5

$$P = \frac{D + \left(\frac{r}{Ke}\right)(E - D)}{ke};$$

$$P = \frac{7.5 + \left(\frac{0.12}{0.10}\right)(10 - 7.5)}{0.10};$$

$$P = \frac{7.5 + (1.2)(2.5)}{0.10};$$

$$P = \frac{7.5 + 3}{0.10};$$

$$P = \underbrace{7.5 + 3}_{0.10};$$

d. Dear Learners, try it Yourself for 100% (answer - ₹100)

Comparative Table When r > Ke:

Dividend Payout	0%	25%	50%	75%	100%
Value of the Share	120	115	110	105	100

Thus, we can see that the as the payout increases the value of shares keep on declining.

Illustration 02:

From the following information supplied to you, ascertain whether the firm is following an optimal dividend policy as per Walter's Model?

Particulars	
Total Earnings	₹ 8,00,000
No. of equity shares (of ₹ 100 each)	50,000
Dividend paid	₹ 2,00,000
P/E Ratio	10
Return Investment	15%

The firm is expected to maintain its rate on return on fresh investments. Also find out what should be the P/E ratio at which the dividend policy will have no effect on the value of the share? Will your decision change if the P/E ratio is 7.25 and return on investment is 10%?

Hint: $Ke = \frac{1}{P.E. ratio}$

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Solution 02:

$$P = \frac{D + \left(\frac{r}{Ke}\right)(E - D)}{ke}$$

$$P = \frac{2,00,000 + \left(\frac{0.15}{0.10}\right)(8,00,000 - 2,00,000)}{0.10};$$

$$P = \frac{2,00,000 + (1.5)(6,00,000)}{0.10};$$

$$P = \frac{2,00,000 + 9,00,000}{0.10};$$

$$P = \frac{11,00,000}{0.10};$$

$$P = ₹ 1,10,00,000.$$

However, this is the value of entire firm. The value per share will be:

$$P = \underbrace{\underbrace{1,10,00,000}_{50,000}}_{P = \underbrace{1,20}_{220}}$$

Alternatively, we can solve the sum using the EPS and DPS.

$$P = \frac{D + \left(\frac{r}{Ke}\right)(E - D)}{ke};$$

$$P = \frac{4 + \left(\frac{0.15}{0.10}\right)(16 - 4)}{0.10};$$

$$P = \frac{4 + (1.5)(12)}{0.10};$$

$$P = \frac{4 + 18}{0.10};$$

$$P = \frac{22}{0.10};$$

$$P = ₹ 220$$

Working Note:

$$Ke = \frac{1}{10}$$
; Ke = 0.10 i.e 10%

Earnings = ₹ 10,00,000.

Earnings Per Share (*EPS*) =
$$\frac{\text{Total Earnings}}{\text{No.of Equity Shares}}$$
; *EPS* = $\frac{8,00,000}{50,000}$; EPS = ₹ 16.

Dividend = ₹ 1,00,000.

Dividend Per Share (DPS) = $\frac{Dividend Paid}{No.of Equity Shares}$; DPS = $\frac{2,00,000}{50,000}$; DPS = $\gtrless 4$.

Illustration 03:

The earnings per share of a company are \gtrless 90 and the rate of capitalization applicable to the company is 15%. The company has before it an option of adopting a dividend payment ratio of:

- a. 0%
- b. 25%
- c. 50%
- d. 75%
- e. 100%.

Using Walter's formula of dividend payout, compute the market value of the company's share of the productivity of retained earnings.

Assumed return on investments

- a. 12%
- b. 15%
- c. 18%.

Solution 03:

We will find the value of the shares for 5 different payout ratios with 3 different Internal Rate of Return by applying the Walter's formula.

(Thus, it is practice of 15 sums)

$$P = \frac{D + \left(\frac{r}{Ke}\right)(E - D)}{Ke}$$

Situation A: When IRR = 12

Dividend Payout Ratio = 0%	Dividend Payout Ratio = 25%
$P = \frac{0 + \left(\frac{0.12}{0.15}\right)(90 - 0)}{0.15}$	$P = \frac{22.5 + \left(\frac{0.12}{0.15}\right)(90 - 22.5)}{0.15}$
$P = \frac{0 + 0.8(90)}{0.15}$	$P = \frac{22.5 + 0.8(67.5)}{0.15}$
$P = \frac{72}{0.15}$	$P = \frac{76.5}{0.15}$
P = 480	P = 510

Financial Management-II

Dividend Payout Ratio = 50%	Dividend Payout Ratio = 75%
$P = \frac{45 + \left(\frac{0.12}{0.15}\right)(90 - 45)}{0.15}$	$P = \frac{67.5 + \left(\frac{0.12}{0.15}\right)(90 - 67.5)}{0.15}$
$P = \frac{45 + 0.8(45)}{0.15}$	$P = \frac{67.5 + 0.8(22.5)}{0.15}$
$P = \frac{81}{0.15}$	$P = \frac{85.5}{0.15}$
P = 540	P = 570

Situation B: When IRR = 15

Dividend Payout Ratio = 0%	Dividend Payout Ratio = 25%
$P = \frac{0 + \left(\frac{0.15}{0.15}\right)(90 - 0)}{0.15}$	$P = \frac{22.5 + \left(\frac{0.15}{0.15}\right)(90 - 22.5)}{0.15}$
$P = \frac{0 + 1(90)}{0.15}$	$P = \frac{22.5 + 1(67.5)}{0.15}$
$P = \frac{90}{0.15}$	$P = \frac{90}{0.15}$
P = 600	P = 600

Dividend Payout Ratio = 50%	Dividend Payout Ratio = 75%
$P = \frac{45 + \left(\frac{0.15}{0.15}\right)(90 - 45)}{0.15}$	$P = \frac{67.5 + \left(\frac{0.15}{0.15}\right)(90 - 67.5)}{0.15}$
$P = \frac{45 + 1(45)}{0.15}$	$P = \frac{67.5 + 1(22.5)}{0.15}$
$P = \frac{90}{0.15}$	$P = \frac{90}{0.15}$
P = 600	P = 600

Situation C: When IRR = 18

Dividend Payout Ratio = 0%	Dividend Payout Ratio = 25%
$P = \frac{D + \left(\frac{r}{Ke}\right)(E - D)}{Ke}$	$P = \frac{D + \left(\frac{r}{Ke}\right)(E - D)}{Ke}$
$P = \frac{0 + \left(\frac{0.18}{0.15}\right)(90 - 0)}{0.15}$	$P = \frac{22.5 + \left(\frac{0.18}{0.15}\right)(90 - 22.5)}{0.15}$

Dividend Decisions - II

Dividend Payout Ratio = 0%	Dividend Payout Ratio = 25%
$P = \frac{0 + 1.2(90)}{0.15}$	$P = \frac{22.5 + 1.2(67.5)}{0.15}$
$P = \frac{108}{0.15}$	$P = \frac{103.5}{0.15}$
P = 720	P = 690

Dividend Payout Ratio = 50%	Dividend Payout Ratio = 75%
$P = \frac{D + \left(\frac{r}{Ke}\right)(E - D)}{Ke}$	$P = \frac{D + \left(\frac{r}{Ke}\right)(E - D)}{Ke}$
$P = \frac{45 + \left(\frac{0.18}{0.15}\right)(90 - 45)}{0.15}$	$P = \frac{67.5 + \left(\frac{0.18}{0.15}\right)(90 - 67.5)}{0.15}$
$P = \frac{45 + 1.2(45)}{0.15}$	$P = \frac{67.5 + 1.2(22.5)}{0.15}$
$P = \frac{99}{0.15}$	$P = \frac{94.5}{0.15}$
P = 660	P = 630

For 100% Dividend Payout under all the three situation, learners will be do it yourself.

Conclusion Table:

		Ke = 12%	Ke = 15%	Ke = 18%
Sr. No.	Payout	R< Ke	R = Ke	R > Ke
1	0.00%	480.00	600.00	720.00
2	25.00%	510.00	600.00	690.00
3	50.00%	540.00	600.00	660.00
4	75.00%	570.00	600.00	630.00
5	100.00%	600.00	600.00	600.00



Conclusion 01: When Internal Rate of Return (R) > Cost of Equity (Ke);

The company here, earns at rate (R) better than the expectation of the investors (Ke). Hence, as and when the company distributes dividend to the shareholders, they might invest in the lower earning projects matching their expectations, thus, the price of the share will be bearish as and when the company pays dividend. So more the dividend, lesser the price.

Conclusion 02: When Internal Rate of Return (R) = Cost of Equity (Ke);

The company here, earns at rate (R) same as the expectation of the investors (Ke). Hence, it doesn't make any difference to the share price due to payment of dividend, as and when the company distributes dividend to the shareholders, they might invest in the similar earning projects matching their expectations, thus, the price of the share will remain unaffected at any payout ratio. So whatever shall be the dividend, price remains the same.

Conclusion 03: When Internal Rate of Return (R) < Cost of Equity (Ke);

The company here, earns at rate lower than the expectation of the investors. Hence, as and when the company distributes dividend to the shareholders, they might invest in the higher earning projects matching their expectations, thus, the price of the share will be bullish as and when the company pays more dividend. So more the dividend, lesser the price.

Illustration 04:

The following figures are collected from the annual report of XYZ Ltd.:

Particulars	Amount
Net Profit	60 lakhs
Outstanding 12% preference shares	150 lakhs
No. of equity shares	4 lakhs
Return on Investment	20%
Cost of capital i.e. (Ke)	16%

Compute the approximate dividend pay-out ratio so as to keep the share price at ₹ 75 by using Walter's model?

Solution 04:

$$P = \frac{D + \left(\frac{T}{Ke}\right)(E-D)}{Ke};$$

$$75 = \frac{D + \left(\frac{0.20}{0.16}\right)(10.5-D)}{0.16};$$

$$75 \ge 0.16 = D + \frac{0.20}{0.16}(10.5-D);$$

$$12 - D = 1.25 (10.5 - D);$$

$$12 - D = 13.125 - 1.25 D;$$

$$1.25 D - D = 13.125 - 12;$$

$$0.25D = 1.125;$$

$$D = \frac{1.125}{0.25};$$

$$D = 4.5$$
Thus, Dividend Payout Ratio should be: $\frac{DPS}{EPS} \ge 100; \frac{4.5}{10.5} \ge 100$
Working Note:
Earnings Per Share (E) = $\frac{Net Profit After Tax - Preference Dividend}{EPS}$

$$= \frac{Net Hojte Ajter Fax - Hejerence bit}{No.of Equity Shares}$$

$$E = \frac{60-18}{4}; E = \frac{42}{4}; E = 10.5$$

6.3 GORDON'S MODEL

Introduction:

Myron Gordon developed a widely famous model that explicitly links the firm's market value to dividend policy.

Assumptions:

Gordon's model is based on the following assumptions.

- 1. The firm is an all-Equity firm
- 2. External financing is not available
- 3. The internal rate of return (r) of the firm is constant.
- 4. The appropriate discount rate (Ke) of the firm remains constant.
- 5. The firm and its stream of earnings are perpetual (E)
- 6. There are no corporate taxes.
- 7. The retention ratio (b), once determined, is going to remain constant. Thus, the growth rate (g) = br is constant forever.
- 8. Ke > g. Furthermore, if this condition is not satisfied, there won't be a meaningful value for the share.

According to Gordon's dividend capitalisation model, the market value of a share (Po) is equal to the present value of an infinite stream of dividends to be received by the share. Thus:

$$Po = \frac{E(1-b)}{Ke - br}$$

Where,

Po = Price per share

E = Earnings per share

b = Retention ratio; [Thus (1 - b = Payout ratio)]

Ke = Cost of capital

r = IRR

br = Growth rate (g)

1 - b = D/p ratio (i.e., percentage of earnings distributed as dividends)

The above equation clearly displays the relationship between current earnings (E), dividend policy (b), internal rate of return (r), and the cost of capital (Ke) of an all-equity firm in determining share value (P0).

Implications:

Company	Condition of r vs Ke	Optimum dividend payout ratio
Growth	r > Ke	Zero
Constant	r = Ke	There is no optimum ratio
Declining	r < Ke	100%

Illustration 05:

Raja Ltd. earns a rate of 12% on its total investment of \gtrless 6,00,000 in assets. It has 60,000 outstanding common shares at valued at \gtrless 10 per share. Discount rate of the firm is 10% and it has a policy of retaining 40% of the earnings. Determine the price of its share using Gordon's Model. What shall happen to the price of the share if the company has payout of:

a. 80%

b. 20%

Solution 05:

When the retention ratio is 40% i.e. 0.40

$$P = \frac{E(1-b)}{Ke-br}$$

$$P = \frac{1.20(1-0.4)}{0.10-0.4 \times 0.12}$$

$$P = \frac{1.20(0.6)}{0.10-0.048}$$

$$P = \frac{0.72}{0.052}$$

$$P = 13.85$$

Situation a: When payout ratio is 80%

$$Po = \frac{E(1-b)}{Ke - (b \times r)}$$

$$Po = \frac{1.2(1-0.8)}{0.1 - (0.8 \times 0.12)}$$

$$Po = \frac{1.2(0.2)}{0.1 - 0.096}$$

$$Po = \frac{0.24}{0.004}$$

$$Po = 60$$

Situation b: When payout ratio is 20%

$$Po = \frac{E(1-b)}{Ke - (b x r)}$$
$$Po = \frac{1.2(1-0.2)}{0.1 - (0.2 x 0.12)}$$

$$Po = \frac{1.2(0.8)}{0.1 - 0.024}$$
$$Po = \frac{0.96}{0.076}$$
$$Po = 12.63$$

1

Authors' Note: While in the question, they have mentioned (retaining = 40%) i.e., retention ratio is 40% or b = 0.40,

meanwhile while testing the additional condition, they have mentioned payout ratio. i.e. (1-b), thus we have taken

When payout ratio = 80%; (1 - b) = 0.80, thus b = 0.20; and,

When payout ratio = 20%; (1 - b) = 0.20, thus b = 0.80;

Illustration 06:

The following data are available for R Ltd.

Particulars	Information
Earnings per share	₹8
Rate of return on investment	16%
Rate of return to shareholders	12%

If Gordon's basic valuation formula is applied what will be the price per share when the dividend payout ratio is 0%, 25%, 50%, 60% and 100%.

Solution 06:

$$Po = \frac{E(1-b)}{Ke - (b x r)}$$

Situation a.

Situation b.

$$Po = \frac{8(1-1)}{0.1 - (1 \times 0.12)} \qquad Po = \frac{8(1-0.75)}{0.1 - (0.75 \times 0.12)}$$
$$Po = \frac{8(0)}{0.1 - 0.12} \qquad Po = \frac{8(0.25)}{0.1 - 0.09}$$
$$Po = \frac{0}{-0.02} \qquad Po = \frac{2}{0.01}$$
$$Po = 200$$

Situation c.

Situation d.

$$Po = \frac{8(1-0.5)}{0.1-(0.5 \times 0.12)} \qquad Po = \frac{8(1-0.25)}{0.1-(0.25 \times 0.12)}$$
$$Po = \frac{8(0.5)}{0.1-0.06} \qquad Po = \frac{8(0.75)}{0.1-0.03}$$
$$Po = \frac{4}{0.04} \qquad Po = \frac{6}{0.07}$$
$$Po = 100 \qquad Po = 85.71$$

Situation e.

$$Po = \frac{8(1-0)}{0.1 - (0 \times 0.12)}$$
$$Po = \frac{8(1)}{0.1 - 0}$$
$$Po = \frac{8}{0.1}$$
$$Po = 80$$

Author's Note: In situation a, Ke < g and the assumptions requires that, Ke > g hence, there won't be a meaningful value for the share. Thus, we got the value as zero.

Illustration 07: (Understanding the implication table)

Case	Condition of r vs Ke	Optimum dividend payout ratio
Case 1	r > Ke	Zero
Case 2	r = Ke	There is no optimum ratio
Case 3	r < Ke	100%

Solution 07:

Solving the above sum in the tabular format to show the results

Case 1: r > Ke

EPS = ₹ 20; r = 20%; Ke = 16%; Dividend payout (from 10% to 100%)

Ε	(1-b) (Payout)	Ke	b (retention)	r	(E x (1-b)/Ke - br)
20.00	0.10	0.16	0.90	0.20	(100.00)
20.00	0.20	0.16	0.80	0.20	(Error)
20.00	0.30	0.16	0.70	0.20	300.00

Е	(1-b) (Payout)	Ke	b (retention)	r	(E x (1-b)/Ke - br)
20.00	0.40	0.16	0.60	0.20	200.00
20.00	0.50	0.16	0.50	0.20	166.67
20.00	0.60	0.16	0.40	0.20	150.00
20.00	0.70	0.16	0.30	0.20	140.00
20.00	0.80	0.16	0.20	0.20	133.33
20.00	0.90	0.16	0.10	0.20	128.57
20.00	1.00	0.16	-	0.20	125.00

The highest price will be when dividend payout is zero. Here as we can observe that, the share price increases as and when the payout decreases, but as we approach towards zero, the price turns negative (at payout level 20% and 10%). This is because, at those level Ke = br; or Ke < br, which violates the assumption of the Gordon's model. hence, there is no meaningful value for the share.



Case 2: r = Ke

EPS = ₹ 20; r = 16%; Ke = 16%; Dividend payout (from 10% to 100%)

Ε	(1-b) (Payout)	Ke	b (retention)	r	(E x (1-b)/Ke - br)
20.00	0.10	0.16	0.90	0.16	125.00
20.00	0.20	0.16	0.80	0.16	125.00
20.00	0.30	0.16	0.70	0.16	125.00
20.00	0.40	0.16	0.60	0.16	125.00
20.00	0.50	0.16	0.50	0.16	125.00

Dividend Decisions - II

Ε	(1-b) (Payout)	Ke	b (retention)	r	(E x (1-b)/Ke - br)
20.00	0.60	0.16	0.40	0.16	125.00
20.00	0.70	0.16	0.30	0.16	125.00
20.00	0.80	0.16	0.20	0.16	125.00
20.00	0.90	0.16	0.10	0.16	125.00
20.00	1.00	0.16	-	0.16	125.00

Here there is no optimum ratio, hence the price is same at each and every dividend payout ratio level.





