Financial Management

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Financial Management

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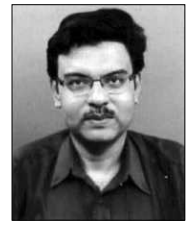

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FINANCIAL MANAGEMENT

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Preface

Financial management is primarily concerned with acquisition, financing and management of financial resources in order to maximise the wealth of the firm for its owners. Accordingly, the finance manager of a modern business firm is generally involved in three types of decisions, namely, (i) investment decision (ii) financing decision and (iii) dividend decision. The investment decision relates to the selection of assets in which funds will be invested by a firm. The investment decision is broadly concerned with the composition of assets of a firm whereas the financing decision is concerned with the financing-mix or capital structure or leverage. The dividend decision is concerned with the determination of quantum of profits to be distributed to the owners. Hence, various finance theories have been developed over the years.

This book is intended primarily for the commerce students pursuing undergraduate studies from University of Calcutta and other major Universities of Eastern India. This book has been written with an objective to explain the basic concepts of finance and its related theories in the most-lucid and student-friendly manner. An attempt has been made to relate theory to practice with illustrations and solved problems.

The book displays well-organised content, structured in pointers and is supplemented with adequate number of solved examples and practice questions. Every attempt has been made to ensure syllabus coverage. With enriched pedagogy of more than 500 questions and chapter-wise segregation of questions from last 12 years (2006–2017) University Question Papers, the book aims at providing ample scope for practice.

Authors

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This book would not have been possible without the unstinting support of many people. We take this opportunity to offer our sincere thanks to all of them. It is a great pleasure to express our deep sense of gratitude to all our respected teachers associated with the Department of Commerce, University of Calcutta, who have enriched our academic knowledge and outlook and have also given us valuable suggestions in drafting this book.

We also express our deep gratitude and indebtedness to all the renowned authors on this subject from whom references have been taken.

We are immensely benefited from the interactions we had with our friends, teachers of different colleges and universities at different points of times.

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Last but not the least, we also acknowledge the endless support of our family members who had to sacrifice quality time spent due to our continuous engagement in this venture.

We believe that our present endeavor will be beneficial for our readers. Any suggestions for the improvement of the book from professionals, teachers, students and other readers will be very much appreciated.

Authors

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Syllabus of University of Calcutta
B.Com. Hons. in Accounting & Finance

Paper 3.4 HA: FINANCIAL MANAGEMENT

Module I – 50 Marks

Unit 1: Introduction **(10 Marks)**

- Important functions of Financial Management
- Objectives of the firm: Profit Maximisation versus Value Maximisation
- Role of Chief Financial Officer

Unit 2: Basic Concepts **(10 Marks)**

- Time Value of Money: Compounding and Discounting Techniques—Concepts of Annuity and Perpetuity
- Risk-Return Relationship (Concepts only)
- Financial environment in which a firm has to operate

Unit 3: Sources of Finance and Cost of Capital **(10 Marks)**

- Different sources of finance; long-term and short-term sources
- Cost of Capital: Concept, relevance of cost of capital, specific costs and weighted average cost, rationale of after tax weighted average cost of capital, marginal cost of capital

Unit 4: Leverage and Capital Structure Theories **(10 Marks)**

- Leverage—Business Risk and Financial Risk, Operating and financial leverage, Trading on Equity
- Capital Structure Decisions—Capital structure patterns, designing optimum capital structure, constraints, various capital structure theories.

Unit 5: Working Capital Management (I) **(10 Marks)**

- Introduction; meaning and concept of working capital; management of working capital and issues in working capital; estimating working capital needs; operating or working capital cycle.

Paper 3.4 HA: FINANCIAL MANAGEMENT

Module II – 50 Marks

Unit 6: Working Capital Management (II) **(10 Marks)**

- Various sources of finance to meet working capital requirements
- Financing current assets: Strategies of financing (Matching, Conservative, and Aggressive policies)
- Bank financing: recommendations of Tandon Committee and Chore Committee
- Management of components of working capital (an introduction only)

Unit 7: Capital Expenditure Decisions (I) **(10 Marks)**

- Purpose, objectives and process, understanding different types of projects
- Techniques of Decision Making: Non-discounted and Discounted Cash Flow Approaches, Payback Period Method, Accounting Rate of Return

Unit 8: Capital Expenditure Decisions (II) **(10 Marks)**

- Net Present Value, Profitability Index, Internal Rate of Return, Modified Internal Rate of Return, Discounted Payback Period
- Ranking of competing projects, ranking of projects with unequal lives, Capital Rationing

Unit 9: Dividend Decisions **(10 Marks)**

- Meaning, nature and types of dividend
- Some dividend policies and formulating a dividend policy
- Dividend Theories: Walter's Model, Gordon's Model, Modigliani and Miller: Irrelevancy Theory

Unit 10: Financial Control **(10 Marks)**

- Concept, objectives and steps, major tools of financial control, advantages and limitations of financial control system.

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1 CHAPTER

Introduction

CHAPTER OUTLINE

1.1 Introduction
1.2 Definition of Financial Management
1.3 Stages of Evolution of Financial Management
1.4 Nature of Financial Management
1.5 Objectives of Financial Management
1.6 Scope or Functions of Financial Management
1.7 Interrelation of Financing, Investment and Dividend Decision
1.8 Objective of the Firm—Profit Maximisation vs. Wealth Maximisation
1.9 Role/Functions of a Chief Financial Officer
1.10 Emerging Role of Financial Manager/CFO in India
1.11 Summary

1.1 INTRODUCTION

Finance is the vigour of a business. In order to sustain the operation of business, finance is indispensable. The importance of finance to an organisation is similar to that of blood to a human body. Just as blood circulates throughout the human body to keep it functioning, similarly finance flows in every vein of business to keep it alive and functioning.

The term 'finance' can be interpreted in both a narrow as well as a broad sense. In its narrow sense, the term 'finance' implies the Financial Capital required to buy all other factors of production such as land, labour, machineries, or even the entrepreneurship. Thus, finance is the prime element that keeps an organisation functioning. In its broader sense, finance is considered to be an area of administration concerned with procurement and utilisation of Financial Capital of a firm.

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

According to Paul G. Hasings, "Finance refers to the management of monetary affairs of business".

Thus, in a broader sense finance is the functional area of management dealing with all the monetary affairs including procurement and utilisation of funds of a business.

1.2 DEFINITION OF FINANCIAL MANAGEMENT

Financial Management refers to the management of finance. It is often termed as money management, or in a broader sense, fund management. This is because money is the standard medium of exchange and Financial Management aims to manage the monetary affairs of a business. To be more specific, Financial Management is concerned with procurement and effective utilisation of financial resources to achieve the desired goals of an organisation. Financial Management is, thus, a subset of the total system of management and is concerned with the management of financial resources of a business.

The term, Financial Management, has been defined by different experts in different ways as follows:

- According to Ezra Solomon, "Financial Management is concerned with the effective use of an important economic resource, namely, capital funds."
- According to Van Horne, "Financial Management is concerned with the acquisition, financing and management of assets with some overall goal in mind."
- Joseph and Massie described Financial Management as, "The operational activity of a business that is responsible for obtaining and effectively utilising the funds necessary for efficient operation."
- Howard and Upton defined Financial Management "as an application of general managerial principles to the area of financial decision-making".

Therefore, Financial Management may be defined as the system of management which is concerned with cost effective procurement and efficient utilisation of financial resources of an organisation with the objective of maximising shareholders' value.

1.3 STAGES OF EVOLUTION OF FINANCIAL MANAGEMENT

Financial Management was traditionally studied as a part of Economics. Gradually, over a period of time it evolved as a separate discipline. Increasing competition and complexities due to rapidly changing business environment and introduction of new analytical, logical tools in the field of finance have widened the scope of Financial Management with time. This evolution of Financial Management can be discussed under three phases—traditional phase, transitional phase and the modern phase.

1.3.1 Traditional Phase (During 1920s–1930s)

During this phase, Financial Management was studied as a part of Economics only and there was no separate existence of a discipline named Financial Management. Finance was considered as a part of economic activity of any firm. During this phase, the term 'Corporate Finance' was in prevalence which referred to the funds required by the corporates to conduct their business activities. Accordingly, only procurement of funds was being emphasised and

their effective utilisation was mostly ignored. Thus, functions of finance were considered from a narrow perspective only. In addition, external sources over internal sources and long term over short term needs were given too much importance. Proper analysis and interpretation of financial decisions were lacking in this phase.

All these voids became more evident due to growing complexities of business as per the fast changing business environment. This is why this approach towards finance was highly criticised on various grounds—ignoring the internal health of a firm, giving too much importance on corporate firms, ignoring the liquidity aspect completely and undermining internal financial decisions.

1.3.2 Transitional Phase (From 1930s till 1950s)

Between the traditional phase and the modern phase, i.e. from 1920—1930s to 1950s, was the transitional phase. This phase was characterized by a number of improvements over the traditional phase. During this phase the need for descriptive analysis of financial decisions was first recognised. Moreover, importance of liquidity aspect was also highlighted.

1.3.3 Modern Phase (Early 1950s)

The beginning of the modern phase in the evolution of Financial Management can be traced back to early 1950s. Unlike the previous two phases, this phase put more emphasis on the analytical aspect of financial decision making process. This was done because of growing complexities. Due to intense competition procuring funds from cost effective sources only was not enough to sustain in the long run, rather maximising benefits from the resources procured became equally essential. So, financial decisions had to be taken after careful analysis of the existing alternatives. Thus, during this phase experts started advocating for application of mathematical models and statistical tools for arriving at financial decisions. Different techniques of financial variable analysis, mathematical models, concept of financial engineering were thus introduced during this phase. Markowitz proposed the very famous Portfolio Management Theory during 1950s. A decade later, during 1960s, Sharpe and Linter introduced the popular Capital Asset Pricing Model (CAPM). Thus, in the modern phase, Financial Management is looked at from a broader perspective. Another major development that has a bearing on financial decisions is behavioural finance. Behavioural finance considers social, cognitive and emotional factors that influence decisions and examines their effects on market prices, returns and allocation of resources. Today the scope of Financial Management is extended to three broad areas of decision making of a business firm viz. the Investment Decision, financing decision and dividend decision.

1.4 NATURE OF FINANCIAL MANAGEMENT

The nature of Financial Management can be summarised as follows:

1. ***Decision-making process:*** Financial Management is a decision-making process concerned with planning, acquiring and utilising funds in a manner that achieves the firm's desired goals.

2. ***Specialized branch of management:*** Today Financial Management is viewed as a specialised branch of management aimed at utilising the scarce financial resources in the best possible manner to maximise the returns from them.
3. ***Separate discipline:*** Financial Management has gradually evolved into a separate discipline that contains specialised knowledge regarding the procurement, utilisation and control of financial resources in the interest of the firm and its stakeholders.
4. ***Multidisciplinary approach:*** Financial Management is a multidisciplinary approach. It depends on other disciplines like Economics, Mathematics and Accounting for a better management of resources.
5. ***Control function:*** Financial manager is often called the controller. This is because financial resources are procured and utilised following the guidelines prepared by the financial manager.
6. ***Highly centralised:*** In every organisation, Financial Management functions are highly centralised to avoid any kind of unauthorised use of financial resources. Everyone is not allowed to participate in the financial decision-making process.
7. ***Profession:*** Financial Management has slowly grown into a profession. Young educated persons, aspiring for a career in management undergo specialised courses in Financial Management, offered by universities and management institutes and take up the profession of Financial Management.

1.5 OBJECTIVES OF FINANCIAL MANAGEMENT

Financial Management is concerned with three important decision areas viz. financing decision, Investment Decision and dividend decision. These decisions are always centered on some pre-determined objectives. These are as follows:

1. ***Profit Maximisation:*** Profit refers to the excess of revenue over costs. An organisation earns revenue by offering its products and services to the buyers. However, at the same time it needs to incur costs to produce the products. Since in a competitive market a firm hardly has any power to influence the price in its own favour, it can increase profit only by controlling costs through optimal utilisation of all resources including finance. This increased profit helps the firm to meet the expectation of owners and to safeguard the interest of all other stakeholders including the creditors and employees. In short, interest of all stakeholders can be best served by achieving the profit maximisation objective. This is why one of the important objectives of Financial Management is to maximise the profits of the firm.
2. ***Wealth Maximisation:*** Though the need for higher profits can never be overlooked, many financial experts like Ezra Solomon, Van Horne, etc., advocated for Wealth Maximisation to be the prime objective of Financial Management. Here 'wealth' refers to the wealth of the shareholders measured in terms of market value of shares. According to the experts, a financial manager should always accept projects that generate positive Net Present

Value (NPV) which is the excess of Cash Inflow over outflow adjusted by the Time Value of Money. This positive NPV improves the performance of the firm which recognized by the market, leads to an increase in the market price of share and consequently the wealth of the shareholders.

3. ***Minimisation of Cost of Capital:*** A financial manager procures fund from different sources each of which carries a cost. While Debt Capital carries fixed interest charges known as cost of debt, Equity Capital requires payment of dividend as cost of equity. Even retained earnings involve notional cost. Since all these costs are charged against the Operating Profit of the firm, higher burden of cost significantly erodes the earnings of the shareholders measured in terms of Earnings Per Share (EPS). Hence, an important objective of Financial Management is to minimise the burden of average Cost of Capital. This can be done by identifying an optimal mix of all the different sources through judicious use of Debt Capital which is supposed to be the cheapest source of capital as compared to others.
4. ***Survival and growth of the firm:*** Growing globalisation and rapid change in technology has made business conditions volatile and competition highly intense. As a result, business firms, today, are vulnerable to any change in the industry conditions unless they can device suitable strategy to combat the same. Thus, Financial Management should focus on such decisions that will ensure sustainability and growth of the firm. The management of a business should be well aware of the changing business scenarios and decision should be taken accordingly.

The above objectives can be viewed as the primary objectives of Financial Management. However, in order to achieve the same, Financial Management must also cater to the following secondary objectives:

1. Optimum utilisation of scarce financial resources
2. Following an optimal Capital Structure in terms of debt-equity mix.
3. Strike a balance between firm's requirement of retained earnings as an internal source of fund and investor's expectation of fair dividend.

1.6 SCOPE OR FUNCTIONS OF FINANCIAL MANAGEMENT

As per the modern approach, Financial Management has three prime functions viz. financing decision, Investment Decision and dividend decision. Each of these functions again has a number of subsidiary functions attached to it. These are depicted in Figure 1.1 and explained as follows:

1. ***Financing Decision:*** Financing Decision or function requires a financial manager to decide on an appropriate mix of alternative sources of finance. For this purpose a financial manager identifies all the available sources of finance and evaluates them based on various quantitative and qualitative parameters. He then selects those that best suit the

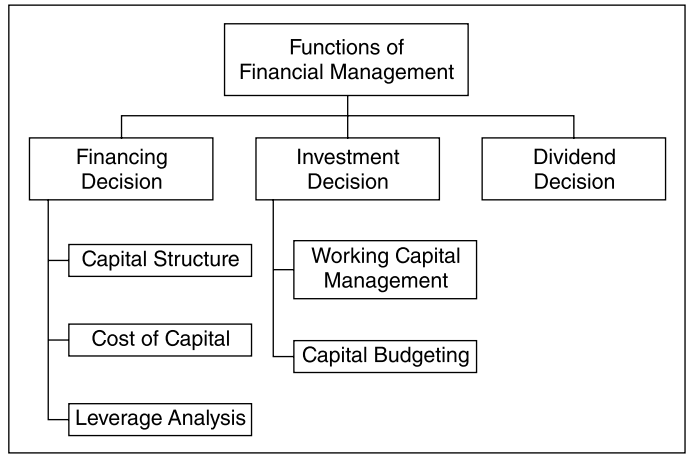


Figure 1.1 Scope/Functions of Financial Management

requirement of the firm. Financing Decision can again be subdivided into three major functions:

i. Determining the Capital Structure, i.e. proportion of various sources in the overall capital of the firm.
ii. Determining the Cost of Capital, i.e. to calculate the cost of each individual source and the overall cost as the weighted average Cost of Capital
iii. Leverage analysis, i.e. to analyse the financial risk associated with a given financing plan, resulting profitability in terms of earnings to shareholders and select plan accordingly.

2. ***Investment Decision:*** This involves decision regarding short-term and long-term investment and hence is further divided into the following two functions.
   i. ***Working Capital management decision:*** This involves short-term Investment Decision or investment in Current Assets. Here the manager needs to estimate the overall requirement of Working Capital and manage each individual component, i.e. cash and cash equivalent, inventory, receivables and payables.
   ii. ***Capital Budgeting Decision:*** This involves long-term Investment Decision or decision regarding investment in fixed assets. Here the finance manager must evaluate each alternative project based on certain predetermined financial and non-financial criteria and select the one that maximises the benefit for the firm.
3. ***Dividend Decision:*** Dividend Decision involves decision regarding how much profit of a business is to be distributed as dividend and how much is to be retained for future expansion. Since dividend payment, at times, has significant bearing on the market price of shares, probable impact of such decision on market value of shares should be judged carefully. A rational dividend policy should aim at increasing market price of shares. However, critics argue that a firm should always explore the possibility of investing its retained earnings for expansion. In such a case dividend becomes a mere residual. As a

result they advocate considering dividend decision not as a separate decision but as a part of a firm's internal financing decision.

Apart from the above three, a finance manager also has to carry out a few other functions as follows:

i. Maintaining liquidity
ii. Framing appropriate financial policies
iii. Ensuring effective cash management
iv. Providing financial information timely for decision making
v. Ensuring effective financial analysis and Financial Control
vi. Payment of taxes timely
vii. Measures to increase the profitability of the firm
viii. Reduction in cost
ix. Estimation of Cash Flows

All these functions are aimed at effective management of financial resources.

1.7 INTERRELATION OF FINANCING, INVESTMENT AND DIVIDEND DECISION

The three important decisions of Financial Management namely financing, investment and dividend decision are interrelated and together help to achieve the Wealth Maximisation objective of the firm.

Through financing decision the manager decides on an appropriate mix of alternative sources of finance keeping in mind that the resultant average Cost of Capital must be the minimum. This enhances the profitability of the firm and increases the market value of shares which in turn maximizes the wealth of the shareholders.

Under Investment Decision the manager evaluates alternative investment proposals, selects only those which offer positive and higher NPV and ultimately allocates the collected funds to the projects selected. As a result, again, the profitability of the firm gets boosted up resulting into higher value for shareholders.