EPS = ₹ 20; r = 12%; Ke = 16%; Dividend payout (from 10% to 100%)

E	(1-b) (Payout)	Ke	b (retention)	r	(E x (1-b)/Ke - br)
20.00	0.10	0.16	0.90	0.12	38.46
20.00	0.20	0.16	0.80	0.12	62.50
20.00	0.30	0.16	0.70	0.12	78.95
20.00	0.40	0.16	0.60	0.12	90.91
20.00	0.50	0.16	0.50	0.12	100.00
20.00	0.60	0.16	0.40	0.12	107.14
20.00	0.70	0.16	0.30	0.12	112.90
20.00	0.80	0.16	0.20	0.12	117.65
20.00	0.90	0.16	0.10	0.12	121.62
20.00	1.00	0.16	-	0.12	125.00

Here, the value of the share keeps on increasing as and when the payout increases and the maximum price will be attained when dividend payout is 100%.

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Thus, the implication of the table

Case	Condition of r vs Ke	Optimum dividend payout ratio		
Growth	r > Ke	Zero		
Constant	r = Ke	There is no optimum ratio		
Declining	r < Ke	100%		

Illustration 08:

From the following data, calculate the MP of a share of ABC Ltd., under:

- (i) Walter's formula; and
- (ii) Gordon's model.

EPS = ₹ 25; Ke = 18%; r = 25%; retention ratio (b) = 40%

Solution 08:

i. Share Price under Walter's Model:

$$P = \frac{D + \left(\frac{r}{Ke}\right)(E - D)}{Ke}$$
$$P = \frac{15 + \left(\frac{0.25}{0.18}\right)(25 - 15)}{0.18}$$
$$P = \frac{15 + 1.39(10)}{0.18}$$
$$P = \frac{28.89}{0.18}$$

P = 160.50

ii. Share Price under Gordon's Model:

$$Po = \frac{E(1-b)}{Ke - (b \times r)}$$

$$Po = \frac{25(1-0.4)}{0.18 - (0.4 \times 0.25)}$$

$$Po = \frac{25(0.6)}{0.18 - 0.10}$$

$$Po = \frac{15}{0.08}$$

$$Po = 187.5$$

6.4 MODIGLIANI AND MILLER'S HYPOTHESIS.

Introduction:

According to Modigliani and Miller (M-M), a firm's dividend policy is irrelevant because it has no effect on the wealth of its owners. They claim that the firm's value is determined by its earnings, which are the product of its investment policy. Thus, when the firm's investment decision is made, the dividend decision the split of earnings between dividends and retained earnings has no bearing on the firm's worth. M - M's irrelevance hypothesis is based on the following assumptions.

- 1. The firm operates in perfect capital market
- 2. Taxes do not exist
- 3. The firm has a fixed investment policy
- 4. Risk of uncertainty does not exist. That is, investors are able to forecast future prices and dividends with certainty and one discount rate is appropriate for all securities and all time periods.

Under M - M assumptions, r will be equal to the discount rate and identical for all shares. As a result, the price of each share must adjust so that the rate of return, which is composed of the rate of dividends and capital gains, on every share will be equal to the discount rate and be identical for all shares.

Thus, the rate of return for a share held for one year may be calculated as follows:

$$r = \frac{D + (P1 - P0)}{P0}$$

Where,

r = Holding period rate of return

Financial Management-II

D = Dividend

 P_1 = Price of the shares at the time of 1 (Usually the selling Price per share)

 P_0 = Price of the share at time 0 (Usually the purchase price per share).

M - M hypothesised that r should be the same for all shares. If this is not the case, investors who will buy high-yielding shares will sell their low-yielding shares.

This mechanism will tend to lower the price of low-return shares while raising the price of high-return shares. This switching will continue until the rate of return differentials are erased. Because there are no risk variations, this discount rate will be the same for all firms under the M-M assumption.

From the above M-M fundamental principle we can derive their valuation model as follows:

Multiplying both sides of equation by the number of shares outstanding (n), we obtain the value of the firm if no new financing exists.

MM approach can be proved with the help of the following formula:

$$Po = \frac{D1 + P1}{(1 + Ke)}$$

Where,

 P_0 = Prevailing market price of a share.

 $K_e = Cost of equity capital.$

 D_1 = Dividend to be received at the end of period one.

 P_1 = Market price of the share at the end of period one.

Here, we are required to find the value of P_1 , hence the derived formula will be

P1 = P0 (1 + Ke) - D1

If the firm sells 'M' number of new shares at time 1 at a price of P, the value of the firm at time 0 will be:

$$M = \frac{I - (X - nD1)}{P1}$$

Where

M = Number of new shares to be issued.

P1 = Price at which new issue is to be made.

I = Amount of investment required.

X = Total net profit of the firm during the period.

nD1= Total dividend paid during the period.

Thus, to calculate the number of new shares to be issued, we can use the above formula.

Unlike Walter's and Gordon's models, the above M - M value equation allows for the issue of new shares. As a result, a company can pay dividends and raise capital to pursue the best investing strategy. Thus, unlike the Walter's and Gordon's models, the M - M model does not mix dividend and investment policies.

After applying the above formula, we can prove the irrelevance of dividend policy by applying undermentioned formula to both the cases i.e. if dividend is paid or not paid.

Vf or nP0 =
$$\frac{(n + \Delta n)P1 - I + X}{1 + Ke}$$

Where,

 V_f = Value of firm in the beginning of the period

n = number of shares in the beginning of the period

 Δn = number of shares issued to raise the funds required

 P_1 = Price at the end period of the Shares

I = Amount required for investment

X = Total net profit of the firm during the period.

Criticism:

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.

- 1. The assumption that taxes do not exist is far from reality.
- 2. M-M argue that the internal and external financing are equivalent. This cannot be true if the costs of floating new issues exist.
- 3. 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.
- 4. 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. If investors have desire to diversify their port folios, the discount rate for external and internal financing will be different.

5. 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 09:

Shiva Ltd., has 2,00,000 shares outstanding the current market price of the shares \gtrless 50 each. The company expects the net profit of \gtrless 6,00,000 during the year and it belongs to a rich class for which the appropriate capitalisation rate has been estimated to be 20%. The company is considering dividend of \gtrless 2.50 per share for the current year. What will be the price of the share at the end of the year

- (i) if the dividend is paid and;
- (ii) if the dividend is not paid.

$$Po = \frac{D1 + P1}{(1 + Ke)}$$

When Dividend is not declared	When Dividend is declared
$50 = \frac{0 + P1}{1 + 0.2}$	$50 = \frac{2.5 + P1}{1 + 0.2}$
P1 = 50(1.2) - 0	P1 = 50(1.2) - 2.5
P1 = 60	P1 = 57.5

Here, the price is different when dividend is declared and not declared, so why it is termed as Dividend Irrelevance theory, lets understand it by further analysis of the theory.

Now let's suppose the company requires a fund of \gtrless 8,00,000 for expansion. This amount will be raised through issue of Equity shares. Let's calculate the fresh no. of shares to be issued to raise the funds.

$$M = \frac{I - (X - nD1)}{P1}$$

Dividend is not declared

$$M = \frac{8,00,000 - (6,00,000 - 2,00,000(0))}{60}$$
$$M = \frac{8,00,000 - (6,00,000 - 0)}{60}$$
$$M = \frac{8,00,000 - 6,00,000}{60}$$
$$M = \frac{2,00,000}{60}$$
$$M = 3,333.33 \text{ i.e. } 3,334$$

Do it Yourself for the case, when dividend is declared. Answer: 12,174

Alternatively, we can solve this using the table.

Steps	Particulars	Dividend is not declared	Dividend is declared
(A)	Fund Required for Expansion - (I)	8,00,000	8,00,000
(B)	Existing Profits - (X)	6,00,000	6,00,000
(C)	Less: Dividend Paid - (nD1)	-	(5,00,000)
(D) = (B) - (C)	Balance Funds	(6,00,000)	(1,00,000)
(E) = (A) - (D)	Additional Funds Required	2,00,000	7,00,000
F	(÷) Issue Price of Shares (P1)	60.00	57.50
$G = (E) \div$ (F)	No. of Shares to be issued (M)	3,333.33	12,173.91
Н	No. of Shares to be issued (M) (Round Up)	3,334	12,174

We cannot issue shares in fraction, so we will always round-up to zero decimal to find the no. of shares to be issued. (**Round up** here means going to next whole number, so whether it 20.01 or 20.99, it will be treated as 21 only.)

Till here, we have found the no. of new shares to be issued. Still Dividend Irrelevance theory is not explained or proved. Let's understand it.

Value of the Firm. V_f or $nP_0 =$

$$Vf = \frac{(n + \Delta n)P1 - I + X}{1 + Ke}$$

When Dividend is not declared

$$Vf = \frac{(2,00,000 + 3,334)60 - 8,00,000 + 6,00,000}{1 + 0.20}$$
$$Vf = \frac{(2,03,334)60 - 2,00,000}{1.20}$$
$$Vf = \frac{(2,03,334)60 - 2,00,000}{1.20}$$
$$Vf = \frac{1,22,00,040 - 2,00,000}{1.20}$$
$$Vf = \frac{1,20,00,040}{1.20}$$

Vf = 1,00,00,033

When Dividend is declared

$$Vf = \frac{(2,00,000 + 12,174)57.50 - 8,00,000 + 6,00,000}{1 + 0.20}$$
$$Vf = \frac{(2,12,174)57.50 - 2,00,000}{1.20}$$
$$Vf = \frac{1,22,00,005 - 2,00,000}{1.20}$$
$$Vf = \frac{1,20,00,005}{1.20}$$

Vf = 1,00,00,004

Alternatively, we can solve this using the table.

Steps	Particulars	Dividend is not declared	Dividend is declared
(A)	Existing Shares	2,00,000.00	2,00,000.00
(B)	Fresh Issue to be made	3,334.00	12,174.00
(C) = (A) + (B)	Total No. of Shares to be issued	2,03,334.00	2,12,174.00
(D)	(x) P1	60.00	57.50
(E) = (C) x (D)	Intermittent Value of the Firm	1,22,00,040.00	1,22,00,005.00
(F)	(-) Fund Required for Expansion - (I)	(8,00,000)	(8,00,000)
(G)	(+) Existing Profit - (X)	6,00,000	6,00,000
(H) = (E) - (F) + (G)	Total Value	1,20,00,040.00	1,20,00,005.00
(I)	(÷) Cost of Equity	1.2	1.2
$(J) = (H) \div (I)$	Value of the Firm	1,00,00,033.33	1,00,00,004.17

Thus, the dividend policy remains irrelevant with respect to the total valuation of the firm.

Illustration 10:

Bansi Ltd. belongs to a risk class for which the appropriate capitalization rate is 12%. It currently has outstanding 20,000 shares selling at ₹ 80 each. The firm is contemplating the declaration of dividend of ₹ 5 per share at the end of the current financial year. The company expects to have a net income of ₹ 4,00,000 and a proposal for making new investments of ₹ 6,00,000. What will be the value of share when dividend is declared and not declared.

Solution 10:

Dividend is not declared	Dividend is declared	
$Po = \frac{D1 + P1}{1 + Ke}$	$Po = \frac{D1 + P1}{1 + Ke}$	
P1 = P0 (1 + Ke) - D1	P1 = P0 (1 + Ke) - D1	
P1 = 80(1.12) - 0	P1 = 80(1.12) - 5	
P1 = 89.6	<i>P</i> 1 = 84.6	

Illustration 11:

Shakti Ltd. has a capital of \gtrless 10,00,000 in equity shares of \gtrless 100 each. The shares are currently quoted at par. The company proposes to declare a dividend of \gtrless 10 per share at the end of the current financial year. The capitalization rate for the risk class to which the company belongs is 15%.

What will be the MP of the share at the end of the year, if

(i) A dividend is not declared.

(ii) A dividend is declared.

(iii) Assuming that the company pays the dividend and has net profits of \gtrless 5,00,000 and makes new investments of \gtrless 10,00,000 during the period, how many new shares must be issued? Use the MM Model.

[Adapted C.A. Final Nov. 1990]

Solution 11:

Statement showing value of the shares under both conditions

Dividend is not declared	Dividend is declared
$Po = \frac{D1 + P1}{1 + Ke}$	$Po = \frac{D1 + P1}{1 + Ke}$
P1 = P0 (1 + Ke) - D1	P1 = P0 (1 + Ke) - D1
P1 = 100(1.15)-0	P1 = 100(1.15)-10
P1 = 115	P1 = 105

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Statement Showing Calculation of No. of Shares to be issued.

Steps	Particulars	Dividend is not declared	Dividend is declared
(A)	Fund Required for Expansion - (I)	10,00,000	10,00,000
(B)	Existing Profits - (X)	5,00,000	5,00,000
(C)	Less: Dividend Paid - (nD1)	-	(1,00,00,000)
(D) = (B) - (C)	Balance Funds	(5,00,000)	95,00,000
(E) = (A) - (D)	Additional Funds Required	5,00,000	1,05,00,000
F	(÷) Issue Price of Shares (P1)	115.00	105
$G = (E) \div (F)$	No. of Shares to be issued (M)	4,347.83	1,00,000.00
Н	No. of Shares to be issued (M) (Round Up)	4,348.00	1,00,000.00

Statement Showing Calculation of Value Per Share

Steps	Particulars	Dividend is not declared	Dividend is declared
(A)	Existing Shares (n)	10,00,000.00	10,00,000.00
(B)	Fresh Issue to be made	4,348.00	1,00,000.00
(C) = (A) + (B)	Total No. of Shares to be issued	10,04,348.00	11,00,000.00
(D)	(x) P1	115.00	105.00
(E) = (C) x (D)	Intermittent Value of the Firm	11,55,00,020.00	11,55,00,000.00
(F)	(-) Fund Required for Expansion - (I)	(10,00,000)	(10,00,000)
(G)	(+) Existing Profit - (X)	5,00,000	5,00,000
(H) = (E) - (F) + (G)	Total Value	11,50,00,020.00	11,50,00,000.00
(I)	(÷) Cost of Equity	1.15	1.15
$(J) = (H) \div$ (I)	Value of the Firm	10,00,00,017.39	10,00,00,000.00

6.5 OTHER DIVIDEND MODELS

6.5.1 ZERO GROWTH MODEL

Zero growth rate model assumes that all dividend paid on the stock remains same till perpetuity. In this case the stock price would be equal to:

$$Po = \frac{D}{Ke}$$

Where,

Po = Current Market price of share

D = Annual dividend

Ke = Cost of capital

Illustration 12:

Zebra Ltd. is a no growth company and pays a dividend of \gtrless 5 per share. If the cost of capital is 10%, calculate the current market price of the share?

Solution 12:

$$Po = \frac{D}{Ke}$$
$$Po = \frac{5}{0.10}$$

Po = 50

6.5.2 Constant Dividend Growth Model

The Constant Dividend Growth Model, also known as the Gordon Growth Model, is a method used to value a stock by assuming that dividends will grow at a constant rate indefinitely. It was developed by Myron J. Gordon and Eli Shapiro.

The formula for the Constant Dividend Growth Model is:

$$Po = \frac{D1}{Ke - g}$$

 D_1 = Expected Dividend Do(1 + g)

 D_0 = Current Dividend or Past Dividend

g = Growth rate or br

Ke = Cost of Equity.

It's important to note that this model makes several assumptions, including a constant growth rate, which may not always hold true in real-world situations. Additionally, it assumes that the cost of equity (Ke) is greater than the growth rate (g).

Investors often use this model as one of the approaches to estimate the intrinsic value of a dividend-paying stock. However, it's essential to consider other factors and use multiple valuation methods for a more comprehensive analysis.

Certainly, let's use the ₹ symbol for the Indian Rupee in the illustrations.

Illustration 13:

Suppose a stock is currently trading at $\gtrless 50$ per share. The most recent dividend paid was $\gtrless 2$ per share, and the investors expect the dividend to grow at a constant rate of 5%. The required rate of return for the stock is 10%.

Solution 13:

Using the Gordon Growth Model formula:

$$P_{0} = \frac{D_{0} \times (1+g)}{Ke-g}$$

$$P_{0} = \frac{2 \times (1+0.05)}{0.10-0.05}$$

$$P_{0} = \frac{2 \times 1.05}{0.05}$$

$$P_{0} = \frac{2.1}{0.05}$$

$$P_{0} = ₹42$$

Therefore, according to the Gordon Growth Model, the intrinsic value of the stock is ₹42.

Illustration 14:

Let's consider another scenario where the required rate of return is 8%, and the dividend growth rate is 3%. Using the simplified formula when KE = g

Solution 14:

$$P_{0} = \frac{D_{0} \times (1+g)}{Ke - g}$$

$$P_{0} = \frac{2 \times (1+0.03)}{0.08 - 0.03}$$

$$P_{0} = \frac{2 \times 1.03}{0.05}$$

$$P_{0} = \frac{2.06}{0.05}$$

$$P_{0} = ₹ 41.20$$

In this case, the intrinsic value of the stock is \gtrless 41.20.
Illustration 15:

Consider a stock trading at \gtrless 60 per share. The expected dividend to be paid is \gtrless 3.18 per share, and the investors expect a constant growth rate of 6%. If the required rate of return is 12%, the Gordon Growth Model is used, calculate the value of the share.

Solution 15:

In this sum, they have mentioned the term, expected dividend is $\gtrless 3.18$, i.e. $D_1 = 3.18$. $D_1 = D_0 \times (1+g)$. Hence, we substitute the numerator straightaway with 3.18.

$$P_{0} = \frac{D_{0} \times (1+g)}{Ke-g}$$
$$P_{0} = \frac{3.18}{0.12 - 0.06}$$
$$P_{0} = \frac{3.18}{0.06}$$
$$P_{0} = ₹53$$

So, the intrinsic value of the stock in this case is ₹53.

6.5.3 Multiple Growth Model

The Multiple Growth Model, also known as the Two-Stage Dividend Discount Model, is used when the dividends of a stock are expected to grow at different rates over different time periods. This model is an extension of the Gordon Growth Model and accommodates multiple phases of dividend growth.

The formula for the Multiple Growth Model is:



Where:

Where D = dividend of different periods (like D0, D1, and so on)

g = higher growth rate

n = number of years in a high growth rate period

gn = growth rate of the stable growth rate period

r = required rate of return

Let's go through an illustration to better understand the Multiple Growth Model:

Illustration 16:

Suppose a stock is currently trading at ₹ 35 per share. The most recent dividend paid is ₹ 2 per share. The dividends are expected to grow at 8% for the first three years (Stage 1), and then the growth rate is expected to drop to 4% indefinitely (Stage 2). The required rate of return is 12%. Calculate the value of the share and comment on the market valuation.

Solution 16:

Statement showing valuation of shares

Year	Dividend	DF @ 12%	DCF
1	2.16	0.893	1.93
2	2.33	0.797	1.86
3	2.52	0.712	1.79
3	*32.75	0.712	23.32
		5	28.90

Therefore, according to the Multiple Growth Model, the intrinsic value of the stock is \gtrless 28.90. Since, the value of the share is 28.90 and its market value is \gtrless 35, the shares are overpriced in the market.

Working Note.

Dividend			Amount
D0	Given	D0 = 2	2.00
D1	D1 = D0(1+g)	D1 = 2(1+0.08)	2.16
D2	D2 = D1(1+g)	D2 = 2.16(1+0.08)	2.33
D3	D3 = D2(1+g)	D3 = 2.33(1+0.08)	2.52
D4	D4 = D3(1+g2)	D4 = D3(1+2.52)	2.62

Under this method, we calculate the dividend growth till the year the dividend gets stabilized. So, till year 1, 2 and 3, we have taken the dividend post growth.

However, after that, when the growth is stable, we take the value of share at the period before the growth is stabilized. (In above illustration, the growth gets stable from the end of year 4, so we will take the value of the share at the period of year 3.)

$$P3 = \frac{D4}{Ke - g};$$

$$P3 = \frac{2.62}{0.10 - 0.04};$$

Illustration 17:

Mr. Rohit is planning to hold a stock that is expected to have three different growth rates over an 8-year period. The stock is currently trading at \gtrless 80 per share, and the most recent dividend paid is \gtrless 4 per share. For years 1 to 3, the dividend growth rate is expected to be 10%, during the years 4 to 6, dividend growth rate will be 8%, after which the dividend growth rate will be constant for the future at 6%, and the cost of equity is expected to be 11%. You are required to calculate the value of the share.

Year	Dividend	DF @ 11%	DCF
1	4.40	0.901	3.96
2	4.84	0.812	3.93
3	5.32	0.731	3.89
4	5.75	0.659	3.79
5	6.21	0.593	3.68
6	6.71	0.535	3.59
6	142.20	0.535	76.08
			98.92

Solution 17:

Therefore, according to the Multiple Growth Model, the intrinsic value of the stock is \gtrless 98.92. Since, the value of the share is 98.92 and its market value is \gtrless 80, the shares are underpriced in the market.

6.5.4 Capm Model

The Capital Asset Pricing Model (CAPM) is a financial model used to determine the expected return on an investment, considering its risk and the risk-free rate. However, the CAPM is typically used to estimate the required rate of return for equity rather than specifically for dividends. The required rate of return for equity, often denoted as Ke, is a key component in various valuation models, including the Gordon Growth Model.

The CAPM formula is as follows:

$$Ke = Rf + \beta(Rm - Rf)$$

Where:

Ke is the required rate of return on equity.

Rf is the risk-free rate.

B is the beta of the stock (a measure of the stock's systematic risk).

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Rm is the expected market return.

To incorporate the CAPM into a dividend valuation model, such as the Gordon Growth Model, you can replace Ke in the model.

It's important to note that the application of the CAPM to valuation models is based on certain assumptions and simplifications, and the accuracy of the model depends on the appropriateness of these assumptions for the specific situation. Additionally, beta β is a crucial parameter in the CAPM, and obtaining an accurate estimate of beta is essential for meaningful results.

Illustration 18:

The management of Nisha Ltd. is considering an investment in a stock, and has requested you want to determine the required rate of return using the CAPM. The risk-free rate is 4%, the beta of the stock is 1.2, and the expected market return is 10%.

Solution 18:

Using the CAPM formula:

 $Ke = Rf + \beta (Rm - Rf)$ Ke = 4 + 1.2(10 - 4) Ke = 4 + 1.2(6) Ke = 4 + 7.2Ke = 11.2%

In this case, the required rate of return for the stock, according to the CAPM, is 11.2%.

6.5.5 Graham & Dodd Model

This approach is given by B. Graham and D. L. Dodd. They clearly emphasize the relationship between the dividends and the stock market. According to them, the stock value responds positively to high dividends and negatively to low dividends, that is, the share values of those companies rise considerably which pay high dividends and the prices fall in the event of low dividends paid.

Symbolically

$$P = \left[m \left(D + \frac{E}{3}\right)\right]$$

Where P is the market price,

M is the multiplier,

D is dividend per share,

E is Earnings per share.

Illustration 19:

From the following information calculate the value of the share

 $EPS = \gtrless 10$; Dividend = $\gtrless 5$, and multiplier is 7.

Solution 19:

$$P = \left[m\left(D + \frac{E}{3}\right)\right]$$
$$P = \left[7\left(5 + \frac{10}{3}\right)\right]$$
$$P = \left[7(5 + 3.33)\right]$$
$$P = \left[7(8.33)\right]$$
$$P = 58.67$$

6.6 EXERCISE

I. Select the most appropriate alternative:

1. What is the intrinsic value of a stock according to Gordon's Model if the most recent dividend is \gtrless 4 per share, the required rate of return is 10%, and the dividend is expected to grow at a constant rate of 5%?

a. ₹ 60	b. ₹ 84	c. ₹ 72	d. ₹ 96

2. If a firm retains 40% of its earnings, the return on equity is 15%, and the cost of equity is 12%, what will be the optimal dividend payout ratio?

a. 0% b. 50% c. 75% d. 100%

3. According to the MM Approach, in a world without taxes and transaction costs, what is the impact of a change in dividend policy on the value of the firm?

a. Dividend policy has no impact on firm value.

b. Stock price increases with higher dividends.

c. Stock price increases with lower dividends.

d. Stock price decreases with higher dividends.

4. If a stock is currently trading at ₹ 50 per share, the expected dividend is ₹ 5 per share, and the required rate of return is 8%, what is the growth rate of dividends in Gordon's Model?

a. 2% b. 4% c. 6% d. 8%

5. In Walter's Model, if the internal rate of return (IRR) on a project is 18%, the cost of capital is 15%, and the retention ratio is 30%, what is the dividend payout ratio?

a. 12% b. 30% c. 70% d. 88%

1.₹84	2.0%	3. Dividend policy has no	4.2%	5.70%
		impact on firm value.		

II. State whether the following statements are true or false

- 1. In Gordon's Model, the dividend policy has a significant impact on the intrinsic value of a stock.
- 2. According to Walter's Model, the optimal dividend payout ratio increases as the return on equity (ROE) decreases.
- 3. In a world without taxes and transaction costs, the Modigliani-Miller (MM) Approach suggests that the value of a firm is unaffected by its dividend policy.
- 4. In Gordon's Model, if the required rate of return exceeds the constant growth rate of dividends, the intrinsic value of the stock is negative.
- 5. Walter's Model assumes that the firm can reinvest retained earnings at a rate equal to the cost of equity.

Answers:

1. True 2. False	3. True	4. False	5. True
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III. Unsolved illustration:

Illustration 01:

Determine the market price of a share under Gordon's and Walter's Dividend Model of Lalwani Ltd., given that ke = 11%; E = ₹ 20;

r = i. 12%; ii. 11%; and iii. 10%

Calculate the value of share if

a. b = 90%; b. b = 60% and; c. b = 30%

Illustration 02:

Ketu & Co. earns ₹ 8 per share having capitalisation rate of 10 per cent and has a return on investment at the rate of 20 per cent. According to Walter's model, what should be the price per share at 30 per cent dividend payout ratio? Is this the optimum payout ratio as per Walter? If not calculate the value as per the optimum payout ratio.

Illustration 03:

Wall Ltd., has 8 lakhs equity shares outstanding at the beginning of the year 2022. The current market price per share is \gtrless 150. The Board of Directors of the company is contemplating \gtrless 10 per share as dividend. The rate of capitalisation, appropriate to the risk-class to which the company belongs, is 8%:

- Based on M-M Approach, calculate the market price of the share of the company, when the dividend is - (a) declared; and (b) not declared.
- (ii) How many new shares are to be issued by the company, if the company desires to fund an investment budget of ₹ 5 crores by the end of the year assuming net income for the year will be ₹ 2 crores?

Illustration 04:

Ram Company belongs to a risk class for which the appropriate capitalization rate is 12%. It currently has outstanding 40,000 shares selling at ₹ 125 each. The firm is contemplating the declaration of dividend of ₹ 8 per share at the end of the current financial year. The company expects to have a net income of ₹ 4,00,000 and a proposal for making new investments of ₹ 6,40,000. Show that under the MM assumptions, the payment of dividend does not affect the value of the firm. How many new shares issued and what is the market value at the end of the year?

Illustration 05:

A firm had been paid dividend at \gtrless 2 per share last year. The estimated growth of the dividends from the company is estimated to be 5% p.a. DETERMINE the estimated market price of the equity share if the estimated growth rate of dividends (i) rises to 8%, and (ii) falls to 3%. Also FIND OUT the present market price of the share, given that the required rate of return of the equity investors is 15%.

Illustration 06:

XYZ is a company having share capital of \gtrless 10 lakhs of \gtrless 10 each. It distributed current dividend of 20% per annum. Annual growth rate in dividend expected is 2%. The expected rate of return on its equity capital is 15%. CALCULATE price of share applying Gordons growth Model.

Illustration 07:

Calculate the intrinsic value of the Shares of X Ltd. if the dividend paid in the previous year was \gtrless 20 and growth rate expected is 12% and the capitalization rate for this class of shares is 18%. Also calculate the value of the shares if other things remain constant except the following:

- i. If dividend per share in the previous year was ₹ 18
- ii. If growth rate is 10%;
- iii. If growth rate is 14%;
- iv. If Capitalization rate is 15%; and
- v. If Capitalization rate is 21%.

MUTUAL FUND AND BOND VALUATION

Unit Structure

- 7.0 Introduction
- 7.1 History & Origin :
- 7.2 Ethics in Mutual Fund :
- 7.3 Classification of Mutual Fund
- 7.4 Bond Valuation
- 7.5 Practial Problem on YTM, Bond Valuation & Duration

7.0 INTRODUCTION

A mutual fund is a pool of money managed by a professional Fund Manager. It is a trust that collects money from a number of investors who share a common investment objective and invests the same in equities, bonds, money market instruments and or other securities. In all over the world, mutual funds play an important role in the financial system of many countries. Mutual funds are an ideal medium for investment by small investors in the stock market. Mutual funds can diversify the portfolio in a better way as compared to individual investors due to professional as well as expertise knowledge and with great availability of funds. Different options are available to invest in mutual funds, is the great importance. A Mutual Fund is recognized as a medium as well as long term investment option.

A mutual fund is a financial vehicle that pools assets from shareholders to invest in securities like stocks, bonds, money market instruments, and other assets. Mutual funds are operated by professional money managers, who allocate the fund's assets and attempt to produce capital gains or income for the fund's investors. A mutual fund's portfolio is structured and maintained to match the investment objectives stated in its prospectus.

Mutual funds give small or individual investors access to professionally managed portfolios of equities, bonds, and other securities. Each shareholder, therefore, participates proportionally in the gains or losses of the fund. Mutual funds invest in a vast number of securities, and performance is usually tracked as the change in the total market cap of the fund—derived by the aggregating performance of the underlying investments.

7.1 HISTORY & ORIGIN

The origin of the concept of Mutual Fund dates back to the dawn of commercial history. It is said that Egyptians and Phoenicians sold their

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shares in vessels and caravans with a view to spreading the risk attached with these risky ventures. However, the real credit of introducing the modern concept of Mutual Fund goes to the Foreign and Colonial Government Trust of London established in 1868.

A strong financial market with broad participation is essential for a developed economy. With this broad objective India's first Mutual Fund was established in 1963, namely Unit Trust of India (UTI), at the initiative of the Government of India and Reserve Bank of India 'with a view to encouraging saving and investment and participation in the income, profits and gains accruing to the Corporation from the acquisition, holding, management and disposal of securities.'

In the last few years the Mutual Fund Industry has grown significantly. The history of Mutual Funds in India can be broadly divided into 5 distinct phases as follows :

- First Phase 1964-1987 : The Mutual Fund industry in India started in 1963 with formation of UTI in 1963 by an Act of Parliament and functioned under the Regulatory and administrative control of the Reserve Bank of India (RBI). In 1978, UTI was de-linked from the RBI and the Industrial Development Bank of India (IDBI) took over the regulatory and administrative control in place of RBI. Unit Scheme 1964 (US' 64) was the first scheme launched by UTI. At the end of 1988, UTI has Rs. 6,700 crores of Assets Under Management (AUM).
- Second Phase 1987-1993 Entry of Public Sector Mutual Funds – The year 1987 marked the entry of public section of mutual funds set up by Public Sector banks and Life Insurance Corporation of India (LIC) and General Insurance Corporation of India (GIC). SBI Mutual Fund was the first 'non-UTI' mutual fund established in June 1987, followed by Can Bank Mutual Fund (Dec. 1987), Punjab National Bank Mutual Fund (Aug. 1989), Indian Bank Mutual Fund (Nov. 1989), Bank of India (Jun 1990), Bank of Baroda Mutual Fund (Oct. 1992). LIC established its mutual fund in June 1989. While GIC had set up its mutual fund in December, 1990. At the end of 1993, the Mutual Fund industry had assets under management Rs. 47,004 Crores.
- Third Phase 1993 2003 Entry of Private Sector Mutual Funds – The Indian Securities market gained greater importance with the establishment of SEBI in April 1992 to protect the interest of the investors in securities market and to promote the development of, and to regulate, the securities market.

In the year 1993, the first set of SEBI Mutual Fund Regulations came into being for all mutual funds, except UTI. The erstwhile Kothari Pioneer was the first private section MF registered in July 1993. With the entry of primate sector funds in 1993, a new ear began in the Indian MF industry, giving the Indian investors a wider choice of MF products. The initial SEBI MF Regulations were revised and replaced in 1996 with a comprehensive set of regulations, viz, SEBI (Mutual Fund) Regulations, 1996 which is currently applicable.

The number of MFs increased over the years, with many foreign sponsors setting up mutual funds in India. Also the MF industry witnessed several mergers and acquisitions during this phase. As at the end of January, 2003, there were 33MFs with total AUM Rs. 1,21,805 crores, out of which UTI alone had AUM of Rs. 44,541 crores.

4. **Fourth Phase – Since February 2003 – April 2014** – In February, 2003, following the repeal of the Unit Trust of India Act 1963, UTI was bifurcated into two separate entities, viz. the Specified Undertaking of the Unit Trust of India (SUUTI) and UTI Mutual Fund which functions under SEBI MF Regulations. With the bifurcation of the erstwhile UTI and several mergers taking place among different private sector funds, the MF industry entered its fourth phase of consolidation.

Following the global melt-down in the year 2009, securities markets all over the world had tanked and so was the case in India. Most investors who had entered the capital market during the peak, has lost money and their faith in MF products was shaken greatly. The abolition of Entry Load by SEBI, coupled with the after-effects of the global financial crisis, deepened the adverse impact on the Indian MF Industry, which struggled to recover and remodel itself for over two years, in an attempt to maintain its economic viability which is evident from the sluggish growth in MF Industry AUM between 2010 to 2013.

5. Fifth Phase - Current Phase – May 2014 – Taking cognizance of the lack of penetration of MFs, especially in tier II and tier III cities, and the need for greater alignment of the interest of various stakeholders, SEBI introduced several progressive measures in September, 2012 to "re-energize" the Indian Mutual Fund industry and increase MFs' penetration.

In due course, the measures did succeed in reversing the negative trend that had set in after the global melt-down and improved significantly after the new Government was formed at the Centre.

Since May 2014, the Industry has witnessed steady inflows and increase in the AUM as well as the number of investor folios (accounts).

• The industry's AUM crossed the milestone of 10 Trillion (Rs. 10 Lakh Crore) for the first time as on 31st May 2014 and in a short span of about three years the AUM size had increased more than two folds and crossed 20 Trillion (Rs. 20 Lakh Crore) for the first time in August 2017. The AUM size crossed 30 Trillion (Rs. 30 Lakh Crore) for the first time in November, 2020.

- The overall size of the Indian MF Industry has grown from 8.11 Trillion as on 30th June 2013 to 44.39 Trillion as on 30th June 2023, more than 5 fold increase in a span of 10 years.
- The MF Industry's AUM has grown from 22.86 Trillion as on June 30, 2018 to 44.39 Trillion as on June 30, 2023 around 2 fold increase in a span of 5 years.
- The number of investor folios has gone up from 7.46 crore folios as on 30th June 2018 to 14.91 crore as on 30th June, 2023, around 2 fold increase in a span of 5 years.
- On an average 12.42 Lakh new folios are added every month in the last 5 years since June 2018.

The growth in the size of the industry has been possible due to the twin effects of the regulatory measures taken by SEBI in re-energising the MF industry in September, 2012 and the support from mutual fund distributors in expanding the retail base.

Definitions :

"Mutual Fund is a corporation which accepts money from investors and uses the same to buy stocks, long term bonds and short term debts instruments issued by issuers."

- Weston. J. F. & Brigham

As per Security Exchange Board of India Regulations "Mutual Fund means a fund established in the form of a trust by a sponsor to raise money by the trustee through the sale of units to the public under one or more schemes for investing in securities in accordance with regulations."

A fund is a type of investment that collects money from many people. The money is subsequently used by fund managers to invest in a variety of stocks and bonds. Each investor is given units that represent a percentage of the fund's holdings.

Characteristics of Mutual Fund :

- A mutual fund is a type of investment vehicle consisting of a portfolio of stocks, bonds, or other securities.
- Mutual funds give small or individual investors access to diversified, professionally managed portfolios.
- Mutual funds are divided into several kinds of categories, representing the kinds of securities they invest in, their investment objectives, and the type of returns they seek.
- Mutual funds charge annual fees, expense ratios, or commissions, which may affect their overall returns.
- Employer sponsored retirement plans commonly invest in mutual funds.

- Investors' holdings are denominated by units, which is the share in the total fund.
- Unit value varies with changes in markets and portfolio value.
- Investment portfolio of Mutual funds is based on investment mandates and investment objectives of the fund.
- The value of one unit of investment is called Net Asset Value (NAV).