Finally, dividend payment, for an aspiring firm, is viewed as a residual after arranging funds internally from retained earnings for future projects and hence basically becomes a finance function.

In this way all the three functions are interrelated and contribute to the ultimate objective of Wealth Maximisation.

1.8 OBJECTIVE OF THE FIRM—PROFIT MAXIMISATION VS. WEALTH MAXIMISATION

A firm's performance may be evaluated based on various alternative yardsticks. The most common and popular yardstick of measuring a firm's performance is profit. A firm earning higher profit is said to perform better whereas a firm earning lower profit is considered to

perform poor. In a market-driven economy, however, an alternative to profit is the market value of the firm. If the market price of shares of a firm increases, then it is said to be performing well and if the share prices drop then the firm is considered to be performing poorly. Thus, the objective of a firm can be either profit maximisation or Wealth Maximisation and at times Wealth Maximisation can be more important than profit maximisation.

1.8.1 Profit Maximisation

Profit Maximisation is often considered as the main objective of any business. This is because profit earned by a firm is an important criterion for measuring the efficiency achieved by the firm. Moreover, economic resources always follow the firms that earn surplus profits. Hence, in an economy where all incumbent firms practice the profit maximisation objective, optimal allocation of scarce economic resources will be least assured.

Arguments in Favour of Profit Maximisation

Every business wants to maximise its profit because without profit a business cannot survive. The arguments which are generally cited in favour of profit maximisation are as follows:

1. Profit helps to measure the efficiency of a business. Hence, higher profit indicates higher efficiency of the firm.
2. Profit is essential for a business to survive and sustain competition.
3. In a competitive market profit maximisation is achieved by minimising the cost through optimum utilisation of resources. This, in turn, ensures social and economic development.
4. Part of the profit retained in business, is an important source of internal fund.
5. Profit helps to judge the viability of a business.

Arguments Against Profit Maximisation Objective of the Firm

Profit Maximisation as a sole objective of the firm is widely accepted. But with increasing competition and growing complexities due to changing business scenario, this objective of the firm has lost its relevance. Critics have pointed out the following arguments against profit maximisation:

1. ***Subjective concept:*** Profit Maximisation is a subjective concept; it varies from business to business. It is indeed very difficult to define what would be the maximum amount of profit. What is maximum for a particular firm may not be same for another firm belonging to the same industry.
2. ***Lack of clarity in the definition of profit:*** In the objective of profit maximisation, the term profit has not been clearly defined. As a result, there is a controversy regarding its proper definition as to whether it is profit before tax or profit after tax, Operating Profit or non-Operating Profit, short-term profit or long-term profit and net profit or gross profit, etc. Some critics advocate that in order to maximise profit, a firm should maximise its EPS. However, this is also not acceptable as there may be instances where profit in absolute term increases but EPS decreases due to increase in outstanding equity shares.
3. ***Ignores risk factor:*** Following profit maximisation objective a firm accepts only those projects that generate maximum return. Hence, the risk factor is completely ignored.

However, in a rapidly changing business environment Cash Flows from a project will be significantly volatile. In such a situation a small amount of certain return may be preferred to a large sum of uncertain return.

4. ***Time Value of Money:*** The value of money decreases over time due to a number of factors like preference of current consumption over future, investment opportunities, inflation, risk, etc. This is why Cash Flow at different points of time cannot be compared, unless they are in the same parlance. Unfortunately profit maximisation objective value Cash Flows similarly over time, i.e. the Terminal Cash Flows are valued as same as the initial Cash Flows. This, at times, may potentially mislead the selection of the optimal project.
5. ***Separation between ownership and management stands in the way of achieving the goal:*** Profit Maximisation as the sole objective may be suited for sole-proprietorship or family form of business but for company where there is a separation between ownership and management, achieving this objective may be more difficult. In a company, equity shareholders are mainly the owners, whereas top level managers and other higher executives constitute the management. The objective of owners is to maximise profit, so as to get higher dividend from higher profit, but the objective of management may be sales maximisation as their compensation are linked with revenue on many occasions. Since management is entrusted with the operation of the company, they may be interested to achieve their own objective at the cost of the owners.
6. ***Profit Maximisation can be achieved in perfectly competitive market:*** This objective was primarily developed under a perfectly competitive market scenario where firms had no control over price. Therefore, practicing this objective, firms could produce and sell maximum quantity of products and be the market leader. However, today business environment is characterised by monopolistic or oligopolistic market structure and hence firms themselves own a fair degree of monopoly power. As a result without utilising the full capacity a firm can win the competitive edge and ensure higher price for its product and accordingly be the market leader.
7. ***Traditional approach:*** Considering profit maximisation as the only objective of a business is a traditional approach to Financial Management. With the growing competition and changing business scenario this objective alone cannot help a firm to sustain competition. It is viable for short-term projects only but for long term investment project it cannot be an acceptable decision criteria.
8. ***Ignores social responsibility:*** Business, to achieve this objective, often ignores the harm caused to the society due to its activities. When profit becomes the one and only target of the business, it often indulges in unethical means to achieve the same.

From the discussion it appears that profit maximisation as the sole objective of the firm has various lacunae. Moreover, with the growing complexities of businesses this objective should be aligned with other long-term objectives of the firm. To overcome these limitations, a wider approach is necessary. Thus, the modern approach to Financial Management advocates Wealth Maximisation to be the objective of the firm.

1.8.2 Wealth Maximisation

Wealth Maximisation refers to maximisation of the wealth of shareholders. Here, wealth of a shareholder is defined in terms of the market value of shares held by him. This is why Wealth Maximisation is also known as value maximisation.

Under modern approach to Financial Management, wealth or value maximisation is considered to be the prime objective of a firm. Hence, all the financial decisions, i.e. the Investment Decisions, Financing Decisions and Dividend Decisions must aim at increasing the market value of shares so as to maximise the wealth of the shareholders. Accordingly a proper risk return trade-off is extremely necessary. If a project involves high risk and its cost of financing is also high, then the return expected should also be higher as otherwise the market value of shares will decline.

The market value of a company's share represents the expectation of the shareholders from the company. So, to maximise the wealth of shareholders, i.e. to maximise the market value of shares some important factors like undertaking long term projects involving low risk, increase in sales volume, paying fair dividend to shareholders, maintaining healthy relationship with customers, increasing market share, etc., are to be taken into account. Although the market price of the shares of a firm is influenced by many factors like company's reputation, prevailing economic condition, use of technology, foreign investments, etc., but on a long term basis the expectation of shareholders will ultimately influence the market value of shares.

Critics therefore argue that a firm must maximise the NPV of its projects in order to maximise the wealth of the shareholders. This is because maximising the NPV of projects automatically ensures fulfilment of shareholders' expectations as mentioned above.

Maximisation of wealth, i.e. maximising the Net Present Value of a project is calculated as follows:

Net Present Value (NPV) = Present Value of Cash Inflows – Present Value of Cash Outflows

$$\text{NPV or } W = \frac{CI_1}{(1+r)^1} + \frac{CI_2}{(1+r)^2} + \frac{CI_3}{(1+r)^3} + \frac{CI_4}{(1+r)^4} + \cdots + \frac{CI_n}{(1+r)^n} - I$$

where,

r = discount rate or Cost of Capital; CI = Cash Inflows at the end of each year;
I = Investment or Cash Outflow; W = Wealth

For mutually exclusive projects, the one with higher NPV should be accepted, whereas for a single project, if the NPV > 0 , i.e. positive then only it will be accepted.

Illustration 1.1

Problem

The estimated Cash Inflows of a firm over the next 4 years are ₹10,000, ₹12,000, ₹16,000 and ₹20,000 respectively. The discount rate is 10%. Calculate the Net Present Value or wealth of the firm. The initial investment is ₹30,000. PV factors are: 0.909, 0.826, 0.751, and 0.683

Solution

Calculation of Net Present Value or Wealth

Year	Cash Inflows (₹)	PV Factor @10%	Present Value of Cash Inflows
1st	10,000	0.909	9,090
2nd	12,000	0.826	9,912
3rd	16,000	0.751	12,016
4th	20,000	0.683	13,660
Total Present Value (PV of Cash Inflows)			44,678
Less: Initial Investment			30,000
Net Present Value or Wealth			₹14,678

Arguments Against Wealth Maximisation Objective

Despite the fact that Wealth Maximisation is an objective far superior to profit maximisation, still it suffers from certain limitations. It has been criticised on the following aspects.

1. ***Conflict between owner and management:*** Here also the conflict between owner and management stands in the way of achieving the goal. The owner is concerned with maximising the wealth of the firm but the manager—an appointed agent of the owner—may be interested in taking those decisions that would help him to earn more incentives. He might be concerned with sales maximisation and thereby ignore the impact of their decisions on the market price of shares. This conflict of interest may make it difficult to achieve the goal.
2. ***Ignoring customers' satisfaction:*** As per modern business environment, customer should be at the heart of a business. Customer satisfaction should be the main target of any business to survive competition. So importance should be given not only to wealth creation but also on producing goods and services as per tastes and preferences of customers.
3. ***Efficient capital market:*** At the core of the Wealth Maximisation objective is the assumption that the capital market is efficient and hence market price truly reflects all the decisions of the firm. However, in practice market price is often manipulated by speculative activities and change in the economic and political environment. Therefore, market value may not always represent the economic value of the shares held.
4. ***Wealth Maximisation cannot be the single goal:*** Wealth Maximisation may not always be a socially desirable goal of business. For example, a firm may be engaged in production of a commodity that serves only the rich people or is harmful for the environment. In such a case Wealth Maximisation will not ensure maximisation of social welfare.

1.8.3 Profit Maximisation *vs.* Wealth Maximisation

The objective of profit maximisation is different from the objective of Wealth Maximisation in many respects. These are summarised in Table 1.1.

Table 1.1 Differences between Profit Maximisation and Wealth Maximisation

Profit Maximisation	Wealth Maximisation
Profit Maximisation is a traditional approach.	Wealth Maximisation is a modern approach.
It is a short-term objective.	It is a long-term objective.
Under profit maximisation objective firm's performance is interpreted in terms of profit.	Under Wealth Maximisation objective firm's performance is interpreted in terms of value of shares held by the shareholders.
It is based on the assumption of a perfectly competitive commodity market.	It is based on the assumption of an efficient capital market.
It doesn't consider the Time Value of Money.	It considers the Time Value of Money.
It does not take into account the risk underlying an investment project.	It takes into account the risk underlying an investment project by adjusting the rate of discounting the Project Cash Flows.
It focuses on maximising the profit only.	It focuses on maximising the Net Present Value of a project i.e. Present Value of Cash Inflows *minus* Present Value of Cash Outflows.
A profit maximising firm may not pay regular dividend.	A wealth maximising firm generally pays regular dividend.
There exists lack of clarity in definition of profit.	There is also lack of clarity regarding the definition of wealth, i.e. wealth of the firm or wealth of the shareholders.
This is suitable for all form of business.	This is suitable for a company form of business only as for all others the market value of ownership interest is not possible to obtain.

1.8.4 Wealth Maximisation Depends on Profit Maximisation

Profit Maximisation and Wealth Maximisation are not mutually exclusive rather profit maximisation complements Wealth Maximisation. In other words, Wealth Maximisation depends on profit maximisation. In its process to achieve the maximum wealth for shareholders by increasing the market value of shares, a firm focuses on many aspects like increasing the market share, increasing sales volume, reducing cost through efficient utilisation of resources and increasing customer satisfaction, etc. All these positively contribute towards the profitability of the firm and as a consequence the profit is maximised. Thus, profit maximisation is a subset of Wealth Maximisation or in other words profit maximisation coupled with other factors maximises the wealth of the shareholders.

1.9 ROLE/FUNCTIONS OF A CHIEF FINANCIAL OFFICER

Chief Financial Officer is a person responsible for managing the financial affairs of an organisation. However, the term 'Chief Financial Officer' (CFO) is mainly used in the context of corporate form of organisation. In all other forms, the same is known as General Manager-Finance or Finance Manager. Whatever be the nomenclature of the post, the person is entrusted with the overall supervision of the finance functions of an organisation.

The role of a CFO underwent significant change over time. Until 1950s, i.e. during the traditional and transitional phase in the evolution of Financial Management, the CFO was entrusted with the function of procurement of financial resources only. Accordingly, the role was limited to identifying the most cost effective source of finance only and dealing with the administrative and legal proceedings of raising funds from the selected source. However, after 1950s, i.e. during the modern phase a CFO's role in managing the financial resources professionally was recognised. Such a need was felt to initiate an analytical and professional approach of making financial decisions to maximise the return under a constantly changing business environment and intense competition. Not only that his services became indispensable to ensure overall efficiency in managing day-to-day business affairs also. As a result, now, a CFO is considered to be one of the top two authoritative positions in an organisation along with a Chief Executive Officer.

In the light of the above discussion, the specific roles of a CFO can be listed as follows:

1. ***Estimating requirement of funds:*** A CFO should estimate the requirement of funds in order to ensure smooth availability of financial resources. This requires him to properly estimate the operating expenditure and investment needs of the firm. In addition, he will also need to provide for contingencies to cover future exigencies.
2. ***Deciding the Capital Structure:*** Capital Structure refers to the proportion of alternative sources of finance, mainly equity and debt, in the total capital of the firm. Now, both the sources have their own pros and cons. While Debt Capital involves higher risk, it is significantly cheaper than the equity. In addition, infusion of Debt Capital offers Trading on Equity and increases the value of the firm. Hence, an optimum combination of debt and equity is of utmost importance for any firm. A CFO should take the rightful decision in this context to maximise the value and minimise the risk at the same time.
3. ***Procurement of funds:*** The CFO should also administer the entire process of fund raising. This is very crucial as different sources may have separate legal and procedural issues attached with them and only a proper guidance of a CFO can smooth out the process by minimising the chance of any mismanagement in handling the funds.
4. ***Deciding the investment programme:*** The CFO should take appropriate Investment Decision to make sure that return from a project is the maximum. For this, he/she should try to utilise the scarce financial resources optimally. In case of fund constraints, decisions should be taken after carefully evaluating the expected returns and risk through objective analysis. Some of the widely used techniques for project evaluation

such as network analysis by Critical Path Method (CPM) and Programme Evaluation Review Technique (PERT) may be useful in this regard. Apart from this for decisions of investment in fixed assets, different Capital Budgeting techniques may be applied.

5. ***Working Capital or Liquidity Management:*** Working Capital represents the excess of Current Assets over Current Liabilities. Hence, it is a measure of liquidity position of a firm. There exists an interesting relation between profitability and liquidity. While lack of liquidity can create operational bottlenecks in form of restricted supply of raw material, cash crunch, etc., resulting into loss of production and profit; excess liquidity can also increase the cost of funds and reduce the profits. In order to avoid this, a CFO must ensure an efficient Working Capital management in the business. Working Capital management refers to the management of various components of Current Assets and Current Liabilities. The CFO must ensure efficient management of cash by deciding on an appropriate level of cash resources to be maintained, effective management of receivable and payables by incorporating a detailed credit policy and also proper investment in inventory by initiating effective purchase and payment policy. He must also estimate the needs of Working Capital and decide on its financing options.
6. ***Retained earnings management:*** Efficient management of retained earnings is also another function of the CFO. Since, retained earnings can be a useful source of internal financing with no immediate cost to be borne, it can, to a great extent, be used to replace costly external financing for future expansion of the firm. However, while managing the retained earnings the CFO must be careful about the dividend policy of the firm. This is because retained earnings are the residual after payment of dividend out of divisible profit and lowering the dividend rates to increase the retained earnings can seriously affect the share price and value of the firm at times. So the CFO must strike a balance between these two.
7. ***Management of portfolio:*** The excess fund of an organisation is often invested in a portfolio of securities and other real assets to earn healthy returns. However, as the market conditions are subject to change any time, this portfolio requires regular rebalancing and management. Thus, a CFO should try to make an optimum portfolio of securities and real assets which ensures maximum return with sufficient diversification to minimize the associated risk.
8. ***Acting as treasurer:*** In case of a small organisations, a CFO may also act as a treasurer. He/she may be entrusted with the responsibility of management of liquid cash.
9. ***Analysing the value of the business:*** Due to intense competition in the industry, organisations often need to consolidate through mergers and acquisitions. The success of such a decision often depends on determining the proper amount of consideration payable to the transferor company. Since consideration payable should reflect the value of the business, it becomes an essential job for the CFO to determine the appropriate value of the business by applying objective basis of valuation. Thus, a CFO should undertake the analysis of the value of the business firm based on certain parameters like profit, sales, purchase, production, dividend and other factors that influence the

profitability of the firm. On the basis of these parameters the CFO should try to find out the actual value of the firm and thereby guide the merger and acquisition exercise in the interest of the firm.

10. ***Managing foreign exchange exposure:*** With globalisation business firms are increasingly exposed to foreign exchange risk due to increased level of foreign trade or cross border acquisitions and investments. Such an exposure can be quite fatal for the profitability of the firm, if not managed properly. It is the duty of the CFO to undertake detail planning to manage the foreign exchange exposure through appropriate hedging techniques.
11. ***Managing other financial risks:*** Due to growing complexities in the fund raising process and use of innovative financial instruments, organisations now-a-days are exposed to a number of other financial risks including credit risk and interest rate risk. In addition, financial institutions also face liquidity risk. Thus, today it becomes indispensable for a CFO to initiate systematic strategies to manage these risks also. Moreover, as these risks are interrelated, a more comprehensive approach of risk management is also unavoidable. Thus, the CFO should give due consideration to ensure enterprise risk management through an integrated risk management procedure.
12. ***Tax administration:*** Since different financial decisions including the decisions to expand internally or externally through consolidation have tax implication, the CFO should also be associated actively with the process of tax administration and overall tax planning of the organisation.
13. ***Providing information to higher authority:*** A CFO should prepare and supply information in proper form and at right time, as required by his higher authority for making rightful decisions in the interest of the organisation. Moreover, he/she should supervise and co-ordinate the process of preparation of various reports to be submitted to the different regulatory agencies.

From the above discussion, it is apparent that the role of a CFO has changed considerably over time. Today, the CFO has to perform a multidimensional role of portfolio manager, risk manager, tax administrator, values and consultant at the same time. As a result, the person must possess sufficient knowledge of different disciplines to successfully guide an organisation towards the path of success.

1.10 EMERGING ROLE OF FINANCIAL MANAGER/CFO IN INDIA

In the post-liberalisation era, the role of financial manager or CFO in India has become more important, complex and demanding. The economic and Financial Environment has changed in many ways.