Advantages of Mutual Fund :

- 1. Professional Management Due to lack of time as well as lack of knowledge individual investors unable to manage their own investments. Thus, mutual fund hire professional managers to manage the investments for the benefit of their investors in return for the management fee, Asset Management Company is the organization which manages the investments Employees of the AMC who perform the role of managing investments are the fund managers.
- 2. Diversification A single mutual fund can hold securities from hundreds or even thousands or issuers. This diversification reduces the risk of a monetary loss.
- 3. Convenient Administration Investing in a Mutual Fund reduced paper work, unnecessary follow up with brokers and companies. Mutual fund save time and make investing easy and convenient.
- 4. Return Potential Mutual funds have the potential to provide higher return as they invest in a diversified basket of selected securities.
- 5. Low Costs Mutual Funds are relatively less expensive way to invest compared to directly investing in the capital markets. The transaction cost is also low.
- 6. Liquidity Units and shares in mutual fund can be bought and sold on any business day which provides easy access to their investors.
- 7. Flexibility Many Mutual Fund companies manage several different funds and allow to switch between these funds at little or no charge.
- 8. Choice of schemes Mutual funds offer a family of schemes to suit varying needs over a lifetime.
- 9. Government Regulation : All Mutual Fund are registered with SEBI and they function with the provisions of strict regulations designed to protect the interest of investors. The operations of mutual fund are regulated and monitored by SEBI.
- 10. Tax Benefits : Most of the mutual funds offer the benefits of tax exemption to the investors. In India, tax benefit will get by the investors u/s 80 of the income tax act.

Limitations / Disadvantages of Mutual Fund :

- 1. Wisdom of Professional Management When the money invested into mutual fund is in the hands of professional manager. The return on investment depends heavily on the manager's skill.
- 2. Lack of Control Investors cannot buys or sells of securities their own at any given time because it's under the control of professional managers.
- 3. Risks and Costs Changing market conditions can create fluctuations in the value of the mutual fund investment. These are fees and expenses associated with investing in mutual fund do not usually occur when purchasing individual securities directly.
- 4. Difficulty in selection of funds A large variety of mutual fund schemes often makes the choice difficult for a common investor.

7.2 ETHICS IN MUTUAL FUND :

Socially responsible mutual funds hold securities in companies that adhere to certain social, moral, religious, or environmental beliefs. To ensure that the stocks or bonds chosen embody values that coincide with the fund's principles, company issuers undergo a careful screening process.

Ethical investing gives the individual the power to allocate capital toward companies whose practices and values align with their personal beliefs. Some beliefs are rooted in environmental, religious, or political precepts.

Entities Involved – The following entities are involved in the Mutual Fund operation in India :

- 1. Sponsor
- 2. Trustee
- 3. Asset Management Company
- 4. Registrar and Transfer Agent (RTA)
- 5. Fund House in India



- 1. Sponsor The Fund Sponsor is the first layer in the three-tier structure of Mutual Funds in India. SEBI regulations say that a fund sponsor is any person or any entity that can set up a Mutual Fund to earn money by fund management. This fund management is done through an associate company which manages the investment of the fund. A sponsor can be seen as the promoter of the associate company. A sponsor has to approach SEBI to seek permission for a setting up a Mutual Fund. However, a sponsor is not allowed to work alone.
- 2. Trustee Trust and trustees form the second layer of the structure of Mutual Funds in India. Also known as the protectors of the fund, trustees are generally employed by the fund sponsor. A trust is created by the fund sponsor in favour of the trustees, through a document called a trust Deed. The trust is managed by the trustees and they are answerable to investors. They can be seen as primary guardians of fund and assets. Trustees can be formed by two ways – a Trustee Company or a Board of Trustees. The trustees work to monitor the activities of the Mutual Fund and check its compliance with SEBI (Mutual Fund) regulations. They also monitor the systems, procedures, and overall working of the asset management company.
- 3. Asset Management Company AMC are the third layer in the structure of Mutual Funds. Registered under SEBI, it is a type of company that is created under the Companies Act. An AMC is meant to float a variety of mutual fund schemes that are in compliance with the requirements of investors and the nature of a market. The asset management company acts as the fund manager or as an investment manager for the trust. A small fee is paid to the AMC for managing the fund. The AMC is responsible for all the fund-related activities. It initiates various schemes and launches the same. Furthermore, it also creates mutual funds with the sponsor and the trustee and regulate its development. The AMC is bound to manage funds and provide services to the investor.
- 4. Registrar and Transfer Agent (RTA) RTAs act as an essential link between investors and fund managers. To the fund managers, they serve by keeping them updated with the details of investors. And, to the investors, they serve by delivering the advantages of the fund. Even they are registered under SEBI and execute a variety of tasks and responsibilities. These are the entities who provide services to Mutual Funds. RTAs are more like the operational arm of Mutual Funds. Since the operations of all Mutual Fund companies are similar, it is economical in scale and cost effective for all the 44 AMCs to seek the services of RTAs.
- 5. Custodian A custodian is one such entity that is responsible for the safekeeping of the securities of the Mutual Fund. Registered under SEBI, they manage the investment account of the Mutual Fund, ensure the delivery and transfer of the securities. Also, custodians allow investors to upgrade their holdings at a specific point of time and assist them in monitoring their investments. They also collect and track the bonus issue, dividends & interests received on the Mutual Fund investment.

6. Fund House in India – Fund houses alternatively known as Assets Management Company (AMC) are organizations that invest pooled in money from investors into financial instruments like equities, mutual funds, securities, etc. These companies have qualified fund managers who decide where to invest money depending on the conditions of the market. In simple words, these companies manage the money pooled from a number of investors.

The main role of mutual fund houses is to decide when, where and how to invest the money in lieu of their declared goals. Fund managers meet investment goals by assessing various metrics like industry risks, market risks, etc. and deciding on funds to invest in.

7.3 CLASSIFICATION OF MUTUAL FUND

There are large variety of Mutual Funds created on the basis of needs of the investors.



- 1. **FUNCITONAL CLASSIFICATION** On the basis of functions the mutual funds are classified as Open ended and Close ended Mutual Fund.
 - Open Ended Mutual Fund Open-ended funds are the funds in which maturity date is not fixed. The investors have the opportunity to buy & sell units any time at NAV. These are the liquid funds & investors can invest at any time during the year & redemption can also be done on continuous basis.
 - Close Ended Mutual Fund Close-ended funds are the funds where maturity period is fixed. These funds are not available for subscription all the time like open-ended funds rather they are available for investment during specified period of time i.e. when they are launched initially. Any further buying and selling transaction will be taken place only through the secondary market.

2

GEOGRAPHICAL CLASSIFICATION - On the basis of territorial jurisdiction of the operation of Mutual Fund, it can be classified as Domestic Mutual Fund and Off-shore Mutual Fund.

- Domestic Mutual Fund Domestic Mutual Funds are the saving schemes which are opened for mobilizing savings of the nationals within the country. It is issued to both the residents and non-residents.
- Off-shore Mutual Funds The basic objective of opening an offshore mutual fund scheme is to attract foreign capital for investment purposes in the country of the issuing company. Offshore Mutual Funds, thus facilitate cross-border fund flow which is a direct route for getting foreign currency without political strings or domination on the issuer country. From investment point of view too, offshore Mutual Funds open up domestic capital markets to the international investors and global portfolio investments.
- 3. **Portfolio Classification (According to Investment Objectives)** Investment in Mutual funds is depending on the investment objective which classify as follows :
- Equity or Growth Fund Equity funds are the funds in which majority of the investment is made in the equity shares. Therefore it carries a high risk but also potential of high returns. The investment goal under such kind of funds is to achieve long term growth. There may be funds which focus mainly on a single market sector for eg Banking sector equity fund.
- Debt or Income Fund The investment under such kind of funds is made in securities such as bonds, debentures, government securities, etc. Since investment is made in debt instruments, risk factor is low & income is stable & regular. Debt or income funds are less volatile as compared to equity funds. The investment goal under such type of funds is safety and to achieve moderate growth of funds.
- Balanced Fund Under balanced funds, the money is invested in both equity & debt instruments. The investment goal is to achieve both profits & moderate growth. They ensure stable returns & appreciation in capital to the individuals who have invested money in balanced funds.
- Money Market Mutual Fund (MMMF) Such kind of funds go for short term investments such as Treasury bills, commercial papers, etc. under which time period is less than 91 days. The investment objective under liquid funds is to attain liquidity, increase in capital & moderate return on funds.
- Tax Saving Fund These schemes offer tax rebate to the investors under specific provisions of the Income Tax Act, 1961. For Eg. Equity Linked Saving Scheme (ELSS). Even Pension Scheme also launched by Mutual Fund for tax benefits.

• Exchange Traded Fund – There is a twist on the mutual fund is the exchange traded fund. They are not considered mutual funds but employ strategies consistent with mutual funds. They are structured as investment trusts that are traded on stock exchanges and have the added benefits of the features of stock it can be bought and sold throughout the trading day, also can be sold short or purchased on margin.

CALCULATION OF NAV, ENTRY LOAD AND EXIT LOAD

Net Assets Value (NAV)

NAV of scheme = <u>Net Assets of the Scheme</u> Number of Units outstanding

Net Assets = Sum total of all assets – Liabilities of fund

Assets = Market Value of Investment + Receivables + Accrued Income + Other Assets

Liabilities = Accrued Expenses + Payables + Other Liabilities

Change in NAV :

- NAV change in absolute terms : = NAV at the end of period (Selling) – NAV at the beginning period (Purchase)
- 2. NAV change in % age terms = [<u>Absolute Change in NAV]</u> * 100 NAV at the beginning
- 3. Annualized NAV change =

= [Absolute Change in NAV] * [12] * 100NAV at the Beginning Months covered

Total Return Method =

Total return = (<u>Dividend Distributions + Change in NAV</u>) * 100 NAV at the beginning of period

Illustration No. 1. If a SBI Funds NAV was Rs. 42 at the beginning of the year and Rs. 65 at the end of the year. Find out the absolute change and % age change in NAV.

NAV change in absolute terms :

= NAV at the end of period (Selling) – NAV at the beginning period (Purchase)

= 65 - 42 = 23

NAV change in % age terms = [<u>Absolute Change in NAV</u>] * 100 NAV at the beginning

$$= \underline{23}_{42} * 100 = 54.76\%$$

Financial Management-II Illustration No. 2. An investor purchased a unit in Tata Infrastructure an open-ended fund at Rs. 32 and its NAV after 15 months is Rs. 60 then, find % age change in NAV and annualized change in NAV.

NAV change in absolute terms :

= NAV at the end of period (Selling) – NAV at the beginning period (Purchase)

= 60 - 32 = 28

NAV change in % age terms = [Absolute Change in NAV] * 100NAV at the beginning

$$= 28 * 100 = 87.50\%$$

Annualized NAV change =

= [<u>Absolute Change in NAV</u>] * [<u>12</u>] * 100 NAV at the Beginning Months covered

$$= \underline{28}_{32} * \begin{bmatrix} 12 \\ 15 \end{bmatrix} * 100 = 70\%$$

Illustration No. 3 . Motorola Company declared dividend of Rs. 20 per unit. Mr. Soham purchased its unit at Rs. 150. The NAV of the fund at the end was Rs. 198. Find the total return by taking into account the dividend distribution by the fund.

Total Return Method = Total return = (<u>Dividend Distributions + Change in NAV</u>) * 100 NAV at the beginning of period

Total Return Method = Total return = $\frac{20 + (198 - 150)}{150}$ * 100 = 45.33%

Illustration No. 4. Mr. Mahesh purchased a unit of HDFC Top 500 Fund at Rs. 68. The fund had declared dividend of Rs. 10 per unit. The NAV of the fund at the end was Rs. 112. Find the total return of Mr. Mahesh.

Total Return Method = Total return =

(<u>Dividend Distributions + Change in NAV</u>) * 100 NAV at the beginning of period

Total Return Method = Total return = $\frac{10 + (112 - 68)}{68}$ * 100 = 79.41%

Illustration No. 5. Calculate the NAV of SBI Mutual Fund with the following information :

- No. of units outstanding 18,000
- Market value of investment in stock Rs. 2,04,000

- Market value on investment in Government securities Rs. 1,50,000
- Other assets of SBI Mutual Fund is Rs. 8,000
- Total liabilities is Rs. 64,000 and payable is Rs. 10,000

NAV of scheme = <u>Net Assets of the Scheme</u> Number of Units outstanding

NAV of scheme = 2,88,000 = 16 per unit. 18,000

Net Assets = Sum total of all assets – Liabilities of fund

Net Assets = 3,62,000 - 74,000 = 2,88,000

Assets = Market Value of Investment + Receivables + Accrued Income + Other Assets

Assets = 2,04,000 + 1,50,000 + 8,000 = 3,62,000

Liabilities = Accrued Expenses + Payables + Other Liabilities

Liabilities = 64,000 + 10,000 = 74,000

Illustration No. 6. Calculate the NAV of ICICI Infrastructure fund with the following information.

- Outstanding unit of scheme is 28,000 units.
- Market value of investment in securities is Rs. 11,00,000
- Market value of investment in Corporate Bond is Rs. 4,50,000
- Other assets of company is Rs. 70,000
- Liabilities of the scheme is RS. 80,000
- Accrued expenses and other payables are Rs. 35,000 and Rs. 25,000 respectively.

NAV of scheme = <u>Net Assets of the Scheme</u> Number of Units outstanding

NAV of scheme = 14,80,000 = 52.86 per unit. 28,000

Net Assets = Sum total of all assets – Liabilities of fund

Net Assets = 16,20,000 - 1,40,000 = 14,80,000

Assets = Market Value of Investment + Receivables + Accrued Income + Other Assets

Assets = 11,00,000 + 4,50,000 + 70,000 = 16,20,000

Liabilities = Accrued Expenses + Payables + Other Liabilities

Liabilities = 80,000 + 35,000 + 25,000 = 1,40,000

Illustration No. 7. Mr. Swami invests Rs. 75,000 in Tata Balanced Fund where NAV is Rs. 27. Entry load is 2.25% and 2% exit load. How many units Mr. Swami has bought?

Investment of Rs. 75,000

NAV = Rs. 27 + Entry Load @2.25%

Purchased NAV = 27 + 2.25% (0.61) = RS. 27.61 per unit

No. of Units = $\frac{\text{Investment in Rs.}}{\text{NAV per unit}}$

No. of Units = $\underline{75,000} = 2,716.41$ units. 27.61

Illustration No. 8. If entry load is @ 2.25% and NAV is Rs. 87, if the investor decided to invest Rs. 45,000, how may units has he bought?

Investment of Rs. 45,000

NAV = Rs. 87 + Entry Load @2.25%

Purchased NAV = 87 + 2.25% (1.96) = RS. 88.96 per unit

No. of Units = $\frac{\text{Investment in Rs.}}{\text{NAV per unit}}$

No. of Units = 45,000 = 505.85 units. 88.96

Illustration No. 9

Investor purchased units of a mutual fund scheme in Jan 2022 at NAV of Rs. 40.50 per unit and sold in at NAV of RS. 75 per unit in Jan 2023.

- 1. Find total returns of investors, assume there is no dividend distribution to investors.
- 2. Determine change in total returns of investors if,
 - Only an entry load of @2% is applicable
 - Only an exit load of @ 2.25% is applicable
 - As entry load of 2% and exit load of 2.25% both are applicable.
- 1. NAV change in % age terms = [<u>Absolute Change in NAV</u>] * 100 NAV at the beginning

NAV change in % age terms = $[\underline{75 - 40.50}]$ * 100 = 85.19% 40.50 2. i. Only an entry load of @2% is applicable

Net Purchase Price = NAV at the time of Purchase + Entry load on NAV

Net Purchase Price = 40.50 + (a) 2% (0.81) = 41.31

Total Net Returns = $\frac{75 - 41.31}{41.31} * 100 = 81.55\%$

2. ii. Only an exit load of @ 2.25% is applicable

Selling Price = NAV at the time of Selling - Exit load on NAV

Selling Price = 75 - (a) 2.25% (1.69) = 73.31

Total Net Returns = $\frac{73.31 - 40.50}{40.50} * 100 = 81.01\%$

2. iii. As entry load of 2% and exit load of 2.25% both are applicable

Net Purchase Price @2% Entry Load = 41.31

Net Selling Price @2.25% Exit Load = 73.31

Total Net Returns = $\frac{73.31 - 41.31}{41.31} * 100 = 77.46\%$

Illustration No. 10

Manoj purchased 600 units of Birla Equity Fund on 1st Feb., 2022 at RS. 95 NAV. Then he sold these units on 31st July, 2022 at Rs. 115 NAV. It carried exit load of 1.5%. There is short term capital gain tax of 10%, which Manoj has to pay. Determine the net profit after tax. What is annualized total return of Manoj.

Manoj Purchased 600 unts at Rs. 95 NAV

Total investment of Manoj = 600 * 95 = 57,000

Manoj sells 600 untis at Rs. 115 with exit load @1.5%

Net Selling Price = 115 - (a) 1.5% (1.73) = 113.27

Total Sales = 600 * 113.27 = 67,962

Short term capital gain = 67,962 - 57,000 = 10,962

Short term capital gain tax @10% = 1,096

Net Profit after tax = 10,960 - 1,096 = 9,865

Total Annualised Returns = $\frac{\text{Net Profit after Tax}}{\text{Total Investment}} * \frac{12}{\text{Months}} * 100$

Total Annualised Returns =
$$9,865$$
 * 12 * $100 = 34.61\%$

When problems involving the dividend.

Dividend Amount = No. of Units * Rate of dividend (in Rs.)

Total Gain = Capital Gain + Dividend Amount

Rate of Return = <u>(Redemption NAV–Purchase NAV)+Dividend Per Unit</u>* 100 Purchase NAV

Illustration No. 11

Mr. Sujay Sharma invested Rs. 25,000/- in HDFC Equity Fund Dividend on 5.08.2022 when its NAV was Rs. 51.045. He received a dividend @ Rs. 4 per unit. On 21st January, 2023 he redeemed all units at an NAV Rs. 62.325. Find out Mr. Sujay Sharma's total gain. Find the rate of return. There were no load in any transaction.

Sine there was no entry load, hence

Purchase price per unit = NAV as on 5.08.2022 = Rs. 51.045

No.of Units Purchase = <u>Amount Invested</u> Purchase Price per unit

No.of Units Purchase = $\frac{25,000}{51.045}$ = 489.764

Dividend Amount = 4 * 489.764 = Rs. 1,959.056

Redemption price per unit = NAV as on 21.01.2023 = Rs . 62.325

Amount realized after Redemption = Redemption price per unit * No. of Units = 62.325 * 489.764 = 30.524.541

Capital Gain = Amount realized after redemption – Amount Invested

Capital Gain = 30,524.541 – 25,000 = 5,524.541

Total Gain = Capital Gain + Dividend Amount

Total Gain = 5,524.541 + 1,959.056 = Rs. 7,483.597

Method I -

Rate of Return = (<u>Redemption NAV – Purchase NAV</u>) + <u>Dividend Per Unit</u> * 100 Purchase NAV

Rate of Return = $(62.325 - 51.045) + 4 \times 100 = 15.28 \times 100 = 29.93\%$ 51.045 51.045×51.045

Method II

Rate of Return =	Total Gain * 100 Amount Invested			
Rate of Return =	$\frac{7,483.597 * 100}{25,000} = 29.93\%$			

Mr. Sujay Sharma's total gain is Rs. 7,483.597 & rate of return is 29.93%

Systematic Investment Plan (SIP) - A SIP or Systematic Investment Plan is a type of investment that helps the investors save and grow the investorsr money over time. Instead of investing a large sum of money all at once, with a SIP, the investors invest small amounts regularly. For example, rather than investing Rs. 6000 all at once, the investors can invest Rs. 500 every month over a period of one year.

SIPs are a convenient and flexible way to invest in mutual funds. There is a choice for the investor that how much want to invest, how often want to invest, and for how long want to continue investing. It can easily set up a SIP and have the investment amount automatically deducted from the investorsr bank account each month, so there is no need to worry about making manual investments. Hence, SIPs are a great option for anyone who wants to invest in mutual funds, but doesn't have a large sum of money to invest all at once.

The idea behind a SIP is to average out the cost of investment over time. For example, if there is a same amount of investment of money each month, will buy more units when the price is low and fewer units when the price is high. This means that will end up paying an average price for all the units the investors have purchased, which can help to maximise the returns over the long term.

Following are the Benefits of SIPs

1. **Rupee Cost Averaging:** Rupee Cost Averaging is a term inspired by the approach of Dollar Cost Averaging or DCA. This approach was introduced to us by Benjamin Graham, in his book, The Intelligent Investor. Rupee Cost Averaging allows the investors to invest small amounts regularly, which helps average out the cost of their investment over time. Let's understand this with an example:

The investors invest 1000 rupees in shares of ABC Ltd. which was worth 10 shares (Rs. 100 per share). However, as the price of the shares increase, they got expensive. So when the investors invested 1000 rupees next month, the investors ended up buying only 8 shares for the same price. The consecutive month, the price decreased and the investors got 12 shares for the same price. Hence, when the markets were expensive, the investors bought fewer shares and when the markets were cheap, the investors got more shares at the discounted price. This means the investors averaged out the cost of the investment, by simply following a disciplined strategy of investing the same amount every month.

SIPs also work on the foundation of this approach. Hence, investing in SIPs can give the investors an edge in averaging out the investments without having to worry about the timing the market.

- 2. Investment Discipline: SIPs encourage a disciplined approach to invest by requiring the investors to set aside a fixed amount of money on a monthly basis. This helps the investors build a disciplined habit of saving and investing, which is critical for long-term financial success. Investing discipline also enables the investors to reap the benefits of wealth-compounding over decades better than the benefits of the investors would get through lump sum investing.
- **3. Convenience:** SIPs are easy to set up and manage. Moreover, the mandate allows the investment amount to be automatically deducted from the investors' bank account each month. Hence, the investors don't have to worry about making manual investments. This makes SIPs a convenient option for individuals who are busy or who don't have the time to manage their investments actively.
- 4. Flexibility: SIPs offer flexibility to the investors to choose the amount want to invest, the frequency of investment, and the duration of the investment. This allows individuals to tailor their investments to meet their specific financial goals and needs. In India, the investors can start a SIP with as low as Rs. 500 a month.
- 5. Cost-effective: Investing through SIPs is cost-effective, as the investment amount is small and the investment management fees are spread over a longer period, reducing the impact of fees on overall returns.
- 6. Diversification: As the aphorism goes, "Do not put all the investors eggs in one basket". SIPs allow individuals to invest in a diversified portfolio of securities, reducing the risk of investing in a single security. This is because mutual funds invest in a variety of stocks and bonds, which helps to balance the portfolio and reduce the risk of losses due to market volatility.
- 7. **Professional management:** Mutual funds are managed by trained professionals with several years of industry experience. SIPs provide access to professional investment management, which can help individuals make informed investment decisions and achieve their financial goals.
- 8. Long-term benefits: SIPs are a great option for long-term investment, as they allow individuals to invest regularly over an extended period of time, taking advantage of the power of compounding. This means that the returns on the investors investments are reinvested, resulting in exponential growth over time.

Illustration No. 12

Mr. Ajay invested in Systematic Investment Plan (SIP) of a M.F., a fixed sum of Rs. 1,000 on 10th of every month for three month from January to March 2023. The NAV on these dates were RS. 20, Rs 25 and Rs. 18 respectively. Find out the average acquisition cost per unit to two decimal places (NO. of units upto 3 decimal places, no entry load)

Solution :

There is no entry load NAV = CP of one unit No. of Units = $\underline{\text{Amount invested in every month}}$

CP	ot	I	Unit	

Months	Amt invested in	CP of 1 unit	NO. of Units
	every month		
JAN	1,000	20	1,000/20 = 50
FEB	1,000	25	1,000/25 = 40
MARCH	1,000	18	1,000/ 18 = 55.556
TOTAL	3,000		145.556

Average acquisition Cost Per Unit =

 $\frac{\text{Total amount invested}}{\text{Total number of Units}} = \frac{3,000}{145.556} = \text{Rs. 20.61}$

Illustration No. 13

Ms. Anita invested in Systematic Investment Plan (SIP) of a M.F., a fixed sum of Rs. 5,000 on 10th of every month for three month from January to May 2023. The NAV on these dates were Rs. 22 RS. 20, Rs 18.5, Rs. 19 and Rs. 21 respectively. Find out the average acquisition cost per unit to two decimal places (NO. of units upto 3 decimal places, no entry load)

Solution :

There is no entry load

NAV = CP of one unit

No. of Units = <u>Amount invested in every month</u> CP of 1 Unit

Months	Amt invested in every month	CP of 1 unit	NO. of Units
Jan	5,000	22	5,000/22 = 227.273
Feb	5,000	20	5,000/20 = 250
March	5,000	18.5	5,000/ 18.5 = 270.27
April	5,000	19	5,000/19 = 263.158
May	5,000	21	5,000/21 = 238.10
Total	25,000		1248.801

Average acquisition Cost Per Unit = <u>Total amount invested</u> = 25,000 = Rs. 20.02 Total number of Units 1,248.801

Financial Management-II Illustration No. 14

A person invested in a systematic plan of a M.F., a fixed sum of Rs. 2,000 on 5^{th} of every month for 4 months. The NAV on these dates were Rs. 44.26, Rs. 56.12, Rs. 49.34 and Rs. 51.85. The entry load was 2% throughout the period. Find the average acquisition price, including the entry load, using the Rupee – Cost – Averaging Method.

Solution :

The entry load is given @ 2% on NAV, C.P. of unit = NAV + Entry load

Months	Amt invested in every month	NAV	LOAD @ 2%	CP of 1 unit	No. of Units
1	2,000	44.26	0.89	45.15	2,000/45.15 = 44.307
2	2,000	56.12	1.12	57.24	2,000/57.24 = 34.941
3	2,000	49.34	0.99	50.33	2,000/ 50.33 = 39.738
4	2,000	51.85	1.04	52.89	2,000/52.89 = 37.814
TOTAL	8,000				156.8

Average acquisition Cost Per Unit =

 $\frac{\text{Total amount invested}}{\text{Total number of Units}} = \frac{8,000}{156.8} = \text{Rs. 51.02}$

Illustration No. 15

A person invested RS. 30,000 in a mutual fund under the dividend reinvestment option on 15/10/2022 when the NAV was RS. 45.74 and entry load was 1.75%. The fund declared a dividend @ Rs. 10 per unit on 12/04/2023 and the ex-dividend was Rs. 38.50. Find the total number of units (upto 3 decimal places) after the dividend is reinvested.

NAV Rs. 45.74, Entry load @ 1.75%

CP of 1 unit = 45.74 + 0.80 = 46.54

Amount invested = Rs. 30,000

No. of Units = $\underline{\text{Amount Invested}}$ = 30,000 / 46.54 = 644.607 CP of 1 unit

Dividend Per unit = Rs. 10

Total Dividend = 644.607 * 10 = Rs. 6,446.07

Ex-dividend

NAV= 38.50

No. of units after total dividend =

 $\frac{\text{Total Dividend}}{\text{NAV of ex-dividend}} = \frac{6,446.07}{38.50} = 167.43$

Practical Problems :

Q. No. 1. LIG funds NAV was Rs. 27 at the beginning of the year and Rs. 33 at the end of the year. Find out the absolute change and percentage change in NAV.

Q. No. 2. Mr. Saurabh purchased a unit in Reliance an open ended fund as Rs. 275 and its NAV after 15 months is RS. 367. Find the % change in NAV. Also find annualized change in NAV.

Q. No. 3. Ms. Sangeeta purchased a unit in Tata an open ended fund as Rs. 250 and its NAV after 12 months is RS. 340. Find the % change in NAV. Also find annualized change in NAV.

Q. No. 4. If the funds NAV was Rs. 22 at the beginning of the year and Rs. 28 at the end of the year. Find the absolute change and % change in the NAV.

Q. No.5. Mr. Anish purchased a unit of NIG Diversified Power Sector Fund at Rs. 60. The fund had dividend distribution of Rs. 3.5 per unit. The NAV of the fund at the end of the year was Rs. 72. Find the total return of Mr. Anish.

Q. No. 6. An investor purchase unit of JD Fund at Rs. 17. The NAV of the fund at the year end is RS. 25. The fund declared dividend of Rs. 6 per unit. Find the total return.

Q. No. 7. Shyam purchases units of K. Ltd 30 fund at Rs. 35.45 and NAV at the year end is Rs. 49.59. This fund paid dividend of Rs. 8.25 per unit. Find the total return of Shyam.

Q. No. 8. Calculate the NAV of JM Agro with the help of following information.

- 1. Outstanding units is 37,000
- 2. Market value of investment in stocks is Rs. 8,28,000
- 3. Market value of investment in Corporate bonds is Rs. 3,15,000
- 4. Receivables is Rs. 50,000 and other assets Rs. 75,000
- 5. Liabilities is Rs. 2,00,000 and accrued expenses is Rs. 72,000
- 6. Other liabilities is Rs. 15,000

Q. No. 9. Calculate NAV of fund in the following case :

- 1. No. of units 10,000
- 2. Market value of investment in Government Securities Rs. 1 Lakh.
- 3. Market value of investment in Corporate Bonds Rs. 1 Lakh.

4. Other assets of the fund Rs. 20,000.

5. Liabilities of the fund is Rs. 25,000

6. Payable by the fund Rs. 5,000

Q. No. 10. Mr. Supriya invested Rs. 40,000 in DS with entry load of 2%. Find the NAV on the date of purchase (up to two decimal places) if the number of units purchased was 3,500.

Q. No. 11. Ms. Manju invested in Mutual Fund to buy 300 units with an entry load of 2.5%. Later she received a dividend of Rs. 10 per unit. After some months, she sold all units with all exit load of 0.5% at NAV of Rs. 600. If her total gain is Rs. 16,500. Find NAV at which she purchased the units.

Q. No. 12. Mr. Sachin invested Rs. 15,000 in Mutual Fund, entry load is 2.25%. The NAV on the date of purchase is 128.36. Find the current value of the investment.

Q. No. 13. Sona invested RS. 10,000 in FID. The NAV on the date of purchase is Rs. 11.48. The current value of the investment is Rs. 9,780.20. Find the entry load.

Q. No. 14. Amit purchased units of SBI mutual fund scheme in March 2022 at NAV of Rs. 37 per unit and sold it at NAV of Rs. 60 per unit in March 2023.

- 1. Find the total Returns of Mr. Amit
- 2. Determine change in Returns of Amit if –
- Only an entry load of 1% is applicable.
- Only an exit load of 2% is applicable.
- An entry load of 1% and exit load of 2% both are applicable.

Q. No. 15. Mr. Vinod invested Rs. 30,000 in Reliable Growth – Dividend plan on 20.04.2022 when its NAV was RS. 62.235. On 12.07.2022 he received a divided @ Rs. 5 per unit. On 5.09.2022, he redeemed all units @ an NAV of Rs. 70.423. Find Mr. Vinod's total gain and rate of return? There were no loads in any transactions.

Q. No. 16. Mr. Arjun invested Rs. 15,000 on 5^{th} Feb, 2022 in LED Infrastructure Fund at NAV of RS. 35.23 and an entry load of 2%. He sold all the units after 6 months and the NAV was Rs. 37.14 and no exit load. Calculate the rate of return.

Q. No. 17. An investor puchases unit of JM Fund at Rs. 18. The NAV of the fund at the year end is Rs. 20. The fund declared a dividend of Rs. 6 per unit. Find the total returns and find the percentage change in NAV.

Q. No. 18. A person invested at Rs. 20,000 in HDFC, under the dividend re-investment option, 25.11.2022 when the NAV was RS. 35.741 and the entry load was 2.25%. The fund declared a dividend @ Rs. 5 per unit on

20.02.2023 and the ex-dividend was Rs. 28.503. Find the total number of units (upto 3 decimal places) after the dividend is reinvested.

Mutual Fund and Bond Valuation

Q. No. 19. An SIP of Reliance Fund was started by a person on 7.08.2022. 5 monthly installment of Rs. 2,000 each were invested on the 8th of every month up to 7.12.2022. The NAV's were Rs. 18.723, Rs. 18.256, Rs. 19.253 Rs. 20.235 & Rs. 19.532 respectively. Find the average acquisition cost per unit up to 4 decimal places (No. of units up to 3 decimal places, no entry load.)

Q. 20. Find the average acquisition cost per unit of the SIP of Rs. 1,500 invested in Mutual Fund on 5th of every Jan, Feb & March 2023 with the NAV's Rs. 45,000, Rs. 46,250 & Rs. 43,250 respectively with an entry load of 2.25%.

7.4 BOND VALUATION

Meaning

Bonds are debt instruments that are issued by companies, financial institutions, banks, states and governments to raise funds for financing their capital expenditure for a wide variety of projects and activities. Bonds bear a predetermined rate of interest and a specific maturity period (more than one year). Bonds refer to debt instruments bearing interest on maturity. In simple terms, organizations may borrow funds by issuing debt securities named bonds, having a fixed maturity period (more than one year) and pay a specified rate of interest (coupon rate) on the principal amount to the holders.

Bond valuation is a technique for determining the theoretical fair value of a particular bond. Bond valuation includes calculating the present value of a bond's future interest payments, also known as its cash flow, and the bond's value upon maturity, also known as its face value or par value. Because a bond's par value and interest payments are fixed, an investor uses bond valuation to determine what rate of return is required for a bond investment to be worthwhile.

- Bond valuation is a way to determine the theoretical fair value (or par value) of a particular bond.
- It involves calculating the present value of a bond's expected future coupon payments, or cash flow, and the bond's value upon maturity, or face value.
- As a bond's par value and interest payments are set, bond valuation helps investors figure out what rate of return would make a bond investment worth the cost.

A bond or debenture is a debt security issued by a borrower and subscribed/ purchased by a lender/ investor. Bond is a usual form of long term financing used by the firms, which upon issuing a bond, promise to make certain cash flows in future (in the form of interest and or repayment). In order to understand the valuation of bonds, the understanding of the following basis terms is required :

- 1. **Par Value :** The par value is also called as the face value or nominal value of the bond is the principal amount of bond and is stated on the face value of the bond is stated on the face of the bond security. The par value of a bond may be Rs. 100 or Rs. 1,000 or any amount. The issue price, however, may be less than, equal to or more than the par value.
- 2. **Coupon rate :** This is the rate at which interest on the par value of the bond is payable as per the payment schedule. The interest may be paid annually or even monthly. The coupon rate is usually described as % rate and is applied to the par value to find out the periodic interest amount.
- 3. **Maturity :** The maturity of a bond refers to the period from the date of issue, after the expiry of which the redemption repayment will be made to the investor by the borrower firm.

Measuring Bond Returns : The returns from a bond fund are essentially the weighted average of the returns on each of its investment. So if a fund has invested in bonds of different maturities and yields, the yield from the fund will be the weighted average of the yields on different securities, weighted by the proportion of invested sum. The quality of papers and average duration of the portfolio are some of the factors that determine the returns one can earn from the fund. However, the prices and yields of bonds can fluctuate like other investments and so there is some risk inherent even in bond funds and they are not absolutely risk-free as they are often made out to be. Bond funds invest in bonds and like any investment are affected by some risks.

Yield to Maturity: Yield to Maturity is the total return anticipated on a bond, if the bond is held until maturity. YTM is considered a long term bond yield, but is expressed as an annual rate. In other words, it is internal rate of return (IRR) of an investment in a bond, if the investor holds the bond until maturity and if all payments are made as scheduled. YTM is the discount rate which equals the present value of promised cash flows to the current market price/ purchase price.

While applying yield to maturity (YTM) calculation, it is assumed that all coupon payments are reinvested at the same rate as the bond's current yield, and take into account the bond's current market price, par value, coupon/ interest rate, and term to maturity.

Yield to maturity is same as Internal Rate of Return. The YTM is calculated as follows :

YTM = <u>I</u> [(Future value – Purchase Price / Years to Maturity)] + Coupon [(Purchase Price + Future Value) / 2]

$$YTM = \frac{I + [F - P] / n}{[F + P] / 2}$$

YTM = Yield to Maturity

- I = Annual Interest Payment
- F = Redemption value of the bond
- P = Current Market Price of the bond / Purchase Price

n = Years to Maturity

Yield to Call and Bond Pricing

An investor in a callable bond also wants to estimate the yield to call, or the total return that will be received if the bond purchased is held only until its call date instead of full maturity.

- Yield to maturity is the total return that will be paid out from the time of a bond's purchase to its expiration date.
- Yield to call is the price that will be paid if the issuer of a callable bond opts to pay it off early.
- Callable bonds generally offer a slightly higher yield to maturity.