1. The industrial licensing framework has been substantially relaxed, leading to considerable expansion in the scope of private sector investment.
2. The Monopolies Restrictive and Trade Practices (MRTP) Act has been replaced by the Competition Act.

3. Foreign Exchange Regulation Act repealed and Foreign Exchange Management Act enacted.
4. Capital Issues (Control) Act abolished and Securities and Exchange Board of India set up.
5. Insurance Regulatory Development Authority (IRDA) Act enacted and IRDA set up to regulate insurance sector.
6. Exchange rate become more volatile and market determined.
7. Derivative instruments such as futures and options have been introduced.
8. Mergers, acquisitions and restructuring have been intensified.
9. Rigorous prudential norms, credit risk management framework for banks and financial institutions introduced.

In this context, the financial manager/CFO faces the challenges in the following areas: (i) financial structure (ii) foreign exchange management (iii) treasury operations (iv) mergers, acquisitions and restructuring (v) Working Capital management (vi) performance management (vii) risk management (viii) investor relations (ix) investment planning.

1.11 SUMMARY

- Financial Management may be defined as the system of management which is concerned with cost effective procurement and efficient utilisation of financial resources of an organisation with the objective of maximising shareholders' value.
- The broad areas of Financial Management are decision areas viz. financing decision, Investment Decision and dividend decision.
- Financing Decision deal with select an appropriate mix of alternative sources of finance.
- Investment Decision involves decision regarding short-term and long-term investment.
- Dividend Decision involves decision regarding how much profit of a business is to be distributed as dividend and how much is to be retained for future expansion.
- The objective of a firm can be either profit maximisation or Wealth Maximisation and at times Wealth Maximisation can be more important than profit maximisation.
- Wealth Maximisation refers to maximisation of the wealth of shareholders.
- The Chief Financial Manger/Financial Manager faces the key challenges in the following areas: (i) financial structure (ii) foreign exchange management (iii) treasury operations (iv) mergers, acquisitions and restructuring (v) Working Capital management (vi) performance management (vii) risk management (viii) investor relations (ix) investment planning.

EXERCISES

A. Short-answer Type Questions (5 Marks)

1. Define Financial Management.
2. Discuss the main objectives of Financial Management. *[C.U. B.Com. (H), 2015]*
3. State the major decision-making functions of Financial Management.
4. Discuss in brief the functions of Financial Management. *[C.U. B.Com. (H), 2009, 2014]*
5. Explain the various functions of Financial Management. *[C.U. B.Com. (H), 2007]*
6. Give an idea about the 'Wealth Maximisation' objective of Financial Management. *[C.U. B.Com. (H), 2006]*
7. State four functions of 'Chief Financial Officer'.
8. Distinguish between Profit Maximisation and Wealth Maximisation objectives of the firm. *[C.U. B.Com. (H), 2008]*
9. "The financial goal of a firm should be to maximise value or wealth." Explain. *[C.U. B.Com. (H), 2010]*
10. Explain the interrelationship between financing decision, Investment Decision and dividend decision. *[C.U. B.Com. (H), 2011]*

B. Essay Type Questions (10 Marks)

1. Discuss the importance of Financial Management.
2. Distinguish between profit maximisation and value maximisation objectives of a firm. Which one of these objectives should be pursued by a firm?
3. The activities of financial managers involve taking three important decisions. Briefly explain these decisions.
4. What is value maximisation objective of a firm? How does it differ from profit maximisation objective? *[C.U. B.Com. (H), 2011]*
5. Why is 'Wealth Maximisation' preferred over 'Profit Maximisation' as the goal of a firm? *[C.U. B.Com. (H), 2012]*
6. "Wealth Maximisation is dependent on profit maximisation'. Discuss. *[C.U. B.Com. (H), 2014]*
7. Should Profit Maximization goal be regarded as the primary goal of Financial Management? *[C.U. B.Com. (H), 2015]*
8. Specify the limitations of 'Maximisation of Profit' as the objective of a firm. *[C.U. B.Com. (H), 2016]*
9. Explain the role of Chief Financial Officer (CFO) in the modern business environment. *[C.U. B.Com. (H), 2015]*

2 CHAPTER

Basic Concepts: Time Value of Money

CHAPTER OUTLINE

2.1 Introduction
2.2 Time Value of Money
2.3 Techniques of Time Value of Money
2.4 Annuity
2.5 Perpetuity
2.6 Risk
2.7 Return
2.8 Risk-Return Relationship
2.9 Risk-Return Trade-off
2.10 Financial Environment
2.11 Summary

2.1 INTRODUCTION

Similar to other subjects of science, finance too has its own language and the two most important concepts of finance are—Time Value of Money and risk.

Before taking any sort of financial decisions these two factors are given due importance. Since money can be put to productive use, its value is different depending upon when it is received or paid. The application of time value and measurement of risk are the invaluable tools in financial analysis. If the timing and risk associated with Cash Flows is not considered, the firm may make decisions which may allow it to miss its objective of maximising the owner's welfare.

2.2 TIME VALUE OF MONEY

Money has a time value. A rupee today is more valuable than a rupee a year hence. The value of money with reference to time is simply the Time Value of Money. For example, if Mr. C earns ₹10,000 and from his earnings he spends ₹6,000 then the remaining amount of ₹(10,000 – 6,000) = ₹4,000 is his savings. Suppose Mr. C sacrifices his present consumption by

₹4,000 to raise the amount for his future consumption. So he would expect some additional amount in lieu of his sacrifice. That additional amount is the interest factor. His amount of savings along with an extra amount (interest) should be available for his future consumption. If the rate of interest is 10% per annum, then the savings of ₹4,000 would earn him an interest of (4,000 × 10% × 1 year) = ₹400 at the end of 1 year. The total amount Mr. C will get along with the principal amount and interest = ₹4,000 (1 + 0.10) = ₹4,400. So an individual sacrificing his present consumption by ₹4,000 would require an amount of ₹4,400 to get the same benefit. As interest rate is greater than 0, the amount of money invested at present would earn something more and the quantity of money, not the value, will increase in future.

In calculating the Present Value, the interest factor is termed as the discount factor. If we consider the above example other way round, i.e. the Present Value of ₹4,400 which is to be received in future is = $\frac{4,400}{(1+0.10)}$ = ₹4,000. If we consider in terms of ₹1, the different value of ₹1 at different point of time is called Time Value of Money. Similarly, if discount rate is 10% per annum, the Present Value of ₹1 to be received at future date, say after 1 year will be = $\frac{1}{(1+0.10)}$ or $\frac{1}{1.1}$ = ₹0.91. The Time Value of Money concept states that the money received today is worth more than the money to be received in future.

The value of money is decreasing due to the inflationary situation persisting in the economy. The real purchasing power of ₹1 today is more than its purchasing power in future. This concept is applicable to individuals as well as businesses for the purpose of decision making. For an individual, the Investment Decision making depends on his/her perception. This is true that value of money decreases with time due to inflation, so an amount invested at present date would be of less value at future date. The value of money is depreciating with time. So a rational investor prefers present/current consumption than future consumption as well as receiving at present than at a future date. Purchasing power of money is decreasing due to inflation. So before taking an Investment Decision an individual should consider the importance of Time Value of Money factor.

From a business point of view, Cash Inflows are generated at a future date from the investment made at a present date. So the point of time of Cash Inflow and outflow (investment) is different. Hence, before arriving at any Investment Decision, the Time Value of Money should be taken into consideration. The inflation factor is an important aspect of any Investment Decision. Since the time of Cash Inflow and outflow is different, they cannot be compared unless they are bought into same footings, i.e. the Present Value of the future Cash Inflows is calculated considering the discount factor and is then compared with the Cash Outflow. For example, D Ltd. considers purchasing a machinery worth ₹2,00,000 and the expected Cash Flow is ₹50,000 for 3 years at a discount rate of 10%. Let see whether it is a right decision to invest. If the Cash Inflow is greater than Cash Outflow then only it is worth investing. So, Present Value of Cash Inflows = $\frac{50,000}{(1+0.10)^1} + \frac{50,000}{(1+0.10)^2} + \frac{50,000}{(1+0.10)^3}$ = ₹1,24,300 as Present Value of the Cash Inflow greater than Cash Outflow, it is a worthy decision.

2.2.1 Concept of Time Value of Money

Money has time value. Before stating the definition of Time Value of Money in technical terms let us understand a basic idea. The value of a rupee received today is more than the value of a rupee to be received in future or the other way round the value of a rupee in future will be less than the value of a rupee at present. In finance, this is simply referred to as Time Value of Money.

The different value of same amount of money or one rupee at different points or periods of time is known as Time Value of Money.

2.2.2 Timeline and Notation

When Cash Flows occur at different points in time, it is very convenient to deal with Cash Flows using a timeline. A timeline shows the timing and the amount of each Cash Flow in a Cash Flow stream. Let us explain the concept of timeline with the help of the following example.

Consider a Cash Flow of ₹15,000 at the end of each year for consecutive 4 years. Discount rate is 6%. Now this can be represented with the help of timeline as follows (Figure 2.1):

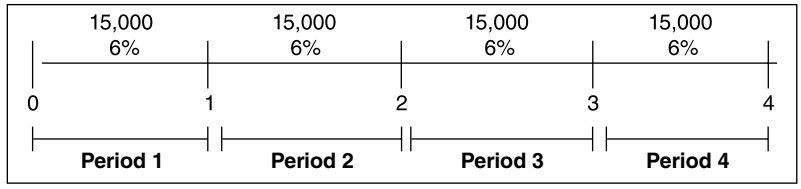
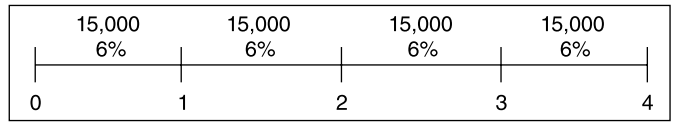


Figure 2.1 Time Line

The Cash Flow at the time 0 does not require any further adjustment because it is at its Present Value. Period 1 which is the first year of Cash Flow as in Figure 2.1 is the time period between Point 0 and Point 1. Similarly, the time between Point 1 and Point 2 is Period 2 and so on. Cash Flow at Point 1 is the Cash Flow occurring at the end of Period 1 or beginning of Period 2 (here in the example we assume that Cash Flow takes place at the end of each year). Similarly, Cash Flow at the end of Point 2 is the Cash Flow at the end of Period 2 and so on. The discount rate of 6% in the above example may vary from one period to another period.

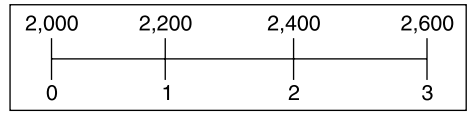
Now, consider a Cash Flow of ₹15,000 at the beginning of each year for consecutive 4 years, and a discount rate of 6%. Now this can be represented with the help of timeline as follows:



Since Cash Flow is at the beginning of each year, hence Cash Flow at Point 1 is the Cash Flow occurring at the beginning of second year and so on. Here the end of Point 0 is the beginning of Period 1, end of Point 1 is the beginning of Period 2 and end of Point 3 is the beginning of Period 4. Likewise, it may continue till n number of years.

Timeline for Simple Interest

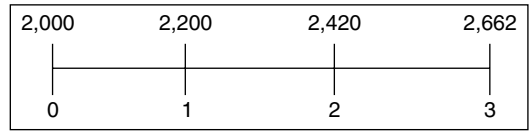
In Simple Interest, interest is earned on the principal amount only. This can be explained with the following example. We assume that ₹2,000 is invested at the beginning of Period 1 for 3 years at the rate of 10% Simple Interest. With timeline it can be represented as follows:



The principal of ₹2,000 deposited at Point 0, earns interest throughout the year and at the end of Period 1 it stands at ₹2,200, i.e. = ₹2,000 + 2,000 × 10% × 1, similarly at the end of period 2 as ₹2,400 and so on. Adding the Simple Interest, total amount will be = ₹2,000 + (200 + 200 + 200) = ₹2,000 + 600 = ₹2,600.

Timeline for Compound Interest

In Compound Interest, interest is earned on the principal amount as well as on the interest earned previously. Let us explain it with the previous example (of Simple Interest)—₹2,000 invested at the beginning of Period 1 for 3 years at the rate of 10% Compound Interest. With timeline it can be represented as follows:

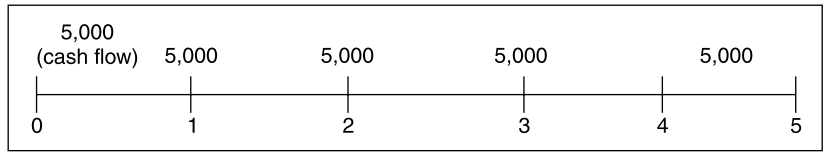


The principal of ₹2,000 deposited at Point 0, earns interest throughout the year and at the end of Period 1 it stands at ₹2,200, i.e. = ₹2,000 + (2,000 × 10% × 1). Similarly, it will be ₹2,200 + (2,200 × 10% × 1) = ₹2,200 + 220 = ₹2,420 and ₹2,420 + (2,420 × 10% × 1) = ₹2,420 + 242 = ₹2,662, respectively, at the end of period 2 and 3.

Timeline for Annuity

Annuity starts after the last deposit and the time period for which interest is earned is number of deposits minus 1. Say n number of deposits of N amount have been made at 1-year gap so the number of period for which interest is earned is $(n - 1)$.

For example, Cash Flow of ₹5,000 at the end of each year for 5 consecutive years is shown as follows:



Notations used in Time Value of Money

FV = Future Value

PV = Present Value

n = Number of years

r = Interest rate (in case of compounding) or discount rate (the interest rate in case of discounting, i.e. in case of calculating Present Value is called discount rate)

A = Annuity, i.e. equal stream of Cash Flows or Sinking Fund

P = Perpetuity

g = growth rate

m = Number of times compounding/discounting is done

$PVIF_{r, n}$ = Present Value Interest Factor/multiplier used to calculate the Present Value of an Annuity at a particular discount rate for a specified time period.

$FVIF_{r, n}$ = Future Value Interest Factor/multiplier factor used to calculate the Future Value of an Annuity at a particular interest rate for a specified time period.

$PVIFA_{r, n}$ = Present Value Interest Factor of an Annuity/multiplier used to calculate the Present Value of an Annuity at a particular discount rate for a specified time period

$FVIFA_{r, n}$ = Future Value Interest Factor of an Annuity/multiplier used to calculate the Future Value of an Annuity at a particular interest rate for a specified time period.

2.2.3 Reasons for Time Preference of Money

The reasons why value of a rupee is worth more at present than in future are discussed below:

1. ***Preferring present consumption:*** Individuals always prefer current consumption than future consumption. In order to induce them to forgo their current consumption and invest for future they should be offered a *very high rate of interest*. So, the likings for present consumption than at future, make the Future Value of money less worthy than that at present.
2. ***Inflation:*** Inflation is a situation of rising price. In an inflationary situation, the value of money depreciates over time, i.e. the real purchasing power of money decreases. Hence, this factor increases or rather widens the gap between the value of money at present and future.
3. ***Risk:*** Future is always uncertain. Nobody knows what would happen in future. There can be different mishaps such as death of the investor, winding up of the company which may lead to non-receipt of money, i.e. total loss. If uncertainty is more value of money will be less in future.
4. ***Investment opportunities:*** An individual receiving an amount of money today can invest it instantly than the same amount of money being received and invested in future.

2.2.4 Importance of Time Value of Money

Time Value of Money facilitates comparison for the purpose of taking any financial decision. Through application of Compounding and Discounting Techniques, Cash Inflows and Outflows at different time period can be compared.

Let us take an example from an individual point of view as well as from a business point of view.

From individual point of view:

Suppose an individual Mr. B is given two options—to have ₹25,000 at present or to take ₹25,000 at a future date say after 1 year. He as a rational individual would like to go for the first option, i.e. taking ₹25,000 at present because he can keep that amount in bank and can earn some extra amount, i.e. interest. Suppose rate of interest is 10%, then Mr. B will receive = 25,000 (0.10 × 1 year) = 27,500 after 1 year.

Similarly, if Mr. B is asked to pay a debt of ₹25,000 today or at a later date, i.e. after 1 year, he would select the second option, i.e. would like to defer the payment. The reason is the same he can keep the amount in bank and earn something extra. So it is apparent that the time gap helps him to earn something extra and the rate of interest is an important aspect in determining Time Value of Money.

From business point of view:

Time Value of Money is an important consideration for a firm before making any Investment Decision. Capital Budgeting techniques are applied to take a decision. Here Cash Inflows and outflows are considered taking into account the Time Value of Money before taking any financial (investment) decision.

Suppose a project requires an initial investment (Cash Outflow) of ₹2,00,000 with an expected Cash Inflow of ₹20,000 at the end of every year for 10 years. Here the Present Value of future Cash Inflows is calculated and compared with outflow before taking any decision.

So it is to be remembered that Cash Flows of different values at different points of time cannot be compared unless they are in same balance, i.e. without adjusting for difference in values.

2.2.5 Concept of Rate of Interest

1. ***Simple Interest Rate:*** It is the rate of interest (percentage) on the actual principal amount.
   Simple Interest in absolute terms = $P \times r \times n$
   where, P = Principal, r = Rate of interest in decimal, n = Number of years

Illustration 2.1

Problem

Mr. X deposits ₹8,000 in bank at the rate of 8% Simple Interest per annum. How much he will receive after 4 years?

Solution

$$\begin{aligned}\text{Future Value} &= \text{Principal} + \text{Simple Interest}\\ &= P_0 + P_0 \times r \times n\\ &= 8{,}000 + 8{,}000 \times 0.08 \times 4\\ &= 8{,}000 + 2{,}560\\ &= ₹10{,}560\end{aligned}$$

Illustration 2.2

Problem

Mr. C will receive ₹10,000 after 5 years. Now he invested ₹8,000. Find the rate of interest annually.

Solution

$$\begin{aligned}\text{Future Value} &= \text{Principal} + \text{Simple Interest}\\ \text{Future Value} &= P_0 + (P_0 \times r \times n)\\ 10{,}000 &= 8{,}000 + (8{,}000 \times r \times 5)\\ 10{,}000 &= 8{,}000 + (40{,}000 \times r)\\ 10{,}000 - 8{,}000 &= (40{,}000 \times r)\\ 2{,}000 &= 40{,}000 \times r\end{aligned}$$

or, $$r = \frac{2{,}000}{40{,}000} \text{ so, } r = 0.05 \text{ or } 5\%$$

2. ***Compound Interest Rate:*** The interest accrued on the previously earned interest is basically Compound Interest. When interest is earned on the interest received previously and the original principal amount, it is known as Compound Interest. Compound Interest is the interest earned on the interest of previous year and the initial principal. Compound Interest is calculated as follows:

$$\text{Amount to be received after } n \text{ years} = P\,(1 + r)^n$$

Illustration 2.3

Problem

Mr. D invested ₹6,000 in bank at the rate of 10% Compound Interest per annum. How much he will receive after 3 years?