The term "yield to call" refers to the return a bondholder receives if the security is held until the call date, prior to its date of maturity. Yield to call is applied to callable bonds, which are securities that let bond investors redeem the bonds (or the bond issuer to repurchase them) early, at the call price.

Bond Pricing

Bond price is the present discounted value of future cash stream generated by a bond. It refers to the sum of the present values of all likely coupon payments plus the present value of the par value at maturity.

YTM is the discount rate at which the present value of all the future cash flows equals the bond's market price. The method for calculating YTM can then be represented with the following formula :

Bond Valuation =

 $\frac{\text{Cash Flow 1}}{(1 + \text{Yield})^1} + \frac{\text{Cash Flow 2}}{(1 + \text{Yield})^2} + \frac{\text{Cash Flow 3}}{(1 + \text{Yield})^3} \dots + \frac{\text{Last Cash Flow}}{(1 + \text{Yield})^n}$

Bond Pricing Theorems

Being fixed income securities bonds are issued with a fixed rate of interest is known as the coupon rate. The calculation of the coupon rate is based on the face value and maturity of the bond.

At the time of issuance, the coupon rate seems to be equal to the prevailing market rate. Based on the market condition, the interest rate may change.

If the current market interest rate is higher than the coupon rate of the bond, the bond generates the lower return and becomes less attractive to the investors. Therefore, the price of bonds will decline bellow its face value.

On the other hand, if the market interest rate decline below the coupon rate, bond price will increase and the bond becomes popular and being sold at a premium on its face value. Thus, the general assumption is that the bond prices vary inversely with the changes in the market interest rates.

There are 5 fundamental principles of Bond Pricing Theorems :

- 1. **Bond prices** moves inversely to market interest charges.
- 2. **The variability in bond prices and term to maturity** are positively related. For a given change in the level of market interest rates, changes in the bond prices are greater for long term maturities.
- 3. The sensitivity to changes in the market interest rates increases at a diminishing rate as the time remaining until the bond's maturity increases.
- 4. **Absolute increase in market interest rates and subsequent bond price** changes are not symmetrical. For a given maturity, a decrease in the market interest rate causes a price rise that is larger than the price decline resulting from an equal increase in market interest rates.
- 5. **Bond price volatility** is related to its coupon rate. The percentage change in the bond's price due to the changes in the market interest rate will be smaller if the coupon rate is higher.

Bond Risks and Bond Duration

Bonds are generally considered secure investments, but all investments carry some level of risk. Risk-taking investors often pursue higher returns, while risk-averse investors might become uneasy during market downturns. The prospect of taking larger risks holds the potential for remarkable rewards. However, even with risk-mitigation strategies in place, not all investments will align with expectations.

- 1. Interest risk : When interest rates rise, bond prices falls, whereas rates decline bond prices rise. The longer the time to bond's maturity, the greater it's interest rate risk.
- 2. Duration risk : Duration enables investor to more easily compare bonds with different maturities and coupon rate. Bond portfolio managers increase average duration when they expect rates to decline, to get the most benefit, and decrease average duration when they expect rates to rise, so minimize the negative impact. If rates move in a direction contrary to their expectations, they lose.
- 3. Inflation risk : Inflation risk refers to the effect of inflation on investments. When inflation rises, the purchasing power of bond returns (principal plus coupons) declines. The same amount of income

will buy lesser goods. E.g., when the inflation rate is 4%, every Rs.1000 return from the bond investment will be worth only Rs.960.

- 4. Reinvestment risk : The probability that investors will not be able to reinvest the cash flows at a rate comparable to the bond's current return refers to reinvestment risk. This tends to happen when market rates are lower than the bond's coupon rate. Say, a Rs.100 bond's coupon rate is 8% while the prevailing market rate is 4%. The Rs.8 coupon earned will be reinvested at 4% rather than 8%. This is called the risk of reinvestment.
- 5. Liquidity risk : Liquidity risk arises when bonds become difficult to liquidate in a narrow market with very few buyers and sellers. Narrow markets are characterized by low liquidity and high volatility.
- 6. Market risk : Market risk is the probability of losses due to market reasons like slowdown and rate changes. Market risk affects the entire market together. In a bond market, no matter how good an investment is, it is bound to lose value when the market declines. Interest rate risk is another form of market risk.
- 7. Default risk : Default risk is the bond issuing company's inability to make required payments. Default risk is seen as other variants of credit risk where the borrowing company fails to meet the agreed terms of the issue.
- 8. Selection risk : The risk that an investor chooses a security that under performs the market for reasons that cannot be anticipated.

Bond Duration :

It is the average time taken by an investor to collect his investment. It measure that how the cost of bond will repay as earliest. Both the investors and portfolio managers uses the duration of the instrument as a measure of the average time to the various coupon and principal payments.

$$\mathbf{D} = \sum_{t=1}^{n} \left(\frac{Ct*1}{(1+r)}\right) / P$$

Where, Ct = Interest and/ Principal payment at time t

t = length of time

n = time to maturity

r = yield to maturity

P= Value or market price of the bond

The two major factors affecting to the bond duration are time to maturity and coupon rate.

Bond duration can be calculated by two method :

Macaulay Duration : This formula measures the number of years required to recover the true cost of a bond, considering the present value of all coupon and principal payments received in the future. The formula as follows :

Macaulay Duration =
$$\frac{\sum_{T=1}^{n} \frac{t \cdot c}{(1-i)} + \frac{n \cdot M}{(1+i)^{n}}}{P}$$

- n = number of cash flows
- t = time to maturity
- C = Cash flows

1.

- i = Required yield
- M = Maturity/ Par Value
- P = Bond Price
- 2. Modified Duration : This is modified version of Macaulay Duration which takes into account the interest rate changes because the changes in interest rates affect the duration as the yield gets affected each time the interest rate varies.

The formula as follows :

Modified Duration = <u>Macaulay Duration</u>

$$1 + \underline{YTM}$$

Where, n = number of compounding periods per year

YTM = Yield to maturity

7.5 PRACTIAL PROBLEM ON YTM , BOND VALUATION & DURATION

Illustration No. 1.

A bond whose face value is Rs. 100 has a coupon rate of 12% and a maturity of 5 years. The required rate of interest is 10%. What is the value of the bond?

Solution :

Interest Payable 12% = 100 * 12 % = Rs. 12

Principal repayment is Rs. 100

Required Rate of return is 10%

V = I * PVIFA (kd,n) + F * PVIF(kd,n)

Value of the bond = 12 * PVFIFA (10%, 5y) + 100 * PVFIFA (10%, 5y)

V = 12 * 3.791 + 100 * 0.621

V = 45.49 + 62.10 = Rs. 107.59

Illustration No. 2

A bond has a face value of Rs. 1,000 with a 5 years maturity period. The rate of interest is 10% It carries an interest rate of 6%. What is the current market price of the bond?

Interest Payable 6% = 1000 * 6 % = Rs. 60 Principal repayment is Rs. 1000 Required Rate of return = 10 V = I * PVIFA (kd,n) + F * PVIF(kd,n)Value of the bond = 60 * PVFIFA (10%, 5y) + 1000 * PVFIFA (10%, 5y) V = 60 * 3.791 + 1000 * 0.621V = 227.46 + 621 = Rs. 848.46

Illustration No. 3

A Bond of Rs. 2,000 each has a coupon rate of 8% per annum and maturity period is 20 years. If the current price is Rs. 2,050, find YTM.

<u>I [(Future value – Purchase Price / Years to Maturity)] + Coupon</u> [(Purchase Price + Future Value) / 2]

YTM = Yield to Maturity

I = 8% of 2000 = 160 F = 2,000 P = 2,050 n = 20 $YTM = \frac{[2000 - 2,050 / 20)] + 160}{[(2050 + 2000) / 2]}$ $YTM = \frac{-2.5 + 160}{2,025}$ $YTM = \frac{157.50}{2,025}$ YTM = 00.777 = 7.77%

Illustration No. 4.

The bond of Seema enterprises with a par value of Rs. 500 is currently traded at Rs. 435. The coupon rate is 12% with a maturity period of 7 years. What will be the yield to maturity?

$$I = 12\% \text{ of } 500 = 60$$

 $F = 500$

P = 435 n = 7 $YTM = \frac{[(Future value - Purchase Price / Years to Maturity)] + Coupon}{[(Purchase Price + Future Value) / 2]}$ $YTM = \frac{[500 - 435 / 7] + 60}{(500 + 435) / 2]}$ $YTM = \frac{9.29 + 60}{467.50}$ $YTM = \frac{69.29}{467.50}$ YTM = 0.1482 = 14.82%

Illustration No. 5

A bond face value of Rs. 1,000 and maturity of 3 years pays 15% interest annually. What is the market price of the bond if the YTM is also 15%?

P = Int * PVIFA (15%, 3 years) + Redemption Value * PVIF (15%, 3 years)

P = 15 * 1000 (15%, 3 years) + Redemption Value * PVIF (15%, 3 years)

 $\mathbf{P} = (150 * 2.283) + (1,000 * 0.658)$

P = 342.45 + 658 = Rs. 1000.45

Illustration No. 6

A bond with a face value of Rs. 100 provides an annual return of 8% and pays Rs. 125 at the time of maturity, which is 10 years from now. If the investor's required rate of return is 12%, what should be the price of the bond?

P = Int * PVIFA (12%, 10 years) + Redemption Value * PVIF (12%, 10 years)

P = 8 (5.65) + (125 * 0.322)P = 45.2 + 40.25 = Rs. 85.45

Illustration No. 7

The following data is available for a bond.

Face value Rs. 1,000

Coupon Rate 16%

Years to Maturity 6

Redemption value RS. 1,000

Yield to Maturity 17%
To compute the duration of the bond, we require to calculate the market price of the bond

V = I * PVIFA (kd,n) + MV * PVIF(kd,n) V = (16% of 1000) * (PVIFA 17%, 6y) + 1,000 (17%, 6) V = (160 * 3.589) + (1000 * 0.390) V = 574.24 + 390 = 964.24

Year	Cash Flow	PVF@ 17%	B * C =	Proportion of Bond Value	Proportion of Bond Value * Time (Years)
(A)	(B)	(C)	(D)	(E)	(E * A)
1	160	0.855	136.80	0.142	0.142
2	160	0.731	116.96	0.121	0.242
3	160	0.624	99.84	0.104	0.312
4	160	0.534	85.44	0.089	0.356
5	160	0.456	72.96	0.076	0.380
6	1160	0.390	452.60	0.469	2.814
			964.40	1	4.246

Duration of the bond is 4.246 years.

Illustration No. 8

The following data is available for a bond.

Face value Rs. 100

Coupon Rate 9%

Years to Maturity 4

Redemption value RS. 1,000

Yield to Maturity 10%

Market Value Rs. 96.83

Calculate the duration this bond.

Cash Flow = coupon rate 9% = face value 100 * 9% = 9

Year	Cash Flow	PVF	B * C =	Proportion of Bond Value	Proportion of Bond Value *
	11010	17%		Dona value	Time (Years)
(A)	(B)	(C)	(D)	(E)	(E * A)
1	9	0.909	8.181	0.084	0.084
2	9	0.826	7.434	0.077	0.154
3	9	0.751	6.759	0.070	0.21
4	109	0.683	74.447	0.769	3.076
			96.821	1	3.524

Duration of the bond is 3.524 years.

Financial Management-II Illustration No. 9

A bond with a face value of Rs. 100 provides an annual rate of 8% and pays Rs. 125 at the time of maturity, which is 10 years from now. If the investor's required rate of return is 12%, what should be the price of the bond?

Solution :

V = I * PVIFA (kd,n) + MV * PVIF(kd,n) V = (8% of 100) * (PVIFA 12%, 10y) + 125 (12%, 10y) V = (8 * 5.65) + (125 * 0.322) V = 45.2 + 40.25 = Rs. 85.45

The price of the bond is Rs. 85.45

Illustration No. 10

You are considering investing in one of the following bonds.

Bonds	Coupon Rate	Maturity	Price Rs. 100 Par Value
Х	10%	8 Years	Rs. 70
Y	14%	10 Years	RS. 60

Income tax rate is 30% and capital gains tax rate is effectively 20%. What is post tax yield to maturity from these bonds?

Solution :

Bond X

$$I = 10\% \text{ of } 100 = 10 - (30\% \text{ tax on } 10) 3 = 7$$

$$F = 100 - (20\% \text{ gain on } 30) 6 = 94$$

$$P = 70$$

$$n = 8$$

$$YTM = I + \underline{[(Future value - Purchase Price / Years to Maturity)]}_{[(Purchase Price + Future Value) / 2]}$$

$$YTM = \frac{7 + [(94 - 70) / 8]}{(94 + 70) / 2}$$

$$YTM = \frac{7 + 3}{82}$$

$$YTM = \frac{10}{82}$$

$$YTM = 0.1219 = 12.20\%$$
Bond Y

I = 14% of 100 = 14 - (30% tax on 14) 4.2 = 9.8 F = 100 - (20% gain on 40) 8 = 92 P = 60 n = 10 $YTM = I + \underline{[(Future value - Purchase Price / Years to Maturity)]}_{[(Purchase Price + Future Value) / 2]}$ $YTM = \frac{9.8 + \underline{[(92 - 60) / 10]}_{(92 + 60) / 2}}{(92 + 60) / 2}$ $YTM = \frac{9.8 + 3.2}{76}$ $YTM = -\underline{13}_{76}$ YTM = 0.171 = 17.10%

Practical Problems :

Q. No. 1. A 10 year bond of Rs. 1,000 has an annual rate of interest of 8%. The interest is paid half yearly. If the required rate of return is 9%, what is the value of bonds?

Q. No. 2. A par value of bond is Rs. 100, maturing after 7 years bears a coupon rate of 12%. What will be the value of the bond when the discount rate is at 10% and at 12%?

Q. No. 3. A bond with a face value of Rs. 1,000 provides an annual rate of 8% and pays Rs. 1,250 at the time of maturity, which is 10 years from now. If the investor's required rate of return is 12%, what should be the price of the bond?

Q. No. 4. A bond with a face value of Rs. 100 provides an annual rate of 10% and pays Rs. 125 at the time of maturity, which is 10 years from now. If the investor's required rate of return is 12%, what should be the price of the bond?

Q. No. 5. The following data is available for a bond.

Face value Rs. 100

Coupon Rate 8%

Years to Maturity 5

Redemption value RS. 1,000

Yield to Maturity 10%

Market Value Rs. 98

Calculate the duration this bond.

Mutual Fund and Bond Valuation Q. No. 6. The following data is available for a bond.

Face value Rs. 1,000

Coupon Rate 12%

Years to Maturity 6

Redemption value RS. 1,000

Yield to Maturity 14%

Calculate the duration this bond.

Q. No. 7. The following data is available for a bond.

Face value Rs. 100

Coupon Rate 13%

Years to Maturity 6

Redemption value RS. 100

Yield to Maturity 15%

Calculate the duration this bond.

Q. No. 8 Mr. Iyer is considering an investment in one of the following bonds and is much confused :

- a. Bond X with coupon rate 12%, maturity 10 years and Price is RS. 70 whose par value is Rs. 100.
- b. Bond Y with coupon rate 10% maturity 6 years and price is Rs. 60 wholse par value is Rs, 100.

Advise Mr. Iyer which bonds are preferable.

Objectives Questions

- 1. Mutual Fund is a ______ that pools together the funds of many investors to make investments in assets
- 2. . _____ are mutual fund scheme which invest in Government securities.
- 3. The professional money managers who administer and manage the portfolio of fund called typically the _____.
- 4. ______ is referred to the commission that is charged on the sale or purchase of a mutual fund.
- 5. All listed and traded securities are accounted as _____.
- 6. Intrinsic value of a bond is ______ value of all the future cash flows.
- 7. Face value is the value stated on the face of the bond and is known as ______value.

- 8. ______ is the Internal Rate of Return (IRR) of an investment in a bond if the investor holds in a bond until maturity and if all payments are made as scheduled.
- 9. The probability that investors will not be able to reinvest the cash flows at a rate comparable to the bond's current return refers to ______ risk.
- 10. When interest rates rise, bond prices falls, whereas rates decline bond prices rise which is called as _____ risk.

Ans. 1. Trust 2. Gilt funds 3. Fund manager 4. Load 5. Closing market price 6. Present 7. Par 8. Yield to maturity. 9. Reinvestment 10. Interest.

Theory Questions :

- 1. What is Mutual Fund? Features of Mutual Fund.
- 2. Explain the term Mutual Fund. What are the advantages and disadvantages of Mutual Fund.
- 3. Limitations of Mutual Fund.
- 4. Explain in details Entities involved in Mutual Fund.
- 5. What is bond? What are the basic terms of bond?
- 6. Explain the concept of YTM
- 7. Which are the types of risks in bond investment?

CREDIT MANAGEMENT

Unit Structure

- 8.1 Introduction
- 8.2 Concept of credit
- 8.3 Credit definition
- 8.4 Concept of credit management
- 8.5 Concept of credit risk management
- 8.6 Credit granting decision
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- 8.8 Characteristics of Credit
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- 8.10 Factors affecting credit policy
- 8.11 Evaluation of credit policies
- 8.12 Aging Schedule
- 8.13 Solved Problem
- 8.14 Unsolved Problem
- 8.15 MCQ

8.1 INTRODUCTION

Every country has to undergo from the continuous process of development. Banks play a vital role in this process. The Indian banking system has progressed as a powerful mechanism of planning for economic growth. Banks channelize savings to investments and consumption. Through that, the investment requirements of savers are reconciled with the credit needs of investors and consumers.

Out of all principal roles of the banks, lending is the most important role in which banks provide working capital to commerce and industry. Importance of credit is not only because of its social obligation to cater the credit needs of different sections of the community but also because lending is the most profitable activity, as the interest rates realized on business loans have always been well above those realized on investments. Credit being the principal source of income for banks and usually represents one of the principal assets of the banks so its proper management becomes all the more necessary. The extension of credit on sound basis is therefore very essential to the growth and prosperity of a bank. With the increasing role of commercial banking in capital formation, employment generation and production facilitation, the credit operations of commercial banks are expected to be in harmony with the requirements of the economic system.

Credit Management

Till today, banks are the major suppliers of working capital to the trade and industry and they have privilege of having massive lending facilities produced by the banks. Hence, the management of bank credit operations is required to be more creative than the traditional approach followed by it earlier.