Solution

Amount to be received in future or Future Value = $P_0 + P_0 \times r \times n$

$$\begin{aligned}\text{FV} &= 6{,}000 + 6{,}000 \times 0.10 \times 1\\ \text{FV}_1 &= 6{,}000 + 600 = ₹6{,}600\\ \text{FV}_2 &= 6{,}600 + 6{,}600 \times 0.10 \times 1\\ &= 6{,}600 + 660 = ₹7{,}260\\ \text{FV}_3 &= 7{,}260 + 7{,}260 \times 0.10 \times 1\\ &= 7{,}260 + 726 = ₹7{,}986\end{aligned}$$

or

Amount to be received in future or Future Value = $P\ (1 + r)^n$

or, $FV = 6{,}000\ (1 + 0.10)^3$

$FV = 6{,}000\ (1.10)^3$

$FV = 6{,}000 \times 1.331$

FV = ₹7,986

Generally compounding is done for the following number of times:

For 1 month = Compounded monthly
For 12 months = Compounded annually
At an interval of 3 months = Compounded quarterly
For 6 months = Compounded half yearly
For 1 day = Compounded daily

If compounding is done on any of the following basis (except annually), the formula for calculating interest rate based on number of time compounding is done would be as follows:

$$i = \frac{r}{k}, \text{ i.e. } \frac{\text{Rate of interest}}{\text{Number of times compounding is done}}$$

Illustration 2.4

Problem

An amount of ₹5,000 doubles after 7 years. Find the compound rate of interest compounded annually. Given $2^{\frac{1}{7}} = 1.104090$

Solution

$$FV = P\ (1 + r)^7$$
$$10{,}000 = 5{,}000\ (1 + r)^7$$
$$\frac{10{,}000}{5{,}000} = (1 + r)^7$$
$$2 = (1 + r)^7$$
$$2^{\frac{1}{7}} = 1 + r$$
$$1.104090 = 1 + r$$
$$r = 1.104090 - 1 = 0.101090 = 10.11\% \text{ (approximately)}$$

3. ***Effective Rate of Interest:*** If interest is given more than once in a year (say x times) then the effective rate of interest is calculated as follows:

$$EROI = \left(1 + \frac{r}{x}\right)^x - 1$$

Illustration 2.5

Problem

If the rate of interest is 15% per annum compounded (i) monthly, (ii) quarterly and (iii) semi-annually calculate the effective rate of interest.

Solution

$$\text{EROI} = \left(1 + \frac{r}{x}\right)^{x} - 1$$

(i) $$\text{EROI} = \left(1 + \frac{0.15}{12}\right)^{12} - 1$$

$$\text{EROI} = \left(1 + \frac{0.15}{12}\right)^{12} - 1$$

$$= (1 + 0.0125)^{12} - 1$$

$$= (1.0125)^{12} - 1$$

$$= 1.1607545 - 1$$

$$= 0.1607545 = 16.075\%$$

(ii) $$\text{EROI} = \left(1 + \frac{0.15}{4}\right)^{4} - 1$$

$$= (1 + 0.0375)^{4} - 1$$

$$= (1.0375)^{4} - 1$$

$$= 1.15865 - 1$$

$$= 0.158650, \text{ i.e. } 15.865\%$$

(iii) $$\text{EROI} = \left(1 + \frac{0.15}{2}\right)^{2} - 1$$

$$= (1 + 0.075)^{2} - 1$$

$$= (1.075)^{2} - 1$$

$$= 1.15562 - 1$$

$$= 0.15562, \text{ i.e. } 15.562\%$$

2.2.6 Comparison of Simple and Compound Interest

Money is invested at Compound Interest means that each interest payment is reinvested to earn further interest in future periods. But no interest is earned on interest, the investment earns only Simple Interest. How an investment of ₹1,000 grows over time under Simple and Compound Interest as to rate of interest is shown in Table 2.1.

Table 2.1 Comparison of Simple & Compound Interest on an investment of ₹1,000

Year	Simple Interest			Compound Interest		
	Opening Balance	Interest	Closing Balance	Opening Balance	Interest	Closing Balance
1	1,000	100	1,100	1,000	100	1,100
5	1,400	100	1,500	1,464	146	1,610
10	1,900	100	2,000	2,358	236	2,594
20	2,900	100	3,000	6,116	612	6,728
50	5,900	100	6,000	1,06,718	10,672	1,17,390
100	10,900	100	11,000	1,25,27,829	12,52,783	1,37,80,612

2.2.7 Doubling Period

Investors want to know how long would it take to double the amount at a given rate of interest. To answer this question, we may look at the Future Value interest factor table. Is there any thumb rule which dispenses with the use of the Future Value interest factor table? Yes, there are thumb rules which are discussed below:

1. ***Rule of 72:*** This is a thumb rule for determining the number of years to be taken for an amount to double if invested at a specified Compound Interest rate, which is compounded annually.

$$\text{Number of years} = \frac{72}{\text{annual rate of interest}}$$

Illustration 2.6

Problem

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

Solution

$$\text{Number of years} = \frac{72}{\text{annual rate of interest}}$$

$$\text{Number of years} = \frac{72}{8}$$

Number of years = 9 years

2. ***Rule of 69:*** Rule 69 is similar to Rule 72 which states how long it takes for an amount of money invested at R% per period to double.

$$\text{Number of years} = \frac{69}{\text{ROI(\%) or } 100k} + 0.35 \text{ period}$$

Illustration 2.7

Problem

How long will it take for ₹40,000 to become ₹80,000 at a compound rate of 10% per annum (approximately)?

Solution

$$\text{Number of years} = \frac{69}{\text{ROI(\%) or } 100k} + 0.35 \text{ period}$$

$$\text{Number of years} = \frac{69}{10} + 0.35 \text{ period}$$

Number of years = 6.9 + 0.35

Number of years = 7.25 years.

3. ***Rule of 70:*** This rule states that the approximate number of years (n) taken for an amount growing at a constant growth rate of R%, to double is:

$$\text{Number of years} = \frac{70}{R}$$

Illustration 2.8

Problem

How long will it take for ₹60,000 to double, at a constant compound rate of 12% per annum (approximately)?

Solution

$$\text{Number of years} = \frac{70}{R}$$

$$\text{Number of years} = \frac{70}{12} = 8 \text{ years}$$

2.3 TECHNIQUES OF TIME VALUE OF MONEY

There are two methods of estimating Time Value of Money which are shown in Figure 2.2 and explained as follows:

1. Discounting Technique or the Present Value Method
2. Compounding Technique or the Future Value Method

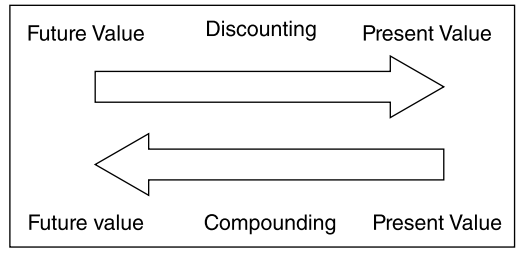


Figure 2.2 Techniques of Time Value of Money

2.3.1 Discounting or Present Value Method

The current value of an expected amount of money to be received at a future date is known as Present Value. If we expect a certain sum of money after some years at a specific interest rate, then by discounting the Future Value we can calculate the amount to be invested today, i.e. the current or Present Value. Hence, Discounting Technique is the method that converts Future Value into Present Value. The amount calculated by Discounting Technique is the Present Value and the rate of interest is the discount rate. Discounting can be done a number of times and based on this, methods for calculating Present Values are listed as follows in Table 2.2:

Table 2.2 Discounting or Present Value Method for Single and Multiple Cash Flows

S. No.	Single and Multiple Cash Flows	Formula	Notations Used
1.	Annually single Cash Flow	$PV = FV\left\{\frac{1}{(1+r)^n}\right\}$ or, $PV = FV(1+r)^{-n}$ or, $PV = FV(PVIF_{r,n})$	PV = Present Value FV = Future Value r = Discount rate n = Number of years $PVIF_{r,n}$ = Present Value Interest Factor
2.	Multiple times, say m number of times discounting is done	$PV = FV\left\{\frac{1}{\left(1+\frac{r}{m}\right)^{mn}}\right\}$	PV = Present Value FV = Future Value r = Discount rate n = Number of years m = Number of times discounting is done say quarterly then m = 4; half-yearly, m = 6 and so on.

3.	Cash Flows of different amounts over the years	$PV = \frac{FV_1}{(1+r)^1} + \frac{FV_2}{(1+r)^2} + \cdots + \frac{FV_n}{(1+r)^n}$, i.e. $\sum_{t=1}^{n} \frac{A^t}{A(1+r)^t}$	PV = Present Value FV = Future Value r = Discount rate n = Number of years

Illustration 2.9

Problem

Find the Present Value of ₹80,000 to be received after 10 years at the discount/interest rate of 12%.

Solution

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

PV = Present Value

FV = Future Value, i.e. ₹80,000

r = Discount/interest rate, i.e. 12% or 0.12

n = Number of years, i.e. 10

$$PV = 80{,}000\left\{\frac{1}{(1+0.12)^{10}}\right\}$$

$$PV = 80{,}000\left\{\frac{1}{(1.12)^{10}}\right\}$$

$$PV = 80{,}000\left\{\frac{1}{3.105848}\right\}$$

$$PV = 80{,}000 \times 0.321973$$

PV = ₹25,757.86

Illustration 2.10

Problem

Calculate the Present Value of ₹40,000 to be received after 6 years at the discount rate of 10% if discounting is done (i) semi-annually and (ii) quarterly.

Solution

$$PV = FV\left\{\frac{1}{\left(1+\frac{r}{m}\right)^{mn}}\right\}, \textit{where,}$$

PV = Present Value

FV = Future Value, i.e. ₹40,000

r = Discount rate, i.e. 10% or 0.10

n = Number of years, i.e. 6

m = Number of times discounting is done

(i) Semi-annually $PV = FV\left\{\frac{1}{\left(1+\frac{r}{m}\right)^{mn}}\right\}$

$$PV = 40{,}000\left\{\frac{1}{\left(1+\frac{0.10}{2}\right)^{2\times 6}}\right\}$$

$$PV = 40{,}000\left\{\frac{1}{(1+0.05)^{12}}\right\}$$

$$PV = 40{,}000\left\{\frac{1}{(1.05)^{12}}\right\}$$

$$PV = 40{,}000\left\{\frac{1}{1.795856}\right\}$$

$$PV = 40{,}000 \times 0.5568375$$

$$PV = ₹22{,}273.50$$

(ii) Quarterly $PV = FV\left\{\frac{1}{\left(1+\frac{r}{m}\right)^{mn}}\right\}$

$$PV = 40{,}000\left\{\frac{1}{\left(1+\frac{0.10}{4}\right)^{4\times 6}}\right\}$$

$$PV = 40{,}000\left\{\frac{1}{\left(1+\frac{0.10}{4}\right)^{4\times 6}}\right\}$$

$$PV = 40{,}000\left\{\frac{1}{(1+0.025)^{24}}\right\}$$

$$PV = 40{,}000\left\{\frac{1}{(1.025)^{24}}\right\}$$

$$PV = 40{,}000\left\{\frac{1}{1.8087259}\right\}$$

$$PV = 40{,}000 \times 0.5528754$$

$$PV = ₹22{,}115.01$$

Illustration 2.11

Problem

Mr. T expects to get ₹25,500 after 5 years from an investment made now. If the interest rate is 11% per annum, how much he should invest now to get the required amount of ₹25,500?

Solution

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

where,

PV = Present Value
FV = Future Value, i.e. 25,500
r = Interest rate, i.e. 11% or 0.11
n = Number of years, i.e. 5

$$FV = PV\ (1 + r)^n$$
$$25{,}500 = PV\ (1 + 0.11)^5$$
$$\frac{25{,}500}{(1.11)^5} = PV$$
$$PV = \frac{25{,}500}{1.685058}$$
$$PV = ₹15{,}133.01$$

Illustration 2.12

Problem

The following are the Cash Inflows from an investment for 5 years. End of 1 year, ₹3,000; 2 year, ₹3,500; 3 year, ₹4,500; 4 year, ₹5,500 and 5 year, ₹6,000. Calculate the Present Value of the series taking the discount rate of 8%.

Solution

PV of the Series of Cash Inflows

Year	Cash Inflows (₹)	Discounting Factor or Present Value Factor	Present Value $PV = FV \times (PVIF_{r,n})$
1	3,000	$\frac{1}{(1+0.08)^1} = 0.9259259$	$3{,}000 \times 0.9259259 = 2{,}777.77$
2	3,500	$\frac{1}{(1+0.08)^2} = 0.8573388$	$3{,}500 \times 0.8573388 = 3{,}000.68$
3	4,500	$\frac{1}{(1+0.08)^3} = 0.7938322$	$4{,}500 \times 0.7938322 = 3{,}572.20$
4	5,500	$\frac{1}{(1+0.08)^4} = 0.73502985$	$5{,}500 \times 0.73502985 = 4{,}042.66$
5	6,000	$\frac{1}{(1+0.08)^5} = 0.6805832$	$6{,}000 \times 0.6805832 = 4{,}083.50$
Total			₹17,476.81

Illustration 2.13

Problem

Mr. B has two options: (i) to receive ₹80,000 after 6 years and (ii) to receive ₹1,00,000 after 8 years. Which option he should choose when discount rate is (i) 8% and (ii) 12%.

Solution

PV of Cash Flows is as follows

Option (i) Discount Rate 8%	Option (ii) Discount Rate 8%
$PV = FV \left\{\frac{1}{(1+r)^n}\right\}$ $PV = 80{,}000 \left\{\frac{1}{(1+0.08)^6}\right\}$ $PV = 80{,}000 \left\{\frac{1}{(1.08)^6}\right\}$ $PV = 80{,}000 \left\{\frac{1}{1.58687}\right\}$ $PV = 80{,}000 \times 0.630169$ PV = ₹50,413.57	$PV = FV \left\{\frac{1}{(1+r)^n}\right\}$ $PV = 1{,}00{,}000 \left\{\frac{1}{(1+0.08)^8}\right\}$ $PV = 1{,}00{,}000 \left\{\frac{1}{(1.08)^8}\right\}$ $PV = 1{,}00{,}000 \left\{\frac{1}{1.85093}\right\}$ $PV = 1{,}00{,}000 \times 0.540268$ PV = ₹54,026.84

When discount rate is 8%, option (ii) is better than option (i), so he should choose option (ii).

Option (i) Discount Rate 12%	Option (ii) Discount Rate 12%
$PV = FV \left\{\frac{1}{(1+r)^n}\right\}$ $PV = 80{,}000 \left\{\frac{1}{(1+0.12)^6}\right\}$ $PV = 80{,}000 \left\{\frac{1}{(1.12)^6}\right\}$ $PV = 80{,}000 \left\{\frac{1}{1.97382}\right\}$ $PV = 80{,}000 \times 0.5066311$ PV = ₹40,530.49	$PV = FV \left\{\frac{1}{(1+r)^n}\right\}$ $PV = 1{,}00{,}000 \left\{\frac{1}{(1+0.12)^8}\right\}$ $PV = 1{,}00{,}000 \left\{\frac{1}{(1.12)^8}\right\}$ $PV = 1{,}00{,}000 \left\{\frac{1}{2.475963}\right\}$ $PV = 1{,}00{,}000 \times 0.4038832$ PV = ₹40,388.32

When discount rate is 12%, option (i) is better than option (ii), so he should choose option (i).

Illustration 2.14

Problem

Years	Cash Flows (₹)
1	8,000
2–4	10,000
5	12,000

For the above data, discount rate is 12%. Calculate the Present Value of Cash Flows.

Solution

PV of the Series of Cash Flows

Year	Cash Flows (₹)	Discounting Factor or Present Value Factor	Present Value $PV = FV \times (PVIF_{r,n})$
1	8,000	$\frac{1}{(1+0.12)^1} = 0.8928$	$8,000 \times 0.8928 = 7,142.4$
2–4	10,000	$\frac{1}{(1+0.12)^2} + \frac{1}{(1+0.12)^3} + \frac{1}{(1+0.12)^4}$ $= 0.7972 + 0.7118 + 0.6355 = 2.1445$	$10,000 \times 2.1445 = 21,445$
5	12,000	$\frac{1}{(1+0.12)^5} = 0.5674$	$12,000 \times 0.5674 = 6,808.8$
Total			₹35,396.2

2.3.2 Compounding or Future Value Method

Compounding is just the opposite of discounting. The process of converting Present Value into Future Value is known as compounding. Future Value of a sum of money is the expected value of that sum of money invested after n number of years at a specific compound rate of interest. Methods for calculating Future Value are given as follows Table 2.3:

Table 2.3 Compounding or Future Value Method for Single and Multiple Cash Flows

S. No.	Single and Multiple Cash Flows	Formula	Notations Used
1.	Annually single Cash Flow	$FV = PV(1 + r)^n$ Or, $FV = PV\ (FVIF_{r,n})$	PV = Present Value FV = Future Value r = Interest rate n = Number of years $FVIF_{r,n}$ = Future Value Interest Factor
2.	Multiple times say m Number of times compounding is done	$FV = PV\left(1 + \frac{r}{m}\right)^{mn}$	PV = Present Value FV = Future Value r = Interest rate n = Number of years m = Number of times compounding done say quarterly then m = 4, half-yearly m = 2 and so on.
3.	Cash Flows of different amounts over the years	$FV = PV_1 \times (1 + r)^1 + PV_2 \times (1 + r)^2 + \cdots + PV_n \times (1 + r)^n$, i.e. $\sum_{t=1}^{n} A^t(1+r)^t$	PV = Present Value FV = Future Value r = Interest rate n = Number of years t = 1, 2, 3, 4….

Illustration 2.15

Problem

Mr. D invested ₹12,000 in bank at the rate of 5% Compound Interest per annum, compounded (i) bi-annually, (ii) quarterly. How much he will receive after 4 years?