Lending activities of banks have surround effect on the economy. For overall development of economy, all the sectors of economy should be grown and developed equally. Credit management serves the concept of credit deployment that bank should observe that overall bank credit should be deployed in such a way that each and every segment of an economy and system of nation get benefited. This is the one aspect of credit management. On the other hand, if lending activity becomes fail, it adversely affects the whole economy. In last decade, banks have realized that an increase in retail credit increased the credit risk also. Success of bank lies on profitability and liquidity and that come majority from successful lending activity. So an examination of some of the important aspects of credit management of Indian banks would provide an insight into the credit/ lending activity of commercial bank.

8.2 CONCEPT OF CREDIT

The word "credit" has been derived from the Latin word "credo" which means "I believe" or "I trust", which signifies a trust or confidence reposed in another person. The term credit means, reposing trust or confidence in somebody. In economics, it is interpreted to mean, in the same sense, trusting in the solvency of a person or making a payment to a person to receive it back after some time or lending of money and receiving of deposits etc.In other words, the meaning of credit can be explained as,

- ✓ A contractual agreement in which, a borrower receives something of value now and agrees to repay the lender at some later date.
- ✓ The borrowing capacity provided to an individual by the banking system, in the form of credit or a loan. The total bank credit the individual has is the sum of the borrowing capacity each lender bank provides to the individual.

8.3 CREDIT DEFINITIONS

Prof. Kinley:

"By credit, we mean the power which one person has to induce another to put economic goods at his deposal for a time on promise or future payment. Credit is thus an attribute of power of the borrower."

Prof. Gide:

"It is an exchange which is complete after the expiry of a certain period of time".

8.4 CONCEPT OF CREDIT MANAGEMENT

Banks and financial institutions mobilize deposits and utilize them for lending. Generally lending business is encouraged as it has the effect of funds being transferred from the system to productive purposes which results into economic growth. The borrower takes fund from bank in a form of loan and pays back the principal amount along with the interest. Sometimes in the non – performance of the loan assets, the fund of the banks gets blocked and the profit margin goes down. To avoid this situation, bank should manage its overall credit process. Bank should deploy its credit in such a way that every sectors of economy can develop. Credit management comprises two aspects; from one angle it is that how to distribute credit among all sectors of economy so that every sector can develop and banks also get profit and from the other angle, how to grant credit to various sectors, individuals and businesses to avoid credit risk.

Credit management is concerned mainly with using the bank"s resource both productively and profitably to achieve a preferable economic growth. At the same time, it also seeks a fair distribution among the various segments of the economy so that the economic fabric grows without any hindrance as stipulated in the national objectives, in general and the banking objectives, in particular.

8.5 CONCEPT OF CREDIT RISK MANAGEMENT

Credit Risk Management is very important area for the banking sector and there are wide prospects of growth. Banks and other financial institutions are often faced with risks that are mostly of financial in nature. Management of risk has been very important component of business plan for the banks and an undercurrent of risk mitigation and planning has always been part of the banking business.

Risk management plays a vital role in a bank"s credit management. Banking professionals have to maintain the balance between the risks and the returns. For a large customer base banks need to have a variety of loan products that are reasonable enough. If the interest rates in loan products are too low, the bank will suffer from losses.

There have been conscious efforts in minimizing the risk without affecting the business opportunities since the early days of banking. With the increasing volume of business and complexity in financial transactions, the risk management also has increased. Risk management is relatively easy in stable environments and under predictable circumstances of interest rates. However, with increasing volatility in the markets has made risk management more complex.

Giving loans is risky affair for bank sometimes; Banks are constantly faced with risks. There are certain risks in the process of granting loans to certain clients. There can be more risk involved if the loan is extended to unworthy debtors. Certain risks may also come when banks offer securities and other forms of investments. Effective Credit Risk Management is vital for success of any bank, as banks are operating with a low margin compared to other business. They should strike a proper balance between profitability and liquidity and should always be careful about default profitability and credit value at risk.

8.6 CERDIT GRANTING DECISION

Credit evaluation attempts to assess the credit worthiness of a prospective customer. It is a pre- requisite for taking a final decision whether to grant credit to the prospective customer or not as it provides the decision maker with necessary information for decision-making. If the customer pays his due, the company will make profit on the sale and he fails to pay, then the amount of cost of the product will be lost. The relative chances of getting the payment or not is expressed as probability of getting the payments and probability of not getting the payment It is possible to obtain expected profit of granting credit as a weighted average profit and loss where weights are the respective probabilities. If the weighted average amount is positive, benefits are more than loss, and hence it is worth granting credit The probabilities are always non-negative and aggregate to one

For example, A Ltd is considering whether to grant credit to a prospective customer or not to grant Based on credit evaluation, it is expected that the probability of getting the payment on time is 0.90 and non-payment is 0.10.

8.7 CREDIT EVALUATION

Before granting credit to a prospective customer, the firm seeks the information of the credit worthiness of that customer In judging the credit worthiness of an applicant, the five basic factors the five 'C's have to be factored in:

Character: Character refers the willingness of the customer to honour his obligations. It reflects integrity, a normal attribute which is considered important by credit managers.

Capacity: it refers to the ability of the customer to pay on time. It depends on the financial situation such as cash, working capital position and profitability.

Collateral: it refers to the security available with the customer which he is willing to offer to the firm in the payment of debt

Capital: The financial soundness of the potential customers is to be analysed with reference to tangible net worth.

Conditions: The general economic condition will affect potential customers ability to earn income and repay debt.

8.8 CHARACTERISTICS OF CREDIT

Some characteristics of credit are of prime importance while extending credit to an individual or to a business enterprise.

- **1. Confidence:** Confidence is very important for granting or extending any credit. The person or authority must have confidence on debtor.
- 2. Capacity: Capacity of the borrower to repay the debt is also very crucial thing to be considered. Before granting or extending any advance, creditor should evaluate the borrower's capacity.
- **3. Security:** Banks are the main source of credit. Before extending credit, bank ensures properly about the debtor"s security. The availability of credit depends upon property or assets possessed by the borrower.
- 4. **Goodwill:** If the borrower has good reputation of repaying outstanding in time, borrower may be able to obtain credit without any difficulty.
- 5. Size of credit: Generally small amount of credit is easily available than the larger one. Again it also depends on above factors.
- 6. Period of credit: Normally, long term credit cannot easily be obtained because more risk elements are involved in its security and repayments.

VIII. CREDIT INSTRUMENTS:

Credit instruments prove very helpful in encouragement and the development of credit and help

I the promotion and development of trade and commerce. Some of the credit instruments are,

- 1. Cheque: Cheque is the most popular instrument. It is an order drawn by a depositor on the bank to pay a certain amount of money which is deposited with the bank.
- 2. Bank draft: Bank draft is another important instrument of credit used by banks on either its branch or the head office to send money from one place to other. Money sent through a bank draft is cheaper, convenient and has less risk.
- **3. Bill of exchange:** It enables a seller of commodity to issue an order to a buyer to make the payment either to him or to a person whose name and address is mentioned therein either on the site of the bill or within a period of time specified therein.4. Promissory note:

According to the Indian negotiable instrument act, "a promissory note" is an instrument in writing containing an unconditional undertaking signed by the maker to pay a certain sum of money only to or the order of certain person or the bearer of the instrument.

5. Government bonds: Government issues a sort of certificate to the person who subscribes to these loans. Such certificates are called government bonds. Some of them are income tax free.

- **6. Treasury bills:** These bills are also issued by the government. They are issued in anticipation of the public revenues.
- 7. **Traveler"scheque:** This is the facility given by bank to the people. It was most useful when recent technological instrument like ATMs were not available. A customer was used to deposit money with the banks and banks give traveler"scheque in turn. It was used to avoid risk of having cash while travelling.

8.9 CREDIT ANALYSIS

The 5 Cs of Credit are Character, Capacity, Capital, Collateral, and Conditions. They are used by lenders to evaluate a borrower's creditworthiness and include factors such as the borrower's reputation, income, assets, collateral, and the economic conditions impacting repayment.

Lenders heavily rely on the 5 Cs of credit management to assess creditworthiness and determine loan or credit product approvals. Additionally, these factors influence loan rates and terms, with borrowers possessing stronger credit profiles offered more favorable rates and terms compared to those with weaker credit profiles.

- 1. Character: The first C of credit is Character, which refers to the customers' reputation and credit history. To assess their ability to repay a loan, credit teams usually use popular credit bureaus such as D&B, Experian, and Equifax to look at the following criteria:
 - Payment history
 - Any outstanding debts
 - Customers' <u>Credit score</u>
 - Past bankruptcies or foreclosures
 - Any legal judgments against the customer

Character is a critical factor because it helps organizations determine the level of risk involved in extending credit. As a customer, if you have a good credit history and a high credit score, your supplier will view you as less of a risk and more likely to repay your debts on time.

2. Capacity: 'Capacity' means whether the customer's organization has enough funds to repay the supplier team. If the customer has been experiencing unstable cash flows, then the credit teams think twice before extending the line of credit.

Sometimes, credit teams also follow the news alerts to understand the customer's financial position, acquisitions, employee stability, etc.

3. Collateral : 'Collaterals' are similar to the concept of a mortgage. If a customer can provide a 'collateral,' such as a fixed asset, it increases the possibility of getting a higher credit line as it acts as a parameter of assurance to the credit management teams.

Most credit teams demand 'collaterals' from high-risk customers to avoid incurring <u>bad debts</u> for their business.

4. Capital: Capital refers to the assets owned and the amount of equity a customer has. Capital includes financial and non-financial assets, and the credit teams get this information through public financial statements. These teams will look at the value of the assets to assess the customers' net worth. They'll also take into account any investments that could be used as collateral for the loan.

Capital is important because it gives credit teams a measure of security. If a customer defaults on the credit owed, the supplier can seize their assets to recover the losses. As a customer, the more capital you have, the less risky the loan is for the lender, and the more likely you are to receive favorable loan terms.

5. **Conditions:** Conditions encompass the current financial condition of the customer, which can be measured by analyzing the company's financial statements, cash flow, balance sheet, and income statement.

Additionally, credit teams review macroeconomic conditions, scrutinizing the country's geopolitical situation, economic conditions, and the customer's industry.

Conditions play a crucial role as they impact the overall cost of credit.

8.10 FACTORS AFFECTING CREDIT POLICY

The credit policy of a business firm is an important factor determining both the quantity and the quality of accounts receivables. Companies may follow a lenient or stringent credit policy. The company that adopts a lenient credit policy sells goods on credit to its customers on very liberal terms and conditions. On the other hand, a company that adopts a stringent credit policy sells goods on credit to its customers on a highly selective basis, i.e., only to those peculiar customers who are financially sound and hold a proper track record strengthening their credit-worthiness.

Any increase in accounts receivables or an additional extension of trade credit granted to customers not only results in higher sales but is also accompanied with additional financing required to support the increased investment in accounts receivables. Moreover, the costs of credit investigations, collection efforts and the chances of bad debts are also increased.

The size of the investment that a company makes in accounts receivables is determined by various factors such as:

- The effect of granting credit to customers on the volume of a company's sales
- The details of credit terms
- The details of the cash discount

- The policies and practices adopted by the firm for the selection of appropriate credit customers
- The paying practices, trends and habits of the company's customers
- The company's policies and practices of collection of debts
- The degree or extent of operating efficiency in the billing, recordkeeping and adjustment functions

Other ancillary costs such as interest, collection costs and bad debts, etc. The rising trend in such costs would depress the size of investment in accounts receivables.

8.11 EVALUATION OF CREDIT POLICIES

A proper evaluation of credit policies to be adopted by a company and those to be dispensed with by a company is indubitably one of the most significant tasks to be undertaken by finance managers. The firm must work out the optimum amount that it should spend on the collection of its debtors. This involves maintaining a trade-off between the levels of expenditure on the one hand and a decrease in bad debt losses/increase in sales revenue on the other. To apprehend the role of different costs involved in the evaluation of credit policies, let us consider the following example:

A business trader whose present sales are in the bracket of Rs. 12 lakh per annum and an average collection period of 30 days wants to adopt a more liberal policy with a view to enhance sales revenue. The selling price per unit is Rs. 6, the average cost per unit is Rs. 4.5 and variable costs per unit are Rs. 4. The current level of bad debt loss is 1%. The required rate of return on additional investment is 20%. A study executed by a management consultant reveals the following information:

Credit Policy A – Increase in collection period by 10 days – Increase in sales by Rs. 60,000 – Present anticipated default rate 1.5%

Credit Policy B – Increase in collection period by 20 days – Increase in sales by Rs. 96,000 – Present anticipated default rate 2%

Credit Policy C – Increase in collection period by 30 days – Increase in sales by Rs. 1,50,000 – Present anticipated default rate 3%

Credit Policy D – Increase in collection period by 45 days – Increase in sales by Rs. 1,80,000 – Present anticipated default rate 4%

Credit Granting Decision

Credit evaluation helps to judge the credit worthiness of a prospective customer. Credit granting decision is a procedure of final decision whether to grant credit to the prospective customer or not. The decision to grant credit or not depends upon the (cost benefit analysis.

Financial Management-II

8.12 AGING SCHEDULE

The aging schedule is a summarized list of accounts receivable broken down into different time periods that rank the receivables depending on days until due or past due. The aging schedule is generally divided into 30 days' categories so that the current items are listed in the 0–30 days' category, moderately overdue items are listed in the 31–60 days' category and very overdue are listed in other categories.

Customer	Total	Current due (under 30 Days)	1to30 days past due	31to60 days past due	61to90 days past due	More than 90 days
Company ABC	100,000	80,000	20,000	-	-	-
Company XYZ	70,000	-	-	30,000	30,000	10,000
Company AXY	25,000	20,000	-	5000		
Total	195,000	100,000	20,000	35,000	30,000	10,000

Aging Schedule Uses

The aging schedule method of monitoring credit policy is more advantageous than its counterpart known as the average collection period.

Following are the uses of aging schedule method -

To Initiate the Collection Process for Overdue Payments

The aging schedule or more commonly the receivables aging schedule is used to determine when to initiate the collection process for overdue payments from the borrowers.

It also shows when to write off a debt as it has turned into bad debt and also when to send the report to a collection agency to collect the overdue bills from the customers.

Used to Determine the Total Amount of Bad Debt

The aging schedule may also be used to determine the total amount of bad debt the company has incurred which helps the company to determine the most appropriate amount for the doubtful accounts.

To Determine the Amount of Credit to Offer

Another use of an aging schedule report is for the credit department to determine whether a particular individual should be offered more or fewer amounts of credit.

Help Lenders Build Their Credit Policy

By maintaining an aging schedule, lenders can easily determine which of their customers are paying the dues back in time and which are unable to pay the dues back. So, this may help the lenders build their credit policy.

In long term, the impact of past due accounts receivables on the cash flow of the lending firm can also be determined using an aging schedule report.

Used to Check the Cash Flow

The aging schedule can also be used to check the cash flow of a company. In the case there is a negative cash flow, it must be addressed as soon as possible and the negative cash flow can be found in the aging schedule table.

To Look for Specific Information

The aging schedule makes it easy to find the auditors to look for specific information from the table.

8.13 SOLVED PROBLEM

Problem 1

The following are the details regarding the operation of a firm during a period of 12 months:

Sales	Rs. 1200000
Selling Price per unit.	Rs.10
Variable Cost Price per uni	Rs.7
Total Cost per unit	Rs.9
Credit period allowed to customers.	1 month

The firm is considering a proposal for a more liberal extension of credit by increasing the average collection period from I month to 2 months. This relaxation is expected to increase the sales by 25%.

You are required to advise the firm regarding adopting the new credit policy, presuming that the firm's required return on investment is 25%.

Solution :

Statement showing evaluation of credit policies

Particular	Present Policy	Pro osed Policy
Credit Period	1month	2 months
No of Units	120000	150000
Sales @ 10	1200000	1500000
(-) Variable cost @ 7	840000	1050000
Contribution	360000	450000
(-) Fixed Cost $(9-7) = 2x120000$	240000	240000

Financial Management-II

Particular	Present Policy	Pro osed Policy
Profit (a)	120000	210000
Receivables	840000 + 240000	1050000 + 240000
$VC+FC/12 \times DCP$	12	12
	x 1	x 2
	90000	215000
Cost of AR	90000 x 25%	215000 x 25%
Capital cost (Receivables x ROI)		
(b)	22500	53750
Net Profit (a-b)	97500	156250
Incremental NP		58750

Suggestion : The company is advised to adopt two months credit period since it resulted in to incremental net profit of Rs. 58750

Problem 2

Arvind Mills Ltd. manufactures readymade garments and sells them on creditbasis through a network of dealers. Its present sale is Rs.60 lakhs per annum with 20 days credit period. The Company is contemplating an increase in the credit period with a view to increasing sales. Present variable costs are 70% of sales and the total fixed costs are Rs-8 lakhs per annum. The company expected pre — tax return on investment@25%. Some other details are given as under:

Proposed Credit Policy	Average Collection Period (Days)	Expected annual Sales (Rs. Lakhs)
Ι	30	65
11	40	70
111	50	74
lV	60	75

Which credit policy should the company adopt? (Assume 360 days in a year)

Solution :

Statement showing evaluation of credit policies

Particulars	Present	Proposed Policy			
	Policy	Ι	Π	Ш	IV
DCP (days)	20	30	40	50	60
Sales	60	65	70	74	75
(-) Variable cost (70%)	42	45.5	49	51.8	52.5
Contribution	18	19.5	21	22.2	22.5
(-) Fixed cost	8	8	8	8	8
Profit (a)	10	11.5	13	14.2	14.5

Credit Management

Particulars	Present		Propose	d Policy	
	Policy	Ι	П	Ш	IV
Receivables					
$VC+FC/360 \times DCP$	42+8x20 /360				
	2.78	4.46	6.33	8.31	10.08
Cost of AR	2.78 x 25%	4.46 x 25%	6.33× 25%	8.31×2 5%	10.08× 25%
Capital cost (Reci x ROI)					
(b)	0.7	1.12	1.58	2.08	2.52
Net profit (a — b)	9.3	10.38	1 1.42	12.12	1 1.98
Incremental NP		1.08	2.12	2.82	2.68

Suggestion : select propose policy III since it result into highest incremental net profit i.e. 2.82 lakhs.

Problem 3

Ponds Ltd. has present sales level of 10,000 units at Rs- 300 per unit. Variable cost is Rs.20() per unit and the fixed cost amounts to Rs.300000 per annum. The present credit period allowed by the company is I month. The company is considering a proposal to increase the credit periods to 2 months and 3 months and has made the following estimates:

Credit policy	Existing	Proposed	
	1 month	2 month	3 month
Increase in sales		15%	30%
% of bad debts	1%	3%	5%

There will be increase in fixed cost by Rs.50000 on account on increase of sales beyond 25% of present level. The company plans on a pretax return of 20% on investment in receivables. You are required to calculate the most paying credit policy for the company.

Solution :

Statement showing evaluation of credit policies

Particular	Present Policy	Proposed Policy	
		Ι	Π
DCP	1 month	2 months	3 months
No ofUnits	10000	1 1 5 0 0	13000
Sales @ (300 p.u.)	3000000	3450000	3900000
(-) Variable cost@ 200 p.u.	2000000	2300000	2600000
Contribution	1000000	1150000	1300000
(-) Fixed Cost	300000	300000	350000
Profit. (a)	700000	850000	950000

Particular		Present Policy	Proposed Policy	
			Ι	Π
Receivables		191667	433333	737500
VC+FC x DCP/12				
cost of AR		38333	86667	147500
Capital cost (Rece	vivables x ROI)			
• Defaulting cost (1	% of sales)	30000	103500	195000
	(b)	68333	190167	342500
Net Profit	(a-b)	63166.7	659833	607500
Incremental NP			28166	-24167

Suggestion : i.e 2 months select propose I since it result into highest implemental net profit i.e. Rs. 28166

Problem 4

Samsung Ltd. manufacturers of Color TV sets are considering the liberalization of existing credit terms to three of their large customers A, B and C. The credit period and likely quantity of TV sets that will be lifted by customers are as follows:

Credit period (Days)	Quantity Lifted (No of TV sets)			
	A	В	С	
0	1000	1000	-	
30	1000	1500	-	
60	1000	2000	1000	
90	1000	2500	1500	

The selling price per TV set is Rs. 9000. The expected contribution is 20% of the selling price. cost of carrying debtors averages 20% per annum.

- 1. A. Determine the credit period to be allowed to each customer. (1 year= 360 days)
- 2. B. What other problems the company might face in allowing the credit period as determined in (a) above.

Solution :

Evaluation of credit proposal for A

Select credit period 0 days since quantity remains inspite of increase in credit period.

Evaluation of credit proposal for B

Particulars	Proposed Policy				
	1	2	3	4	
DCP	0	30	60	90	
No. of units	1000	1500	2000	2500	

Credit Management

Particulars	Proposed Policy			
	1	2	3	4
Sales @ 9000 p.u	900000	13500000	18000000	2.25
(-) Variable cost (80%)	7200000	10800000	14400000	18000000
Contribution (20%) (a)	1800000	2700000	3600000	4500000
Receivables Sales x DCP / 360	-	1125000	3000000	5625000
Cost of AR Capital cost (Recv x ROI)	-	225000	600000	1125000
(b)	-	225000	600000	1125000
Net profit (a — b)	1800000	2475000	3000000	3375000

Suggestion : select propose policy 4 i.e. 90 days credit period as it results into highest net profit Rs. 3375000.

Note : in absence of information of fixed cost, receivable have been valued at sales.

Evaluation of credit proposal for C

Particulars	Proposed Policy			
	3	4		
DCP	60	90		
No. of units	1000	1500		
Sales @ 9000 p.u	9000000	13500000		
- Variable cost (80%)	7200000	10800000		
Contribution (20%) (a)	1800000	2700000		
Receivables				
Sales x DCP/360	1500000	3375000		
Cost of AR Capital cost (Recv x ROI)	300000	675000		
(b)	300000	675000		
Net profit (a — b)	1500000	2025000		

Suggestion : select propose policy 4 i.e. 90 days credit period as it results into highest net profit Rs. 2025000.

Note : in absence of information of fixed cost, receivable have been valued at sales.

B) the problems to be face by the company in allowing credit period as determine in a above.

1) Customer A on discovering that B & C are allowed higher credit period 90 days at same price will feel is treated by the company in an unfair manner, and may stop doing business with company.

2) Customer A might also spread disinformation in market resulting into Loss at reputation / goodwill for Samsung Ltd.

Problem 5

X & Co. whose current sales are per annum and an average collection period of 30days wants to pursue a more liberal policy to improve sales.

Credit Policy	Increase In Collection Period (Days)	Increase In Sales Rs.	% Default Anticipated
Α	10	30000	1.50%
В	20	48000	2%
c	30	75000	3%
D	45	90000	4%

Selling price per unit is Rs.3, average cost per unit is Rs.2.25 and variable cost per unit is Rs.2 Current Bad Debt loss is Required Return on additional Investment is 20%. Assume 360 days a year. Which of the above policies would you recommend for adoption?

Solution :

Particulars	Present		Propose	d Policy	
	Policy	Α	В	С	D
DCP (days)	30	40	50	60	75
No. of units	200000	210000	216000	225000	230000
Sales@3 p.u.	600000	630000	648000	675000	690000
(-) Variable cost @ 2p.u.	400000	420000	432000	450000	460000
Contribution	200000	210000	216000	225000	230000
(-) Fixed cost (2.25 - 2) x 200000	50000	50000	50000	50000	50000
Profit (a)	150000	160000	166000	175000	180000
Receivables					
VC+ FC \times DCP/360	37500	52222	66944	83333	106250
Cost Of AR					
Capital cost (Recv x ROI)	7500	10444	13389	16667	21250
Defaulting cost	6000	9450	12960	20250	27600
(b)	13500	19894	26349	36917	48850
Net profit (a — b)	136500	140106	139651	138083	131150
Incremental NP	-	3606	3151	1583	-5350

Statement showing evaluation of credit policies

Suggestion : select propose policy A since it result into highest incremental net profit i.e. Rs.3606

Problem 6

A trader whose current sates are Rs. per annum and average collection period is 30 days wants to pursue a mc*e liberal credit to improve sates. A study made by consultant firm reveals the following information.

Credit Policy	Increase in collection period	Increase in Sales
A	15 dyas	60,000
В	30 days	90,000
C	45 days	150,000
D	60 days	180,000
E	90 daya	200,000

The selling price per unit is Rs. 5 Average cost per unit RS.4 and variable cost per unit I Rs.2.75 paise unit. The required rate of return on additional investments is 20 percent (cost of capital). Assume 360 days a year and also assume that there are no bad debts. Which of the above policies would you recommend for adoption.

Solution :

Particulars	Present	Α	В	C	D	Е
Credit period	30 days	45 days	60 days	75 days	90 days	120 days
No of units	300,000	312,000	318,000	330,000	336,000	340,000
Sales	1,500,000	1,560,000	1,590,000	1,650,000	1 680,000	1,700,000
Variable cost @ 2.75	8125000	8,58,000	874,500	907 500	924000	935,000
Fixed Cost	375,000	375,000	375,000	375,000	375,000	375,000
Total Cost	1,200,000	1,233,000	1,249,500	1,282,500	I 299,000	1,310,000
Profit (A)	300,000	327,000	340,500	367,500	381,000	390,000
Average debtors Cost (at cost) [(TC)(×/360)]	100,000	154,125	208,250	267,188	324,750	436,667
Cost of Investment @ 20% (B)	20,000	30,825	41 1650	53,437	64,950	87,333
Net Profit (A- B)	280,000	296,175	298,850	314,063	316,050	302,667

Statement showing evaluation of credit policies

A credit policy of 90days is the best as it gives us highest net profit 3rd rank 120 days credit policy cant be done as f rank policy has an average debtors of 324750 and 3fd rank 120 days policy has average debtors of 436667, which is not feasible. What is the point of put extra money and earn lesser. So all other policy is feasible but for policy of 120 days credit.

Problem 7

XYZ Co is making sale of 1600000 it extends customers, However, in to overcome financial "difficulties, it is considering to change the credit policy, The "posed terms of credit and expected sales are

Policy	Term	Sale
Ι	75 days	1500000
II	60 days	1450000
III	45 days	1425000
IV	30 days	1350000
V	15 days	1300000

The firm his the variable cost of 80% and a fixed cost of the cost capital is 15%. Evaluate different proposed policies and suggest which policy should be accepted? (Year 360 days)

Particulars	Credit F	Policies				
	90days	75days	60days	45days	30days	15days
A) Sales	160000	150000	145000	142500	135000	130000
Cost		0	0	0	0	0
Variable cost (80%)	128000	120000	116000 0	114000 0	108000 0	104000 0
Fixed cost	10000	10000	10000	10000	10000	10000
B) Total Cost	138000	130000	126000 0	124000 0	118000 0	114000 0
C) Profit (A-B)	220000	200000	190000	185000	170000	160000
D) Debtors at cost Total cost/360 days	345000	270833	210000	155000	98333	47500
E) Cost of Funding Debtors 15% of d	51750	40625	31500	23250	14750	7125
Net Profit (C-E)	168250	159375	158500	161750	155250	152875
Policy Recommendations	1			2		

Statement showing evaluation of credit policies

The existing policy of 90 days is still the best as it gives the <u>highest net</u> <u>Profit of 168250</u>. The firm may choose the 2^d best profit period which is <u>45days</u> credit policy. But if we compare correctly, if we this policy, the credit period is drastically reduced by 45 and marginally. This maybe a very good option.

Problem 8

H Ltd has at present annual sales level of Rs units at Rs 300 per unit. variable cost is R.s 200 per unit and fixed cost amount to Rs per annum. present credit period allowed by the company is I month. The company is

considering a proposal to increase the credit period to 2 months and 3 months and has made the following estimates:

	Existing	Proposed	
Credit Period (month)	1	2	3
Increase in Sales (%)	-	15	30
Bad Debts (%)	1	3	5

There will be increase in fixed cost by Rs 50.000 on account of increase in sales beyond 25 per cent of present level. The company plans a pre-tax return of 20 per cent on investment in receivables. You are required to calculate the most paying credit policy for the company.

Particulars	1 month	2 months	3 months
Sales (units)	10,000	11,500	13,000
Sale revenue	Rs 30,00,000	Rs 34,50,000	Rs 39,00,000
Less: Variable costs	20,00,000	23,00,000	26,00,000
Total contribution	10,00,000	11,50,000	13,00,000
Less: Other costs: Fixed costs	3,00,000	3,00,000	3,50,000
Bad debts	30,000	1,03,500	1,95,000
Investment cost (see working notes)	38,333	86,667	1,47,500
profit	6,31,667	6,59,833	6,07,500

Statement showing evaluation of credit policies

Suggestion : the firm is advised to Adobe policy of extending credit of two months as it is maximum profits.

Working Note :

	Existing	2 months	3 months
Investment in Debtors (VC+FC)/Debtors Turnover	23,00,000/12 = Rs. 191667	26,00,000/6 = Rs. 4,33,333	29,50,000/4 = Rs. 7.37,500
Cost of Investment (investment in debtors × 0.20)	38,333	86,667	1,47,500

Problem 9

Mr. Cheekoo is a Trader , whose current sales are 10000 units @ Rs.5 per unit, and average collection period is 1 month .Current Cost of Collection is Rs,2000. Mr. Nano wants to adopt a more liberal policy to Improve sales. Following is the information of marketing research carried out :

Credit	Expected	Expected Units	Expected	Expected
Policy	collection period	to be sold	Bad Debt	Collection Cost
А	1.5 months	15000	1%	Rs.2500
В	2 months	20000	2%	Rs.3000
С	2.5 Months	25000	3%	Rs.3500
D	3 months	30000	4%	Rs.4000

Contribution Ratio is 22%. The Current Bad debt loss is 0.5 00. Required rate of return is 20 % on additional investment applicable tax rate is 15%. Cost of Collection Which policy would you recommend for adoption.

Statement showing evaluation of credit policies

Particulars	Present Policy	Policy A	A Policy Policy		Policy D
	1 month	1.5	2	2.5	3
		months	months	months	months
Units	10000	15000	20000	25000	30000
Sales (100%)	50,000	75,000	1,00,000	1,25,000	1,50,000
Less :- Variable Cost (78%)	39,000	58,500	78,000	97,500	1,17,000
Contribution (22%)	11,000	16,500	22,000	27,500	33,000
Less :- Fixed Cost	-	2 -	-	-	-
Profit	11,000	16,500	22,000	27,500	33,000
Bad Debt %	0.50%	1%	2%	3%	4%
Less :- Bad Debt	250	750	2,000	3,750	6,000
Less :- Cost of Collection	2,000	2,500	3,000	3,500	4,000
Expected Net Profit Before	8,750	13,250	17,000	20,250	23,000
$\frac{1}{1} ess := Tax 15\%$	1 3 1 3	1 088	2 550	3 038	3 4 5 0
Expected Profit after Tax	7 /38	1,760	14 450	17 213	19 550
Less :- Opportunity Cost of	7,730	11,203	17,730	17,213	17,550
investment in Debtor (20%)	650	1,463	2,600	4,063	5,850
Net Benefit	6,788	9,800	11,850	13,150	13,700

Suggestion : we select policy because is net benefit is maximum.

8.14 UNSOLVED PROBLEMS

1. AK LTD has a current turnover of 30 lakhs p.a. cost of sales is 80% of turnover and bad debts are 2% of turnover. Cost of sales include 70% variable cost and 30% fixed cost, while company's required rate of return is 15% .AK LTD currently allows 15 days credit to its customers but is considering increasing this to 45 days credit in order to increase its turnover. It has been estimated that this change in policy will increase turnover by 20% while bad debts will increase by 1%.It is not expected that the policy change will result in an increase in fixed cost and creditors and stock will be unchanged. Should AK LTD introduce the proposed policy(Assume 360 days in a year)

- 2. The AK ltd currently sells on terms 'net 45'. The company has sales of 37.5 lakhs a year, with 80% being the credit sales. At present, the average collection period is 60 days. The company is now considering offering terms '2/10,net 45'. It is expected that the new credit terms will increase current credit sales by 1/3rd. The company also expects that 60% of the credit sales will be on discount and avg collection period will be reduced to 30 days. The average selling price of the company is 100 per unit and variable cost is 85% of selling price. The company is subject to a tax rate of 40% and its before tax rate of borrowing for working capital is 18%. Should the company change its credit terms to '2/10,net 45'? Support your answers by calculating the expected change in profit(Assume 360 days in a year)
- 3. Slow payers are regular customer of goods dealers ltd,Calcutta and have approached the sellers for extension of a credit facility for enabling them to purchase goods from goods dealers ltd. On analysis of past performance and on the basis of information supplied, the following pattern of payment schedule is given

At the end of 30 days	15% of bills
At the end of 60 days	34% of bills
At the end of 90 days	30% of bills
At the end of 100 days	20% of bills
Non recovery	1%

Slow payers want to enter into a commitment for purchase of goods of 15 lakhs in 2023, deliveries to be made in equal quantities on the first day of each quarter in the calendar year. The price per unit of commodity is 150 on which a profit of 5 per unit is expected to be made. It is anticipated by goods dealers ltd that taking up of this contract would mean an extra recurring expenditure of 5000 p.a. If the opportunity cost of funds in the hands of goods dealers is 24% p.a, would you as a finance manager of the seller recommend the grant of credit to slow payers? Assume 365 days in a year.

4. AK ltd is considering the revision of its credit policy with a view to increasing its sales and profits. Currently all its sales are on credit and customers are given one month's time to settle the dues. The profit volume ratio is 40% and required rate of return is 20%. The marketing director of the company has given the following options with draft estimates for consideration.

Particulars	Current position	Option 1	Option 2	Option 3
Sales(lakhs)	200	210	220	250
Credit period(months)	1	1.5	2	3
Bad debts(% of sales)	2	2.5	3	5

Advice the company as to which option to choose.

AK ltd is considering to relax its present credit policy. 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 150000. The firm is required to give a return of 25% on the investment in new accounts receivable. The company's variable costs are 70% of the selling price. Given the following information which option is better ?

Particulars	Present policy	Policy 1	Policy 2
Annual credit sales	50 lakhs	60 lakhs	67.5 lakhs
Acc receivable turnover	4 times	3 times	2.4 times
Bad debt	1.5 lakhs	3 lakhs	4.5 lakhs

8.15 MCQ

5.

1. Receivables arise -....

(A). If the goods are sold on credit.

(B). If the goods are sold on cash

(C). If the services are rendered on credit

(D). If the services are rendered on cash.

2.A decrease in the firm's receivable turnover ratio means that -

(A) it is collecting credit sales more quickly than before

(B) it is collecting credit sales more slowly than before

(C) sales have gone down

(D) inventories have gone up

3. The goal of receivables management is to maximize the value of the firm by achieving a trade-off between —

(A) Risk & Profitability

(B) Liquidity & Profitability

(C) Return & Profitability

(D) Return & Liquidity

4. Risk of non-payment may due to –

(A) Insolvency

(B) Liquidity problems

(C) Intention of cheating

(D) All of the above

5. The cash discount is given to customers for:

(A) Early payments

(B) Good business relations

(C) Bulk purchase

(D) Frequent purchases

6. Accounts receivable are reported in the balance sheet:

- (A) At face value
- (B) At gross value
- (C) At net realizable value
- (D) At net credit sales value

7. may also be offered for the early payment of dues.

Credit Management

(A) Trade discounts

(B) Special discounts

(C) Both (A) and (B) (

(D) Cash discounts

8. Increasing the credit period from 30 to 60 days, in response to a similar action taken by all of our competitors, would likely result in:

(A) An increase in the average collection period.

(B) A decrease in bad debt losses.

(C) An increase in sales.

(D) Higher profits.

9. is an arrangement to have debts collected by a third party entity for a fee.

(A) Factoring

(B) Aging

(C) Forming

(D) Crediting

10. The payment terms 2/10, Net 30 tell us that:

(A) 2% discount will be awarded if the payment is made within 10 days of invoice date; otherwise, the full amount is payable within next 10 days of invoice date.

(B) 10% discount will be awarded if the payment is made within 20 days of invoice date; otherwise, the full amount is payable within 30 days of invoice date.

(C) 2% discount will be awarded if the payment is made within 30 days of invoice date; otherwise, the full amount is payable within next 10 days of invoice date.

(D) 2% discount will be awarded if the payment is made within 10 days of invoice date; otherwise, the full amount is payable within 30 days of invoice date.

[ANS. (1 - a), (2 - b), (3 - a), (4 - d), (5 - a), (6 - c), (7 - d), (8 - a), (9 - a), (10 - d)