Solution

Amount to be received in future or Future Value = $PV\left(1+\frac{r}{m}\right)^{mn}$

PV = Present Value

FV = Future Value

r = Interest rate, i.e. 5% or, 0.05

n = Number of years, i.e. 4

m = Number of times compounding done

Or, $FV = 12{,}000\left(1+\frac{0.10}{2}\right)^{4\times2}$

$FV = 12{,}000\ (1.05)^{8}$

$FV = 12{,}000 \times 1.477455$

FV or Compounded Amount = ₹17,729.465

Compound Interest = ₹17,729.465 – 12,000 = ₹5,729.465

Or, $FV = 12{,}000\left(1+\frac{0.10}{4}\right)^{4\times4}$

$FV = 12{,}000\ (1.025)^{16}$

$FV = 12{,}000 \times 1.484505$

FV or Compounded Amount = ₹17,814.0674

Illustration 2.16

Problem

Mr. X invested ₹250, ₹500, ₹750, ₹1,000 and ₹1,250 at the end of each year. Compute the compounded value at the end of last year, i.e. 5th year, compounded annually at the rate of 12% Compound Interest per annum.

Solution

$$FV = \sum_{t=1}^{n} A^{t}(1+r)^{t}$$

Compounded Value at the end of 5th Year

End of Year	Amount Invested (₹)	Number of Years Compounded	Compounded Factor	Future Value (₹) = PV(FVIF$_{12\%,5}$)
1	250	4	$(1 + 0.12)^4$ or $(1.12)^4 = 1.5735$	$250 \times 1.5735 = 393.37$
2	500	3	$(1 + 0.12)^3$ or $(1.12)^3 = 1.4049$	$500 \times 1.4049 = 702.45$

(Contd.)

End of Year	Amount Invested (₹)	Number of Years Compounded	Compounded Factor	Future Value (₹) = PV(FVIF$_{12\%,5}$)
3	750	2	$(1 + 0.12)^2$ or, $(1.12)^2 = 1.2544$	$750 \times 1.2544 = 940.8$
4	1,000	1	$(1 + 0.12)^1$ or, $(1.12)^1 = 1.12$	$1{,}000 \times 1.12 = 1{,}120$
5	1,250	0	$(1 + 0.12)^0$ or, $(1.12)^0 = 1.0000$	$1{,}250 \times 1.00 = 1{,}250$
Compounded Value at the end of 5th Year =				**₹4,406.62**

Or, $FV = 250 \times (1 + 0.12)^4 + 500 \times (1 + 0.12)^3 + 750 \times (1 + 0.12)^2 + 1{,}000 \times (1 + 0.12)^1 + 1{,}250 \times (1 + 0.12)^0$

$FV = 250 \times 1.5735 + 500 \times 1.4049 + 750 \times 1.2544 + 1{,}000 \times 1.12 + 1{,}250 \times 1.00$

$FV = 393.37 + 702.45 + 940.8 + 1{,}120 + 1{,}250$

$FV = ₹4{,}406.62$

Illustration 2.17

Problem

Mr. Y deposited ₹60,000 in a bank paying 8% Compound Interest per annum for 15 years, on time deposits. What will be the value of the deposit at the end of 15 years? Given FVIF$_{8\%, 15}$ = 3.172169.

Solution

Initial Deposit = ₹60,000

$r = 0.08$, i.e. 8%

$n = 15$ years

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

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

$FV = 60{,}000 \times 3.172169$

$FV = ₹1{,}90{,}330.15$

Illustration 2.18

Problem

Mr. E deposited ₹50,000 in bank for a time period of 1 year. The bank gives two options: (i) to receive interest at the rate of 11% per annum compounded monthly and (ii) to receive interest at the rate of 11.75% per annum compounded semi-annually. Which option Mr. E would choose?

Solution

$FV = PV\left(1 + \frac{r}{m}\right)^{mn}$, when compounding is done multiple times.

PV = Present Value

FV = Future Value

r = Interest rate

n = Number of years

m = Number of times compounding is done.

Option (i)	Option (ii)
$FV = PV\left(1+\frac{r}{m}\right)^{mn}$	$FV = PV\left(1+\frac{r}{m}\right)^{mn}$
$FV = 50{,}000\left(1+\frac{0.11}{12}\right)^{12\times1}$	$FV = 50{,}000\left(1+\frac{0.1175}{2}\right)^{2\times1}$
$FV = 50{,}000\left(1+\frac{0.11}{12}\right)^{12\times1}$	$FV = 50{,}000\left(1+\frac{0.1175}{2}\right)^{2\times1}$
$FV = 50{,}000(1 + 0.0091666)^{12}$	$FV = 50{,}000(1 + 0.05875)^{2}$
$FV = 50{,}000(1.0091666)^{12}$	$FV = 50{,}000(1.05875)^{2}$
$FV = 50{,}000 \times 1.1157188$	$FV = 50{,}000 \times 1.12095156$
FV = ₹55,785.9418	FV = ₹56,047.5781

Effective Rate of Interest Calculation

Option (i)	Option (ii)
$EROI = \left(1+\frac{r}{x}\right)^{x} - 1$	$EROI = \left(1+\frac{r}{x}\right)^{x} - 1$
$= \left(1+\frac{0.11}{12}\right)^{12} - 1$	$= \left(1+\frac{0.1175}{2}\right)^{2} - 1$
$= \left(1+\frac{0.11}{12}\right)^{12} - 1$	$= \left(1+\frac{0.1175}{2}\right)^{2} - 1$
$= (1 + 0.0091666)^{12} - 1$	$= (1 + 0.05875)^{2} - 1$
$= (1.0091666)^{12} - 1$	$= (1.05875)^{2} - 1$
$= 1.1157188 - 1$	$= 1.12095156 - 1$
= 0.1157188, i.e. 11.57188%	= 0.1209515, i.e. 12.09515%

So Mr. E should choose option (ii) which has the highest Future Value and the effective rate of interest as compared to option (i).

Illustration 2.19

Problem

Mr. R deposited ₹85,000 in bank at the rate of 12% Compound Interest per annum. How much he would receive after 20 years? Given, $FVIF_{12, 20} = 9.646$.

Solution

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

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

PV = Present Value or sum invested ₹85,00,000

FV = Future Value

r = Interest rate, i.e. 12% or 0.12

n = Number of years, i.e. 20

$$FV = PV\ (FVIF_{r,\ n})$$
$$FV = 85,00,000 \times 9.646$$
$$FV = ₹819,91,000$$

Illustration 2.20

Problem

Mr. Oman deposited ₹10,560 in bank for 20 years. Bank gives an interest at the rate of 10% p. a. Find the Future Value of the present deposit.

Solution

Amount to be received in future or Future Value = Principal (1 + Simple Interest)^n

$$r = 0.10,$$
$$n = 20$$
$$PV = 10,560$$
$$FV = 10,560\ (1 + 0.10)^{20}$$
$$FV = 10,560\ (1.10)^{20}$$
$$FV = 10,560 \times 0.62749$$
$$FV = ₹71,042.40$$

2.3.3 Distinction between Compounding and Discounting Methods

The points of distinction between compounding and discounting are as follows in Table 2.4.

Table 2.4 Contrast between Compounding and Discounting

Compounding	Discounting
The process of converting the Present Value into Future Value is known as compounding.	The process of converting Future Value in Present Value terms is known as discounting.
Interest rate is used to calculate the Future Value or the compounded value.	Discount rate is used to calculate the Present Value.
Higher the interest rate greater will be the future or the compounded value.	Higher the discount rate lower will be the Present Value.
Future Value is always greater than the Present Value provided the interest rate is positive.	Present Value is always less than the Future Value.
$FV = PV(1 + r)^n$	$PV = FV\left\{\frac{1}{(1+r)^n}\right\}$

Every finance manager has to take three important Financial Management decisions such as the Investment Decision, Financing decision and the Dividend decision. Finance manager has to take all these decisions keeping in mind the value maximisation or the wealth maximisation objective of Financial Management. So a finance manager before taking a financial decision should keep in mind the objective of value maximisation. In case of an Investment

Decision, where return is fixed and assured it is said to be risk-free investment, for example, 10% Reserve Bank of India Bonds, government bonds, keeping money in deposit accounts offered by public sector banks, etc. In this case, the probability of the return is 1 and hence no risk is associated with it. Again for taking Investment Decision for investing in shares of a company, the risk associated with mutual funds needs to be considered as in this type of investment the return varies which is neither fixed nor assured. Share market is volatile and the return varies depending on certain macro level factors and company-specific factors such as capital depreciation, fluctuating dividend rate due to profit fluctuation, fund crisis, etc. So, two aspects are involved in any financial decision—one the risk and another return. Both these two factors vary from one decision to another. A proper balance or trade-off between risk and return is required to maximise the return by minimising the risk and, thereby, achieving the goal of maximising the market value to shares.

2.4 ANNUITY

Equal series of Cash Flow either receipt or payment for definite time period at regular intervals is known as an Annuity. Generally, Cash Flows relating to financial decision are not equal, but when the Cash Flows are equal and constant over time it is termed as Annuity. An Annuity is a contract whereby financial product is sold by a financial institution which in turn accepts and promises to grow the product with an objective to make a series of equal payments to the individual upon annuitisation, at a later date. Annuity is a fixed and equal amount of money receivable or payable (Cash Flows) at periodic intervals evenly spaced over time, usually, a year is referred to as Annuity.

Some of the common examples of Annuity products are insurance premium payments, retirement savings, mortgage payments, etc. The prime sellers of Annuity products are life insurance companies and investment companies. The most commonly used Annuity product is the insurance product. Usually four parties are involved in an Annuity contract, which are annuitant, contract owner, beneficiary and insurance carrier. The person who will receive the periodic payment is known as the annuitant. The person who enters into the contract is the contract owner. The annuitant and the contract owner is usually the one and the same person. Beneficiary is the person who is entitled to receive the fund on account of death of the annuitant, and lastly, the insurance company is the insurance carrier who sold the product. The process of conversion of an investment into equal series of payments is known as annuitisation. Annuities are of different types depending on different parameters such as starting time of Annuity, types of pension scheme, types of pension amount and liquidity.

The most commonly used parameters are starting time of Annuity and types of pension amount. The different types of Annuity based on these two are as follows:

1. ***Deferred Annuity and Annuity Due:*** Deferred Annuity is the type of Annuity that begins only after the expiry of a certain period of time after the final and the last premium or instalment has been paid by the purchaser of the Annuity contract. In this type of Annuity Cash Flows occur at the end of each period. In case of Annuity Due, Cash Flows

occur at the beginning of each period. The Annuity where the Cash Flows occur at the end of each period is called an ordinary or a deferred Annuity whereas the Annuity where Cash Flows occur at the beginning of each period is called an Annuity Due.

2. ***Immediate Annuity:*** In immediate Annuity, the Cash Flow commences immediately after the payment of final purchase premium.
3. ***Fixed Annuity:*** Fixed Annuity is the type of Annuity where the Cash Flow is fixed over time despite market fluctuations. This type of Annuity is preferred by those investors who like to take minimum risk.
4. ***Variable Annuity:*** Variable Annuity is the Annuity where the return is not fixed and constant over time. It varies with market fluctuations. Usually it is preferred by those investors who like to take high risk in expectation of high return.
5. ***Indexed Annuity:*** Indexed Annuity is almost similar to variable Annuity but the only difference is that the rate of return here depends on stock market index such as Sensex, Nifty, S&P 500, etc. It is not available in India.

The two main advantages of Annuity products are tax saving and assured return. Unlike advantages there are some disadvantages also such as costly investment, penalty for early withdrawal and often the complexity to understand.

2.4.1 Present Value of an Annuity

An investor may be interested in knowing the Present Value of the Annuity of his investment. The method for calculating the Present Value of Annuity is shown in Table 2.5.

Table 2.5 Method for Calculating the Present Value of an Annuity

S. No.	Annuity	Formula	Notations Used
1.	Deferred Annuity	$\text{PVA} = A\left\{\frac{(1+r)^n - 1}{r(1+r)^n}\right\}$ Or, $\text{PVA} = \frac{A}{r}\left\{1 - \frac{1}{(1+r)^n}\right\}$ Or, $\frac{\text{PVA}}{\frac{(1+r)^n - 1}{r(1+r)^n}}$ = Capital recovery factor (A)	PVA = Present Value of Annuity A = Future Value of Expected Equal Cash Flows r = Discount rate n = Number of years Present Value Interest Factor of an Annuity $(\text{PVIFA}_{r,n}) = \left\{\frac{(1+r)^n - 1}{r(1+r)^n}\right\}$ $\text{PVIFA}_{r,n}$ is the interest factor used to calculate the Present Value of an Annuity at a particular discount rate for a specified time period. Capital Recovery Factor = To repay the borrowings in total taken at a given interest rate, payment of equal annual instalments is known as capital recovery.
2.	Deferred Annuity when discounting done m number of times	$\text{PVA} = A\left\{\frac{\left(1+\frac{r}{m}\right)^{mn} - 1}{r\left(1+\frac{r}{m}\right)^{mn}}\right\}$	PV = Present Value A = Annuity r = Discount rate n = Number of years m = Number of times discounting is done say quarterly then $m = 4$, half-yearly $m = 2$ and so on.

Illustration 2.21

Problem

Mr. J expects to get a fixed sum of ₹12,000 at the end of each year from an investment for 12 years. If the discount rate is 6%, calculate the Present Value of the future Cash Flows?

Solution

Present Value of Annuity, PVA = $A\left\{\frac{(1+r)^n-1}{r(1+r)^n}\right\}$

$$\text{PVA} = 12{,}000\left\{\frac{(1+0.06)^{12}-1}{0.06(1+0.06)^{12}}\right\}$$

$$\text{PVA} = 12{,}000\left\{\frac{(1.06)^{12}-1}{0.06(1.06)^{12}}\right\}$$

$$\text{PVA} = 12{,}000\left\{\frac{2.01219647-1}{0.06\times 2.01219647}\right\}$$

$$\text{PVA} = 12{,}000\left\{\frac{1.01219647}{0.120731}\right\}$$

PVA = 12,000 × 8.383844

PVA = ₹1,00,606.13

Illustration 2.22

Problem

Mr. I has taken loan of ₹7,50,000 from bank for 1 year. The bank charges interest at the rate of 12% p. a. Find the amount of monthly instalment. Given $\text{PVIFA}_{12,1}$ = 11.255.

Solution

Present Value of Annuity, PVA = $A \times \text{PVIFA}_{12,1}$

or $$A = \frac{\text{PVA}}{\text{PVIF}_{12,1}}$$

or $$A = \frac{7{,}50{,}000}{11.255}$$

or $$A = ₹66{,}637.05$$

Illustration 2.23

Problem

Mr. U takes loan of ₹45,50,000 from bank for purchasing house. He decides to repay the loan in 15 years in 15 equal annual instalments. The bank charges an interest at the rate of 9% p. a. What will be the amount of instalment if payments are to be made bi-annually?

Solution

$$\text{PVA} = A\left\{\frac{\left(1+\frac{r}{m}\right)^{mn}-1}{r\left(1+\frac{r}{m}\right)^{mn}}\right\}, \textit{where},$$

PVA = Present Value of Annuity, i.e. 45,00,000

A = Future Value of Expected Equal Cash Flows

r = Discount rate, i.e. 9% or 0.09

n = Number of years, i.e. 15

$$\text{PVA} = A\left\{\frac{\left(1+\frac{r}{m}\right)^{mn}-1}{\frac{r}{m}\left(1+\frac{r}{m}\right)^{mn}}\right\},$$

$$45{,}00{,}000 = A\left\{\frac{\left(1+\frac{0.09}{2}\right)^{2\times 15}-1}{\frac{0.09}{2}\left(1+\frac{0.09}{2}\right)^{2\times 15}}\right\}$$

$$45{,}00{,}000 = A\left\{\frac{(1+0.045)^{30}-1}{0.045(1+0.045)^{30}}\right\}$$

$$45{,}00{,}000 = A\left\{\frac{(1.045)^{30}-1}{0.045(1.045)^{30}}\right\}$$

$$45{,}00{,}000 = A\left\{\frac{(1.045)^{30}-1}{0.045(1.045)^{30}}\right\}$$

$$45{,}00{,}000 = A\left\{\frac{3.745318-1}{0.045\times 3.745318}\right\}$$

$$45{,}00{,}000 = A\left\{\frac{2.745318}{0.1685393}\right\}$$

$$45{,}00{,}000 = A \times 16.28888$$

$$A = \frac{45{,}00{,}000}{16.28888}$$

A = ₹2,76,261.95 (approximately)

2.4.2 Future Value of an Annuity

If an investor makes an investment in an Annuity product for a specified period of time at a certain rate of interest, he may be interested in knowing the future or compounded value of an Annuity. The method for calculating the future or compounded value of Annuity is given in Table 2.6.

Table 2.6 Method for Calculating Future or Compounded Value of an Annuity

S. No.	Annuity	Formula	Notations Used
1.	Deferred Annuity (Cash Flow at the end of each period)	$FVA = A\left\{\frac{(1+r)^n - 1}{r}\right\}$	FVA = Compounded sum of Annuity/Future Value of Annuity A = Equal Cash Flows r = Interest rate n = Number of years Future Value Interest Factor of an Annuity $(FVIFA_{r,n}) = \left\{\frac{(1+r)^n - 1}{r}\right\}$ $FVIFA_{r,n}$ is the interest factor used to calculate the Future Value of an Annuity at a particular interest rate for a specified time period.
2.	Annuity Due (Cash Flow at the beginning of each period)	$FVA = A\left\{\frac{(1+r)^n - 1}{r}\right\}(1+r)$	FVA = Compounded sum of Annuity/Future Value of Annuity A = Equal Cash Flows r = Interest rate n = Number of years
The amount to be invested for certain number of years at a specified rate of interest to generate ₹1 at the end of the year is known as Sinking Fund.			
3.	Sinking Fund Factor	$A = \left\{\frac{S_n}{\frac{(1+r)^n - 1}{r}}\right\}$	A = annual fixed amount or Sinking Fund r = Rate of interest n = Number of years S_n = Compounded sum of Annuity or Future Value of an Annuity

Illustration 2.24

Problem

Mr. T invested fixed amount of ₹15,000 at an interest rate of 8% per annum at the end of each year for 10 consecutive years. Compute the Future Value of the Annuity.

Solution

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

where,

FVA = Compounded sum of Annuity/Future Value of Annuity
A = Equal Cash Flows or Annuity, i.e. ₹15,000
r = Interest rate, i.e. 8% or 0.08
n = Number of years, i.e. 10

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

$$FVA = 15{,}000\left\{\frac{(1+0.08)^{10} - 1}{0.08}\right\}$$

$$FVA = 15{,}000\left\{\frac{(1.08)^{10} - 1}{0.08}\right\}$$

$$FVA = 15{,}000\left\{\frac{2.15892499 - 1}{0.08}\right\}$$

$$FVA = 15{,}000\left\{\frac{1.158924997}{0.08}\right\}$$

$$FVA = 15{,}000 \times 14.48656$$

$$FVA = ₹2{,}17{,}298.437$$

Illustration 2.25

Problem

Mr. H deposits ₹12,000 at the beginning of each year for 8 consecutive years in bank. The deposit earns Compound Interest of 12% p.a. Compute how much he will receive at the end of 8 years.

Solution

Future Value of Annuity Due-

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

FVA = Compounded sum of Annuity/Future Value of Annuity

A = Equal Cash Flows, i.e. ₹12,000

r = Interest rate i.e. 12% or, 0.12

n = Number of years i.e. 8

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

$$FVA = 12{,}000\left\{\frac{(1+0.12)^8 - 1}{0.12}\right\}(1+0.12)$$

$$FVA = 12{,}000\left\{\frac{(1.12)^8 - 1}{0.12}\right\}(1.12)$$

$$FVA = 12{,}000\left\{\frac{2.47596317 - 1}{0.12}\right\}(1.12)$$

$$FVA = 12{,}000\left\{\frac{1.475963176}{0.12}\right\}(1.12)$$

$$FVA = 12{,}000 \times 12.299693 \times 1.12$$

$$FVA = ₹1{,}65{,}307.8757$$

Illustration 2.26

Problem

Mr. G wants to buy plot of land in Kolkata costing ₹65,00,000. The payment has to be made 15 years from now. With this plan, he wants to save fixed amount annually in the form of bank deposit. The bank pays interest at the rate of 14% p.a. How much Mr. G should save per year if the amount of deposit with interest would be sufficient to buy the plot of land after 15 years?

Solution

Fixed amount of savings required

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

where,

A = Annual fixed amount or Sinking Fund

r = Rate of interest i.e. 14% or, 0.14

n = Number of years i.e. 15

S_n = Compounded sum of Annuity or Future Value of an Annuity

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

$$A = \left\{ \frac{65,00,000}{\frac{(1+0.14)^{15} - 1}{0.14}} \right\}$$

$$A = \left\{ \frac{65,00,000}{\frac{(1.14)^{15} - 1}{0.14}} \right\}$$

$$A = \left\{ \frac{65,00,000}{\frac{7.13793797 - 1}{0.14}} \right\}$$

$$A = \left\{ \frac{65,00,000}{\frac{6.1379379}{0.14}} \right\}$$

$$A = \left\{ \frac{65,00,000}{43.842414} \right\}$$

A = ₹1,48,258.26 (approximately)

2.5 PERPETUITY

Perpetuity is an Annuity that occurs indefinitely. Annuity forever is known as Perpetuity. Although it sounds illogical but still the Annuity where Cash Flows continue for an infinite period of time is called Perpetuity. Examples of Perpetuity are real estate investments and

preferred stock investments. Perpetuities are not in vogue in all the countries. It is popular in the United Kingdom (UK) where it is known as consols. An example of Perpetuity is irredeemable preference shares although not in vogue in India at present.

Perpetuity where Cash Flows for infinite period, but grows at a constant rate is termed as growing Perpetuity method for calculating Perpetuity is shown in Table 2.7.

Table 2.7 Method for Calculating Perpetuity

S. No.	Perpetuity	Formula	Notations Used
1.	Perpetuity	$P = \frac{A}{r}$	P = Perpetuity r = discount rate A = expected Cash Flow
2.	Growing Perpetuity	$P = \frac{A}{(r-g)}$	P = Perpetuity r = discount rate A = expected Cash Flow g = growth rate

Illustration 2.27

Problem

Compute the Present Value of a Perpetuity of ₹1,50,000 per year at a discount rate of 14%.

Solution

Present Value of a Perpetuity, $P = \frac{A}{r}$

where,

P = Perpetuity

r = discount rate, i.e. 14% or 0.14

A = expected Cash Flow, i.e. ₹1,50,000

$$P = \frac{1,50,000}{0.14}$$

P = ₹10,71,428.57 (approximately)

Illustration 2.28

Problem

Compute the Present Value of Perpetuity of ₹80,000 per year at a discount rate of 12% where growth rate is 8%.

Solution

Growing Perpetuity, $P = \frac{A}{(r-g)}$

where,

P = Perpetuity

r = Discount rate, i.e. 12% or 0.12

A = Expected Cash Flow, i.e. 8%, i.e. 0.08

g = Growth rate, i.e. 8%, i.e. 0.08

$$P = \frac{A}{(r - g)}$$

$$P = \frac{80{,}000}{(0.12 - 0.08)}$$

$$P = \frac{80{,}000}{0.04}$$

P = ₹20,00,000

2.6 RISK

The business dictionary defines risk as exposure to the possibility of loss, injury, or other adverse or unwelcome circumstance, i.e. a chance or situation involving such a possibility. Risk is the probability or possibility of having negative outcome due to certain sudden events. The variation of the actual outcome from the expected outcome is defined as risk. In simple terms, risk is the volatility in actual outcome. It is a sudden occurrence of some unexpected or unplanned events resulting in reduction of earnings or huge financial losses.

Although used synonymously, risk is bit different from uncertainty. In case of risk, probabilities of the occurrence of an event can be predicted based on the past available facts, figures and information for the purpose of decision making, but in case of uncertainty the occurrence of an event cannot be predicted, due to unavailability of facts, figures and information. Uncertainty varies from zero (0) to infinity (∞). Risk is better than uncertainty. Risk lies somewhere between certainty and uncertainty. If uncertainty is equal to 0, it indicates certainty.

2.6.1 Types of Risk

Risk can be categorised into three broad categories—Business Risk, non-Business Risk, and Financial Risk. **Business Risk** is the risk associated with the day-to-day activities of business or the operational activities of the business. It depends on certain factors such as changes in demand, input prices and obsolescence due to technological advances. **Non-Business Risk** refers to all forms of risk that are beyond the control of any business. Political risk and all sorts of risk associated with variation in macroeconomic factors fall under this category of risk. **Financial Risk** is the most common form of risk. This form of risk is associated with the financing decision of a firm. It is a major area of concern for all the firms. Financial Risk is associated with host of factors such as the uncertainty in the movement of market due to factors such as fluctuation in interest rate, currencies and stock/share prices caused by certain macro and micro factors. **Financial Risk** can be further classified into following types—market risk, credit risk, liquidity risk, operational risk and legal risk. **Market Risk** is associated with uncertain movement of stock prices, credit risk refers to the risk when one party generally the customer-taken credit fails to fulfil the commitment, liquidity risk refers to risk that an asset may not be sold in the market quickly for realisation of cash in time of financial crunch, operational risk is associated with the possibility of failure of business due to mismanagement,

human errors or some technical reasons and legal risk refers to the financial losses due to huge legal constraints.

Broadly, risk can also be of the following types—investment risk, systematic risk, unsystematic risk and portfolio risk. **Investment Risk** is the risk associated with an Investment Decision. This type of risk arises when the expected return is less than the actual return. **Systematic Risk** is also known as uncontrollable risk or diversifiable risk. This type of risk is beyond the control of a firm. This risk arises due to change in macroeconomic factors such as currency fluctuation, inflation, changes in economic policy, etc. **Unsystematic Risk** is also known as the controllable risk or the non-diversifiable risk. This type of risk is specific to a company which is due to certain factors such as paucity of funds, resources, human capital, huge litigations, etc. **Portfolio Risk** is the risk which arises due to investment in different projects to minimise the risk portfolio investment is made. This risk cannot be eliminated in total but can be minimised.

2.6.2 Measurement of Risk

There are various methods of measuring risk. The following will provide an overview of the different methods available.

1. ***Sensitivity analysis:*** It is a method of risk estimation based on the decision model. Under this approach, the probable impact of risk arising due to change in data set is tried to be assessed on the decision model. It measures the sensitivity of the data set used for decision making, i.e. trying to assess the changes in expected values or outcomes of a decision model due to change in the data set. Analysing the sensitivity of the data set which is very vital for decision making ensures better decision making of the management of a firm. So this technique does not measure risk in quantitative term but rather in qualitative terms by stating the impact on the final decisions due to sudden variations in those factors affecting decision making.
2. ***Probability distribution and expected values:*** Probability is the chance of occurrence of an event. Probability distribution not only takes into account the possible or expected return from each alternative but also considers the uncertainty associated with each of the alternatives. Probability can be objective or subjective. Objective probability is based on large number of observations under independent and identical situation, whereas subjective probability is totally based on individual judgement or decision and not based on large number of identical and independent observations.
3. ***Standard Deviation:*** Standard Deviation is an absolute measure of dispersion. Dispersion is variation of the actual value from the central value or mean. Standard Deviation measures the deviation of actual return from the expected return in absolute terms. It is the positive square root of the mean of the squares of the deviations of the variables from their arithmetic mean. It is denoted by sigma (σ).

   High Standard Deviation indicates higher dispersion, i.e. higher amount of risk, whereas low Standard Deviation reveals lower dispersion, i.e. lower amount of risk. Standard Deviation is expressed by the following formulae:

$$\text{Standard Deviation } (\sigma) = \sqrt{\frac{1}{n}\sum (x - \bar{x})^2} \text{ (without frequency)}$$

or $$\text{Standard Deviation } (\sigma) = \sqrt{\frac{1}{N}\sum f(x - \bar{x})^2} \text{ (with frequency)}$$

Standard Deviation is not a reliable measure of risk; this measure suffers from the limitation that in case of a project involving different Cash Outflows and different expected returns or mean values, this measurement of risk has the high chance of giving misleading results. So it is not suitable for comparison.

Coefficient of Variation: Coefficient of variation is a relative measure of risk. It is expressed as

$$\text{Coefficient of variation (CV)} = \frac{\text{Standard Deviation}}{\text{Mean or Expected Value}} \times 100$$

This is measured as Standard Deviation as percentage of mean. This method is also not a reliable measure of risk but it helps in comparison in case of projects having different Cash Outflows and different expected returns. Higher coefficient of variation reveals higher degree of risk and vice versa.

4. ***Decision Tree Analysis:*** In this method, decision tree is drawn to explain the full set of probable events and alternatives that may arise under a given situation. Each course of action is represented by branch which further has subsidiary branches which represents the probable alternative course of actions and events in future. In case of an Investment Decision, this Decision Tree Analysis method is usually followed, where the Investment Decision is portrayed by a tree along with branches which represents the future probable events.
5. ***Capital Asset Pricing Model:*** Capital Asset Pricing Model (CAPM) measures the expected return on equity. In this method, the return on equity has two components—one is the risk-free rate of return and another is the risk premium. Risk-free rate of return is the assured return especially on the government or the gilt-edged securities. Risk premium is the additional or extra return for investing in a particular risky security. Risk premium component comprises of average return on the market portfolio and the beta factor which represents the risk of a particular security. Beta measures sensitivity of an investment in respect to the market. It is measured as follows:

$$\text{Beta } (\beta) = \frac{\text{Risk of the } j\text{th security}}{\text{Risk of the market as whole}}$$

Beta value (β) > 1, represents high-risk security, beta value (β) < 1 represents low-risk securities and beta (β) = 1 represents neutral, i.e. neither high risk nor low risk.

6. ***Alpha:*** It is also another measure of risk, where risk is measured relative to the market risk or the benchmark index.
7. ***R squared (R^2):*** This measure is expressed as a percentage (%) of a particular investment's or security's movement in terms of the movement of the benchmark index.
8. ***Sharpe Ratio:*** This ratio is calculated to determine whether the return arising from an investment is due to rational Investment Decision or the reward for taking excess or high risk.

2.7 RETURN

Return is simply, the Cash Inflows arising from an investment. Return arising from an investment has two components, one the periodic return called the dividend or interest on the principal sum invested and another the difference between the price at the time of investment, i.e. purchase price and the ending, i.e. the selling price. Periodic return may be received in different ways such as annually, bi-annually, quarterly, etc. From a business point of view return is the reward of a business for carrying out its operation and undertaking risk involved in such operations. From an investor's point of view, the perception of return varies from investor to investor. Some may opt for high return on short-term basis, whereas other may like to invest in long-term growth funds. Again, some may like to invest in the security of a company with sustainable growth in sales and earnings over the years, whereas some may invest in the security of a company based on its high return on net worth.

2.7.1 Measurement of Return

Some of the commonly used techniques of return measurement are as follows:

1. ***Return on Investment (ROI):*** ROI is the profit earned by a company in relation to the amount of capital invested. It is the measure which indicated the overall financial performance of a company. Return on Investment as a measure of return was first developed by DuPont Company in USA in the year 1919. It is expressed as follows:

$$\text{Return on Investment (ROI)} = \frac{\text{Operating Profit}}{\text{Networth}} \times 100$$

   High ROI, indicates higher return whereas low ROI represents low return. This ratio has certain advantages such as it measures the Operating Profit of a firm, helps in understanding the profit earning capacity of a firm, indicates efficiency of assets utilisation, helps in taking long-term Investment Decision but at the same time suffers from some limitations such as unsuitable for short-term Investment Decisions, perception of profit varies, etc.

2. ***Internal Rate of Return (IRR):*** It is that rate of return at which Present Value of Cash Inflow is just equal to the Present Value of the Cash Outflow, i.e. the initial cost of investment, which means at IRR, the Net Present Value, i.e. Present Value of Cash Inflow—Present Value of Cash Outflow is just equal to zero. It is also known as the opportunity Cost of Capital. Internal Rate of Return is calculated as:

$$\sum \frac{CI}{(1+r)^n} - \sum \frac{CO}{(1+r)^n} = 0$$

where, r = IRR.
CI = Cash Inflow
CO = Cash Outflow
n = no. of years

Under this method, an Investment Decision is taken based on criteria for a single project as r (rate of return) > K (Cost of Capital), accept the project; r (rate of return) < K (Cost of Capital), reject the project; and r (rate of return) = K (Cost of Capital), firm is indifferent. In case of mutually exclusive project, the project with higher IRR is to be selected. This method as an Investment Decision measure has certain advantages such as it considers the Time Value of Money factor, Cash Inflows are taken in total for estimated life, easy to understand, does not takes into account the Cost of Capital in its calculation, etc., whereas at the same time it suffers from various limitations such as involving very complex calculation, difficulty in decision making in case of mutually exclusive project, ignores the concept of Cost of Capital or the required rate of return, etc.

3. ***Weighted Average Cost of Capital:*** Cost of Capital is the minimum or the required rate of return to be earned on a project to retain the investors. Weighted average Cost of Capital is calculated as the Cost of Capital of individual sources multiplied by the respective weights and their sum divided by the total of their weights.
4. ***Weighted Average Return Method:*** Under this method, similarly, the returns from different projects are calculated and that figures are multiplied by their respective weights. Finally, the sum of the product is divided from the total of their weights. The potential income from a particular investment varies from one investment to another. This potential income from different investments is called the weight of an investment. Such potentialities may be high, low or moderate.
5. ***Profit Method:*** This is a simple method of return estimation. In this method, profit that is calculated by deducting the amount of purchase from the sales amount is taken to be the return.
6. ***Cash Flow Method:*** Under this method, Cash Outflows are deducted from the Cash Inflows of a project. Only cash items are considered. The difference between Cash Inflows and Cash Outflows is known as the return from project.
7. ***Income Method:*** Under this method, return is the income which is the excess of total revenue over and above the total expense. There are different types of income such as income before interest and tax, income before tax and after tax, etc.
8. ***Ratio Analysis Method:*** Ratio depicts the relationship between two variables in the financial statements. For example, if we calculate the gross profit ratio as $\frac{\text{Gross Profit}}{\text{Sales}} \times 100$, it measures the return by deducting the cost of goods sold from the sales figure, i.e. gross profit—measuring it as a percentage of sales. Again if we take return on capital employed, it is the net earnings of a firm as percentage of the capital employed.
   or
   All these are the commonly used measures of return.

2.8 RISK-RETURN RELATIONSHIP

Every firm has to bear risk in different forms in course of its operation. Return is the reward for bearing the risk. Risk and return are the two key concepts of a Financial Management decision. Finance manager has a vital role in the area of decision making. Every financial decision involves huge amount of risk. The objective of the firm as per the modern concept of Financial Management is the value or wealth maximisation. Value or wealth maximisation refers to maximising the market value of shares and maximising the shareholders wealth, since they are the prime owner of business. Higher return helps to maximise the market value of the shares, i.e. helps to achieve the value maximisation objective. Every Investment Decision involves risk. It is expected that higher risk would lead to higher amount of return and lower risk would lead to lower amount of return. So risk and return are directly proportional to each other whereas there exists a negative relationship between risk and competition. Higher risk in any project leads to low level of competition and, therefore, chances of higher return but in case of low-risk project there is higher and intense competition with chances of low return. Hence, any decision involving huge amount of financial investment should be taken after considering these two aspects of risk and return. In other words, every financial decision should be taken considering these two factors. Every decision involves balancing or trade-off between these two aspects. Hence, a financial manager should aim at higher return to maximise market value of shares at a minimum risk. Financial manager should try to trade-off between risk and return in line with the objective of the firm.

A representation of risk-return relationship is shown in Figure 2.3:

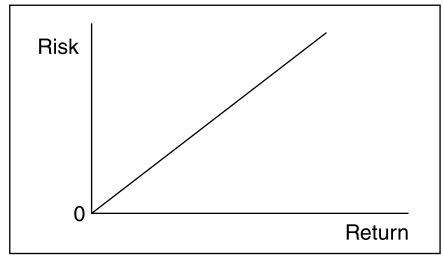


Figure 2.3 Risk-Return Relationship

2.9 RISK-RETURN TRADE-OFF

The important objective of Financial Management is value or wealth maximisation of a firm. According to the modern approach of Financial Management, the prime objective of Financial Management is value maximisation, i.e. maximising the value of the firm by maximising the market value of shares. It is simply the maximisation of Net Present Value of an action. Attainment of this objective depends on the investment, financing and dividend decision of a firm. The objective of wealth or value maximisation focuses simply on maximisation of value for shareholders through creation of wealth. Value of a firm is represented by market price

of shares. This broad-based long-term objective can be fulfilled only if the financial manager takes right financial decision at the right time. If the actual return is equal to the expected return, then it is said to be a right decision. So to achieve this, a proper balance between risk and return is an important prerequisite. The return must be proportional to the risk involved. Since finance manager would always try to maximise the value of the firm by maximising the market value of shares, so he/she usually takes those decisions where return is maximum and risk is minimum. Striking a proper balance between the two, i.e. risk and return is popularly known as the risk–return trade-off. Higher the return higher will be the market value of the shares, other factors remaining constant. So balancing the two, i.e. risk and return is of utmost importance to achieve the long-term goal of Financial Management.

2.10 FINANCIAL ENVIRONMENT

Environment refers to the surroundings in which a business operates. Financial Environment can be broadly classified into two broad categories: (i) internal environment and (ii) external environment. Internal factors are within the organisation such as management, sales policy, marketing, etc. The internal environmental factors are the controllable factors within the control of the business. External environmental factors are the factors external to the business. These factors are the uncontrollable factors, i.e. beyond the control of the business. These factors include government policy, infrastructure, economic policy, financial regulations, etc.

All these factors exert influence on the operation of business. This Financial Environment having impact on the business constitutes the external environment. The main components of Financial Environment are—financial institutions, financial markets, financial instruments, financial services and financial regulators. Figure 2.4 provides an overview of the Financial Environment components and its sub components.

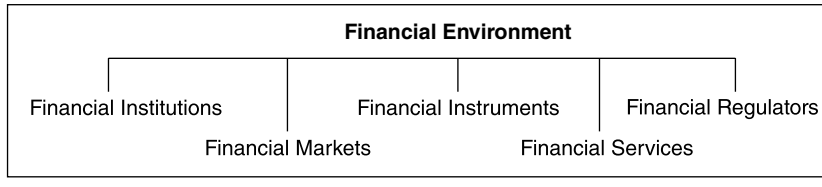


Figure 2.4 Components of Financial Environment

1. ***Financial Institutions:*** Financial institutions are those institutions which facilitate mobilisation of savings and channelise those savings into productive investment through different avenues. Financial institutions are creators as well as purveyors of credit. Financial institutions can be categorised as follows:
   - Intermediary financial institutions
   - Non-intermediary financial institutions
   - Other financial institutions

Intermediary financial institutions are of two types—banking financial intermediary institutions and non-banking financial intermediary institutions. Banking financial intermediary institutions are those institutions which accept deposits from the public and disburse loans. Banking institutions are both the creator and purveyor of credit. Commercial banks accept deposits from the public and provide loan directly. On the other hand, non-banking financial intermediary institutions are those institutions which are not the creators of credit, they function like bank but not the same as banking institutions. Few examples of non-banking financial intermediary include Life Insurance Corporation of India (LICI), General Insurance Corporation of India (GICI), non-banking financial companies (NBFCs), etc.

Non-intermediary financial institutions do not collect deposit directly from the public. These institutions only provide credit for specific purpose. These are sector-specific institutions, for example, Industrial Financial Corporation of India (IFCI), Industrial Credit and Investment Corporation of India (ICICI), National Bank for Agricultural and Rural Development (NABARD), Small Industries Development Bank of India (SIDBI), etc.

Other financial institutions are some specialised financial institutions established to facilitate smooth functioning of the financial system and to facilitate economic development for example, National Securities Depositories Ltd. (NSDL), National Securities Clearing Corporation Ltd. (NSCCL), etc.

2. ***Financial Markets:*** Financial market refers to the place where securities are transacted and financial claims are settled. In financial market the price of the securities are determined through interaction of demand and supply. Financial markets can be broadly categorised into two types—money market and capital market. Money market is a highly organised market which provides short-term loans. Short term implies a period of less than 1 year. Money market deals in short-term financial assets. Money market instruments are treasury bills, commercial bills, Commercial Papers and certificate of deposits. Call money market is also another component of money market. Capital market is also an organised financial market which provides long-term loan. Long-term loan means loan for a period of more than 1 year. In this market shares and debentures are transacted. Capital market is of two types—primary market and the secondary market. Primary market deals in new issue of securities whereas secondary market deals in existing securities.

   Again financial market can be classified into organised market and unorganised market. Organised market abides by the formal rules and regulations, whereas unorganised market does not come under the purview of any rules and regulations. Banking institutions and LICI come under the organised market whereas the money lenders and Mahajans constitute the unorganised sector.

3. ***Financial Instruments:*** Financial instruments refer to the claim of certain sum of money to be paid or received in future or a periodic payment like interest or dividend. Financial instruments can be broadly classified into—long-term, medium-term, and

short-term instruments. Long-term instruments have a maturity period of 10 years and above, medium-term instruments have maturity period of 5–10 years and short-term instruments have a maturity period of less than 1 year. Financial instruments can again be classified into two types—money market instruments and capital market instruments. Money market instruments are treasury bills, commercial bills, Commercial Papers and certificate of deposits, etc. Capital market instruments are shares, debentures and derivative instruments. Derivative instruments include forward, future, option and swap. Financial instruments have the common characteristics such as liquidity, transferability, negotiability, maturity period, reversibility, default risk, volatility, rate of return and tax status.

4. ***Financial Services:*** Financial services are the range of services offered by financial institutions operating in the financial system. Financial services facilitate raising funds from investors. Financial services facilitate borrowing, lending, investing, buying, selling, management of risk and settlement of transactions. Financial services are provided by financial intermediary institutions such as stock exchange, banks, mutual funds, etc. Financial services provided by the institutions help in bridging the gap between lack of knowledge of the investors regarding the different investment venues. Financial services can be classified into—fund-based financial services and fee-based financial services. Fund-based financial services are also known as asset-based financial services. Fund-based financial services include providing finance and contractual agreement for use of an asset. Fund-based financial services are hire purchase, leasing, factoring, venture capital financing, etc. Fee-based financial services are those services provided in lieu of fees. Fee-based financial services are portfolio consultancy, merchant banking, management of share issue, assistance regarding mergers and acquisitions, etc.
5. ***Financial Regulators:*** Financial regulators are those institutions which regulate the functioning of the all the above components of financial system, thereby, ensuring the smooth functioning of the system. Financial regulators lay down the rules, regulations which the financial institutions and markets are to abide by. Financial regulators also have close surveillance regarding the functioning of the components of financial system. In Indian financial system, the financial regulators are Reserve Bank of India (RBI) regulating the function of banks, Securities and Exchange Board of India (SEBI) regulating the function of stock exchanges, Insurance Regulatory Development Authority (IRDA) regulating the function of insurance companies, etc. All these regulatory institutions monitor the performance of the institutions and takes preventive and corrective measures if required. Organised sector comes under the purview of such regulations.

All the components of Financial Environment are interdependent and interlinked. They interact together to maintain smooth functioning of the financial system. Financial Environment is closely linked with the functioning of business. With gradual integration of India with the global market the number of financial products and services has increased, but along with that the level of risk has also increased. Exposure of Indian financial market to global market has increased the number of investment options for the investors but at the same time has

imposed threat by increasing the volatility. Hence, the need for stringent regulation of the financial institutions and markets has increased over time.

2.11 SUMMARY

- Money has time value. A rupee today is more valuable than a year hence.
- When Cash Flows occur at different points in time, it is very convenient to deal with Cash Flows using a timeline. A time line shows the timing and the amount of Cash Flow in a Cash Flow stream.
- The reasons for time preference of money are (i) preferring present consumption (ii) inflation (iii) risk (iv) investment opportunities
- Simple Interest is the rate of interest (percentage) on the actual principal amount.
- Compound Interest is the interest earned on the interest of previous year and initial principal, reinvested is termed as Compound Interest.
- Two methods of estimating Time Value of Money are: Discounting Technique or the Present Value Method and Compounding Technique or the Future Value Method
- The current value of an expected amount of money to be received at future date is known as Present Value.
- Future Value of a sum of money is the expected value of that sum of money invested after n number of years at a specific compound rate of interest.
- Annuity refers to a series of Cash Flows of equal amount over the years.
- Perpetuity is an Annuity that occurs indefinitely.
- The variation of the actual outcome from the expected outcome is defined as risk.
- Risk can be categorized into three broad categories namely, Business Risk, Non-Business Risk and Financial Risk.
- Risk can be measured by various methods: (a) Sensitivity Analysis (b) Probability Distribution and Expected Values (c) Standard Deviation (d) Coefficient of Variation (e) Decision Tree Analysis (f) Capital Asset Pricing Model (g) Alpha (h) R squared (R^2) (i) Sharpe Ratio.
- Return is the Cash Inflows arising from an investment.
- Techniques of return measurement are: (a) Return on Investment (ROI) (b) Internal Rate of Return (IRR) (c) Weighted Average Cost of Capital (d) Weighted Average Return Method (e) Profit Method (f) Cash Flow Method (g) Income Method (h) Ratio Analysis Method.
- Environment refers to the surroundings in which a business operates.
- The main components of Financial Environment are: (a) financial institutions (b) financial markets (c) financial instruments (d) financial services and (e) financial regulators.

EXERCISES

A. Short-answer Type Questions (5 Marks)

1. Explain the concept of Time Value of Money with examples.
2. Write short notes on Time Value of Money. *[C.U. B.Com. (H), 2009]*
3. State the compounding and Discounting Techniques of Time Value of Money. *[C.U. B.Com. (H), 2010]*
4. Explain with examples the Compounding Technique and the Discounting Technique in relation to the Time Value of Money. *[C.U. B.Com. (H), 2006]*
5. In which techniques time is adjusted with the value of money? *[C.U. B.Com. (H), 2014]*
6. State the importance of Time Value of Money.
7. State the reasons for time preference of money.
8. Define risk. Classify risks associated with Financial Management.
9. Discuss the relationship between risk and return. *[C.U. B.Com. (H), 2014]*
10. Briefly state the concept of risk and return. *[C.U. B.Com. (H), 2016]*
11. What are the basic components of the Financial Environment in which a firm operates? *[C.U. B.Com. (H), 2016]*
12. Discuss the basic components of the Financial Environment under which a firm has to operate. *[C.U. B.Com. (H), 2015]*

B. Essay Type Questions (10 Marks)

1. What is the importance of Time Value of Money? What is Annuity? Discuss the Financial Environment in which a firm operates.
2. What do you mean by Compounding Technique and the Discounting Technique of estimating the Time Value of Money? *[C.U. B.Com. (H), 2006, 2010]*
3. Write short notes on (a) Compounding and Discounting Techniques. *[C.U. B.Com. (H), 2012]*
4. What do you mean by Time Value of Money? Explain in brief the relevance of this concept in Financial Management. *[C.U. B.Com. (H), 2008, 2009]*
5. Explain the significance of Time Value of Money.
6. Discuss the different measures of risk.
7. Discuss the different measures of return.
8. Discuss the relationship between risk and return.
9. Discuss about the different components of Financial Environment in India.

C. Practical Problems

1. Naba is offered either to receive ₹5,000, 1 year from now or ₹7,000, 5 years from now. Which one Naba will accept and why if discount rate is 10%? Given, Present Value of ₹1 at 10% is .909 and .621 for 1st and 5th year, respectively?

   [Ans. Naba will accept the first option, because it will offer highest NPV as compare to the other option.] *[C.U. B.Com. (H), 2007]*

2. Shubha invested ₹10,000 at an interest of 12% p.a. for 3 years. Compute Future Value of investments assuming interest is compounded quarterly. [Given $FVIF_{(3,12)} = 1.4262$]

   [Ans. ₹14,262] *[C.U. B.Com. (H), 2007]*

3. From the following Cash Flow streams, which Cash Flow would you recommend and why?

End of Year	Stream-A (₹)	Stream-B (₹)	Stream-C (₹)
1	200	500	350
2	300	400	350
3	400	300	350
4	500	200	350

   It is given that Present Value of ₹1 at 10% to be received at the end of each year is given as follows:

Year	1	2	3	4
P.V. Factor	0.91	0.83	0.75	0.68

   [Ans. As the Present Value of Cash Flow of stream B is the highest (i.e. ₹1,148), it should be recommended] *[C.U. B.Com. (H), 2009]*

4. A sum of ₹5,000 is invested for 2 years at 10% interest rate compounded biannually. Find the maturity amount. **[Ans. ₹6,077.53]** *[C.U. B.Com. (H), 2011]*

5. You want to make a gift of ₹1,00,000 to one of your friends after 4 years from now. What amount of money you need to invest every year starting from the beginning of the first year so that you can get the required amount after 4 years? The normal rate of return is 10%. **[Ans. ₹21,547 (approx.)]** *[C.U. B.Com. (H), 2013]*

6. A trader deposited ₹4,00,000 in bank at the rate of 8% p.a. Compound Interest for 5 years. How much will he get at the end of 5 years? (Compounded value of ₹1 for 5 years @ 8% p.a. = 1.469) **[Ans. ₹5,87,600]** *[C.U. B.Com. (H), 2013]*

7. If the loan amount is ₹10 lakhs, tenure is 3 years and rate of interest is 12%, find out equated annual instalment. ($PVIFA_{12\%, 3} = 2.40$)]

   [Ans. ₹4,16,667] *[C.U. B.Com. (H), 2014]*

8. Mrs. Sunita has ₹50,000 at her disposal. She wants to get her money doubled.
   (a) If interest is compounded at the rate of 12% p. a. annually, then how long she has to wait to fulfil her desire?
   (b) If she is ready not to wait for more than 4 years then what should be the approximate rate of Compound Interest?

   [Ans. 6 years, 18.9%] *[C.U. B.Com. (H), 2014]*

9. Mrs. Dasgupta has two options at the time of her investment:
   Option A: Receive ₹10,00,000 as on the date of retirement.
   Option B: Receive ₹1,00,000 as an annual pension over 20 years.
   If the discount rate is 12%, which option should she choose?
   [Present Value of rupee @ 12% over 20 years is 7.469]
   [Ans. Option A since P.V. of annual pension i.e. in option B, i.e. ₹7,46,900 is less than option A receiving ₹10,00,000 on the date of retirement] *[C.U. B.Com. (H), 2014]*

10. Mr. Bhattacharya borrows ₹15,00,000 to buy a bungalow in Rajarhat. He wants to repay this amount in 15 equal annual instalments. The loan has been taken from a commercial bank which charges interest at the rate of 10% p. a. What is the amount of each annual instalment? [$PVIF_{10, 15} = 7.606$] **[Ans. ₹1,97,212.73]** *[C.U. B.Com. (H), 2015]*

11. You are approached by an insurance agent to buy an Annuity of ₹50,000 for 6 years starting from the beginning of first year. How much you should be ready to pay now for this Annuity if you consider discount factor of 8% per annum?

    [Ans. ₹6,310.90] *[C.U. B.Com. (H), 2015]*

12. Mr. X invested ₹50,000 at an interest of 12% p. a. for 3 years. You are required to compute Future Value of investment assuming interest is compounded quarterly.

    [Ans. ₹71,288.04] *[C.U. B.Com. (H), 2015]*

13. Amal wants to invest ₹5,000 for 4 years. He invests the amount at 12% per annum Compound Interest, interest accruing at the end of each quarter. What amount will he receive after 4 years? **[Ans. ₹8,023.53]** *[C.U. B.Com. (H), 2016]*

14. Mr. Chiko is offered the following Cash Inflows:

End of Year	1	2	3	4	5
Amount (₹)	15,000	20,000	32,000	20,000	18,000

    Calculate the amount receivable by Mr. Chiko if he wants the whole amount at the end of 4^{th} year. (Applicable interest rate is 10% p. a. compounded annually).

    [Ans. ₹99,365] *[C.U. B.Com. (H), 2016]*

15. Mr. I deposited ₹6,00,000 in a commercial bank. The bank offers 10% interest on deposits. Calculate the effective rate of interest if compounding is done (i) monthly, (ii) quarterly, (iii) half-yearly and (iv) yearly.

    [Ans. (i) 10.41%, (ii) 10.38%, (iii) 10.25%, (iv) 10%]

16. Calculate the Future Value of ₹90,000 invested now, after 8 years if interest at the rate of 12% is compounded quarterly and semi-annually. **[Ans. ₹2,31,757.45, ₹2,28,631.65]**
17. Mr. F invested the following amount for consecutive 4 years at an interest rate of 8% p.a.

End of Year	1	2	3	4
Amount (₹)	36,500	28,430	19,800	14,200

Calculate how much he will receive at the end of 4th year. **[Ans. 1,14,724.24]**

18. Mr. U has received ₹40,00,000 on his retirement. He wants to invest for 5 years and has two options of fixed deposit (i) 9.50% interest p.a. compounded half yearly and (ii) 11% interest compounded quarterly. Which option he should choose and why?
[Ans. Option (ii), since higher FV = ₹68,81,713.72 and Effective ROI= 11.46%]
19. X Ltd. has 10% debentures of ₹20,00,000. The firm wants to redeem the debentures after 8 years and creates one Sinking Fund for that. Sinking Fund investments earns interest at the rate of 15% per annum. What annual payment should the firm make in the Sinking Fund to get the desired amount at the time of redemption? **[Ans. 1,45,700.18]**
20. Mr. T has two options: (a) to receive a lump sum of ₹15,50,000 at the time of retirement and (b) to receive ₹15,000 monthly as pension, for 12 years. If the rate of interest is 8% p.a., which option he should choose?
[Ans. Option (a), since PV of option (b) ₹13,56,494.04]
21. Mr. D deposited the following amount in a bank at the end of each year for 8 years, which provides interest at the rate of 10% p.a. Find the compounded value of the Cash Flows at the end of 8th year.

End of Year	1	2	3	4–7	8
Amount Deposited (₹)	2,500	3,000	4,000	5,000	6,500

[Ans. 48,653.97]

22. Find the effective rate of interest, if the nominal rate of interest is 12.50% p.a. compounded monthly for 2 years. **[Ans. 13.24%]**
23. Mr. W deposited the following amount for consecutive 5 years at the beginning of each year in a bank. The bank provides interest at the rate of 12% per annum. Find how much he will receive at the end of 5th year.

Beginning of Year	1	2	3	4	5
Amount Deposited (₹)	18,000	15,000	14,000	10,000	7,000

[Ans. ₹95, 377.93]

24. Find the Present Value of the Cash Flows for 10 years at a discount rate of 14%.

Year	1	2	3-7	8	9	10
Cash Flows (₹)	5,000	6,200	7,100	8,000	8,900	10,000

[Ans. 36,150.98]

25. Which option to choose (a) an Annuity of ₹18,000 beginning after 2 year to be continued for 7 years at an interest rate of 7% p.a. and (b) an Annuity of ₹12,000 beginning instantly to be continued for 6 years at an interest rate of 6% p.a.
[Ans. option (a) since PV is higher ₹73,803.55]
26. Mr. R invested an amount of ₹1,20,000 which after 2 years will become ₹1,50,000. Find the rate of Compound Interest. **[Ans. 11.803%]**
27. Mr. F has taken a loan from bank amounting to ₹45,56,500. The bank charges interest at the rate of 11% p.a. The loan is taken for 12 years. Mr. F promises to pay the loan along with interest in 12 equal annual instalments. Find the amount of each instalment. Given $PVIFA_{11\%, 12} = 6.492$. **[Ans. 7,01,863.83]**
28. Mr. Z has two options: (a) Investment of a fixed amount of ₹19,000 at an interest of 9% p.a. at the end of each year for 8 years and (b) Investment of ₹15,000 at an interest of 9% p.a at the beginning of each year for 8 years. Find the Future Value of both the options. **[Ans. option (a) FVA = ₹2,09,541.00 and option (b) FVA= ₹1,80,315.55]**
29. Compute the Present Value of Perpetuity of ₹2,25,000 per year at a discount rate of 15%.
[Ans. ₹15,00,000]
30. Mr. I took a loan of ₹5,25,000 from bank at an interest of 9% p.a. for 4 years. The amount is to be repaid in equal instalments for 4 years. Find the amount of each monthly instalment. **[Ans. 13,064.65]**
31. G Ltd. issued debentures amounting ₹4,50,000. The debentures are redeemable after 8 years from now. Find the amount G Ltd. will have to accumulate every year at an interest rate of 12% p.a. so that it can get the said amount after 8 years at the time of redemption. **[Ans. ₹36,586.28]**
32. Compute the Present Value of an Annuity of ₹1,80,000 for 9 years at a discount rate of 11%. Given $PVIFA_{11, 9} = 5.537$ **[Ans. ₹9,96,660]**
33. Mr. Y has decided to purchase a car costing ₹8,25,500 after 3 years. He wants to save an amount and deposit that in a financial institution yearly, to accumulate the said amount after 3 years. The financial institution pays an interest on the deposit at the rate of 8.5% p.a. How much Mr. Y would save and deposit yearly, so that along with interest earned, it accumulates the required amount after 3 years? **[Ans. ₹2,52,894.88]**
34. Mr. G decided to withdraw an equal amount of ₹50,000 every year from his bank deposit, consecutively for 10 years. The interest rate at present date is 5% p.a. How much he should deposit in the bank now? **[Ans. ₹3,86,086.75]**
35. The Present Value of the following stream of Cash Flows at the end of 4th year is ₹1,200 at a discount rate of 9%. Find the amount of Cash Flow for the 3rd year.

Year	1	2	3	4
Cash Flows (₹)	500	300	?	500

Given PV of ₹1 at 9% discount rate for 1st year = 0.917, 2nd year = 0.842, 3rd year = 0.772 and 4th year = 0.708 **[Ans. 628]**

36. Mr. F deposited the following amount in a bank at the end of each year for 6 years, which provides interest at the rate of 7% p.a. Find the amount to be received at the end of 4th year, if he wants the entire amount by end of 4th year.

End of Year	1	2	3	4	5	6
Amount Deposited (₹)	1,200	1,350	1,500	1,800	2,100	2,300

[Ans. ₹12,450.968]

37. Mr. N deposited ₹10,000 every year in his recurring deposit account, for 20 years at the end of each year, at an interest of 8% p.a. Find the Future Value of the Annuity at the end of 20th year. Given FVIFA $_{r, n}$ = 45.762 **[Ans. 4,57,620]**

3 CHAPTER Sources of Finance and Cost of Capital

CHAPTER OUTLINE

3.1 Sources of Finance
3.2 Financial Needs of a Business
3.3 Classification of Sources of Finance
3.4 Long-Term Sources of Finance
3.5 Short-Term Sources of Finance
3.6 Cost of Capital—Concept and Definition
3.7 Importance/Significance/Relevance of Cost of Capital
3.8 Factors Determining Cost of Capital
3.9 Different Types of Cost of Capital
3.10 Determination of Cost of Capital
3.11 Weighted Average Cost of Capital or Overall Cost of Capital
3.12 Marginal Cost of Capital
3.13 Additional Solved Problems
3.14 Summary

3.1 SOURCES OF FINANCE

Sources of finance signify the ways for collecting various terms of finance to the industrial concern. Sources of finance state how the companies mobilise finance for their requirements. The companies could be the existing ones or the new ones which need some amount of finance to meet the long-term and short-term requirements such as purchasing of fixed assets, construction of office building, purchase of raw materials and day-to-day expenses, etc.

3.2 FINANCIAL NEEDS OF A BUSINESS

1. ***Long-term financial needs:*** Long-term finances are required for a period exceeding 5–10 years. All fixed investments in plant, machinery, land, buildings are considered as long-term financial needs.

2. ***Medium-term financial needs:*** Medium-term finances are required for a period between 1 year and 5 years. Identification of medium-term financial needs is arbitrary. Sometimes, long-term requirements for which long-term funds cannot be arranged immediately may be financed from medium-term sources, thus generating medium-term financial needs.
3. ***Short-term financial needs:*** It is related to investment in Current Assets such as stock, debtors, cash, etc. Investment in these assets is called Working Capital. The requirement of Working Capital depends upon a number of factors and may differ from industry to industry. They are usually required for a period up to 1 year.

3.3 CLASSIFICATION OF SOURCES OF FINANCE

Sources of finance may be classified under various categories according to the following important heads:

3.3.1 Based on the Period

Sources of finance may be classified under various categories based on the period.

1. ***Long-term sources:*** When the finance is mobilised with large amount and the repayable amount over a period is more than 5 years, it may be considered as long-term source. Share capital, issue of debenture, long-term loans from financial institutions and commercial banks fall under this category of source of finance. Long-term source of finance needs to meet the capital expenditure of the firms such as purchase of fixed assets, land and buildings, etc. Long-term sources of finance include:
   - Equity Shares
   - Preference Shares
   - Debenture
   - Long-term Loans
   - Fixed Deposits
2. ***Medium and Short-term sources:*** Apart from the long-term sources of finance, firms can generate finance with the help of short-term sources such as loans and advances from commercial banks, moneylenders, etc. Short-term source of finance needs to meet the operational expenditure of the business concern. Short-term source of finance include:
   - Bank Credit
   - Customer Advances
   - Trade Credit
   - Factoring
   - Public Deposits
   - Money Market Instruments

3.3.2 Based on Ownership

Based on ownership, capital may be of two types. These are:
Owned Capital: It includes:

- Shares capital,
- Retained Earnings

Borrowed capital: It includes:

- Debenture
- Bonds
- Public Deposits
- Loans from Bank and Financial Institutions

3.3.3 Based on Sources of Generation

Sources of finance may be classified into various categories based on the source of their generation.

Internal source: It includes:

- Retained Earnings
- Depreciation Funds
- Surplus

External sources: It includes:

- Share Capital
- Debenture
- Public Deposits
- Loans from Banks and Financial institutions

3.3.4 Based on the Mode of Finance

Security finance: It includes:

- Share Capital
- Debenture

Retained earnings: It includes:

- Retained Earnings
- Depreciation Funds

Loan finance: It includes:

- Long-Term Loans from Financial Institutions
- Short-Term Loans from Commercial Banks

3.4 LONG-TERM SOURCES OF FINANCE

3.4.1 Equity Share

Equity shares (or ordinary shares or common shares) are a very important source of capital. Equity shares represent the ownership capital of the firm. The holders of equity shares also known as the equity shareholders are in fact the owners of the company. They enjoy an advantageous

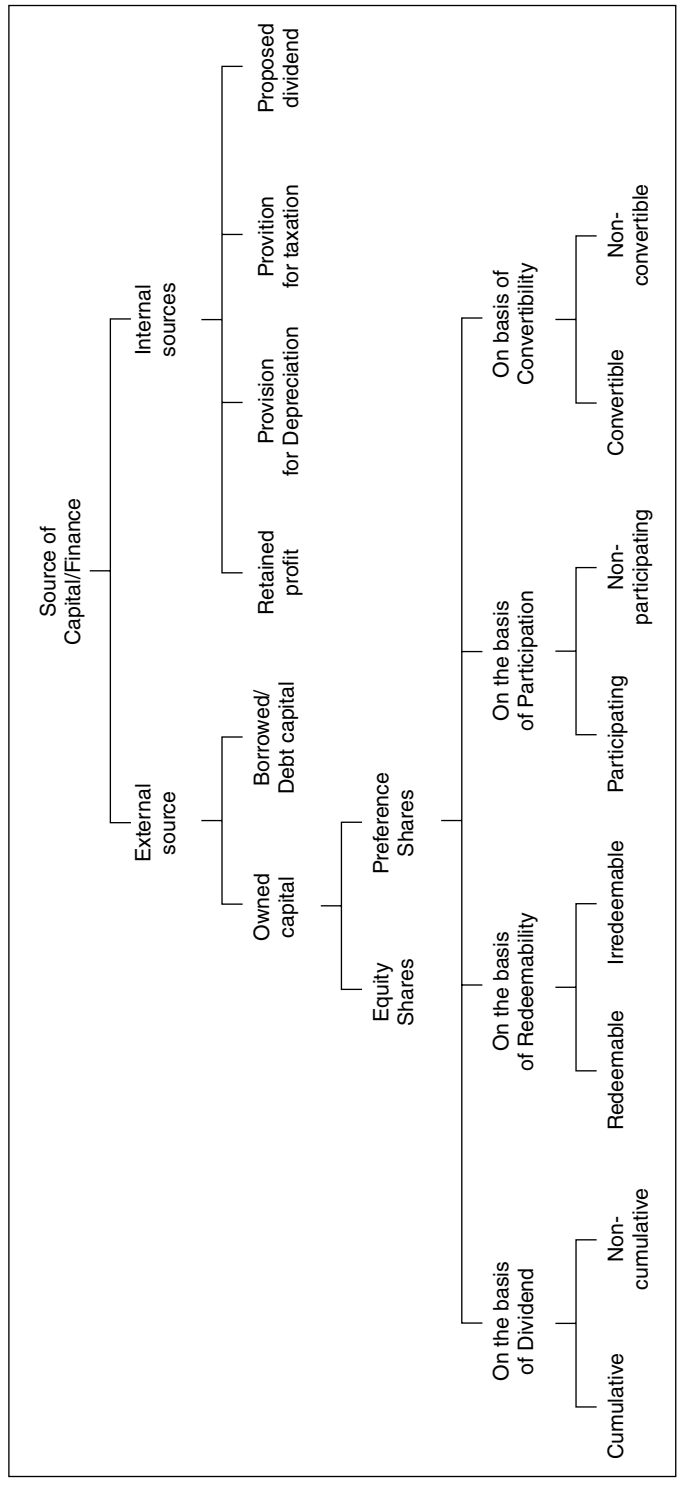


Figure 3.1 Source of Capital/Finance

position over other providers of capital in respect of control and profitability. They enjoy voting rights in the meetings and thus have a control over the workings of the company. But as the owners of the company they also have to bear certain risks. They get a share of profit (known as dividend) after payments have been made to all other providers of capital including the preference shareholders. The rate of dividend is not fixed; however, in the years when the company makes higher profit more dividend is paid and vice versa. Also in the event of winding up of the company the capital is returned after the claims of all other creditors and preference shareholders have been met. If the value of assets is insufficient then the claim of equity shareholders may remain unpaid in case of liquidation. In spite of the risks there is a high demand of the shares of profitable firms.

A company can raise equity share capital by issuing fresh shares to the public, or through right issue, or by issuing bonus shares or through issue of sweat equity shares.

Right issue means the issue of shares to the existing shareholders on a pro-rata basis. Under Section 62(1) of the Companies Act, 2013 where at any time a company having share capital proposes to increase its subscribed capital by issue of further shares that may be offered to persons who at the date of the offer are holders of equity shares of the company in proportion, as nearly as circumstances admit, to the paid-up share capital on those shares. The objective of such an issue is to ensure an equitable distribution of shares and not to affect the proportion of voting rights due to issue of fresh shares. This right enjoyed by the shareholders is known as pre-emptive right. The shareholders can get only one pre-emptive offer, which if declined once cannot be accepted later on. The shareholders can exercise their rights or may renounce the same in favour of any other person who may not be a member of the company. Generally the issue price of such shares is fixed much below the existing market price.

Bonus shares may be issued by a company out of (a) its free reserves, (b) the securities premium account or (c) the capital redemption reserve account according to Section 63(1) of the Companies Act, 2013. However, bonus shares cannot be issued in lieu of dividend. No issue of bonus shares can be made by capitalising the reserves created by revaluation of assets. They are issued to the existing shareholders free of cost in a proportion only to the fully paid-up equity shares. Bonus issue cannot be made to partly paid shares until they are made fully paid-up. At any time the total amount of bonus shares issued out of free reserves shall not exceed the total amount of paid-up Equity Capital. But issue of bonus shares might have a negative impact on the future earnings per share, unless the earnings increase, as the number of equity shares increases.

Sweat equity shares refers to such shares which are issued by a company to its directors or employees at a discount or for consideration other than cash for providing their know-how or making available rights in the nature of intellectual property rights or value additions, by whatever name called. Such issue is to be authorised by a special resolution passed by the company and such an issue cannot be made within 1 year of the commencement of business by the company.

Features of Equity Shares

Some of the features of equity shares are given as follows:

1. ***Ownership and control:*** Equity shareholders are the real owners of the company. Though the major decisions are made by the Board of Directors they have indirect control over the affairs of the company.
2. ***Voting rights:*** The equity shareholders can exercise their control through the voting right in the meetings. Thus, they have a say in taking a number of important decisions such as election of the directors, changes in memorandum of association, etc. The shareholders have votes equal to the number of shares held by them.
3. ***Limited liability:*** Another important feature of equity shares which make it even more attractive investment option is limited liability. The liability of an equity shareholder is limited to the value of shares subscribed by him/her. If the shareholder has already paid the full price of shares purchased then he/she cannot be held liable to contribute anything more in the event of liquidation.
4. ***Dividend:*** The portion of the earnings of the company which the shareholders receive after deduction of interest, tax and Preference Dividend (PD) is known as dividend. The rate of dividend is not fixed as the equity shareholders have residual claim over the earnings of the company. The payment of dividend depends on the discretion of the management as some portion of the residual earnings may also be retained by the management for future developments.
5. ***Claim on assets:*** In the event of liquidation of the company, the equity shareholders have residual claim on the assets of the company. After payment is made to the other claimants such as creditors, preference shareholders, etc., if anything left, it is received by the equity shareholders. If the value of assets is insufficient to fulfil the claims of the other claimants then the claims of the equity shareholders remains unpaid.
6. ***Pre-emptive right:*** The equity shareholders of a company enjoy pre-emptive right which implies that they are given the first opportunity to subscribe to issue of additional shares on pro-rata basis. This is also known as *rights issue*. The objective of such an issue is to ensure an equitable distribution of shares and not to affect the proportion of voting rights due to issue of fresh shares.
7. ***Rules for issue:*** The issue of shares is made strictly according to the Companies Act and SEBI guidelines. The shares may be issued at par, at a premium or at a discount.
8. ***Maturity:*** The equity shares do not have a maturity date; hence, it is a permanent source of fund.

Advantages of Equity Shares

Some of the important advantages of equity shares may be identified as follows:

1. ***No mandatory payment:*** Issue of equity shares does not impose any financial burden on the company as the company is not legally obliged to pay dividends in the years of loss.

Even in the years of profit, the company can retain a portion of the residual earnings for further developments.

2. ***Ownership:*** Equity shareholders are the real owners of the company.
3. ***Control:*** The equity shareholders have indirect control over the affairs of the company.
4. ***Permanent capital:*** Since equity shares do not mature, it is a permanent source of capital.
5. ***Limited liability:*** The liability of the equity shareholders are limited to the extent of the face value of the shares held by them. In the event of liquidation the equity shareholders need not pay anything if their shares are already paid in full.
6. ***Corporate flexibility:*** The new equity share capital increases the corporate flexibility from the point of view of Capital Structure planning. One such strategy may be to reduce the amount of debt financing out of the funds received from the issue of Equity Capital.
7. ***Raising funds:*** Issue of equity shares is the most important source of raising funds for a new company.
8. ***Pre-emptive right:*** The equity shareholders enjoy pre-emptive right which enables the shareholders to receive additional shares offered by the company on pro-rata basis before they are offered to the public.
9. ***Bonus shares:*** The equity shareholders get the benefit of receiving bonus shares without any consideration, i.e. free of cost.
10. ***Ease of selling:*** Equity shareholders can sell off their shares in the capital market and get back their invested amount easily.

Disadvantages of Equity Shares

In spite of being such an important source of capital, Equity Capital has some disadvantages which are listed as follows:

1. ***No stability in income:*** Since the rate of dividend is not fixed, the equity shareholders do not have a stable income from the equity shares.
2. ***High cost:*** The equity share capital has the highest specific Cost of Capital among all the sources. So the Rate of Return to be paid to the equity shareholders is generally higher than the return paid to others investors.
3. ***Dilution of ownership:*** Excessive issue of equity shares can dilute the ownership and control of the company.
4. ***No flexibility:*** Since equity share capital is permanent in nature, it reduces the flexibility of the Capital Structure.
5. ***Trading on Equity:*** Issue of more equity shares reduces the advantage the company can get from the use of cheaper source of Debt Capital for magnifying the return of equity shareholders.
6. ***Risk:*** From the equity shareholders viewpoint, investment in equity shares can prove risky as the price of equity shares are fluctuating continuously.

3.4.2 Preference Shares

Preference shareholders, as the name suggests, enjoy some preferential rights over the equity shareholders. The preferential rights are in respect of: (a) preference with payment of dividend and (b) preference with reference to repayment of capital in case of liquidation of the company. Preference Share Capital represents ownership interest and not liability of the company. It has characteristics of both debt and Equity Capital, thus, it is actually hybrid in nature. The characteristics similar to Debt Capital are that they do not enjoy voting rights, fixed rate of dividend, priority over equity share capital, etc. The characteristics which are similar to Equity Capital are that they are also the owners of the company (though not in true sense), payment of dividend is made out of distributable profits, etc. As per Companies Act, 2013, a company can issue preference shares which are to be redeemed within 20 years from the date of issue if not otherwise mentioned. Payment of dividend is not compulsory for preference shares though if the company decides to pay dividend to equity shareholders then dividend due to preference shareholders is to be made first in full.

Classification of Preference Shares

1. ***Cumulative and non-cumulative preference shares:*** In case of insufficient profits in any year, the preference dividend goes on accumulating till it is paid for the cumulative preference shares. The arrear dividend is to be paid in full in the year in which the company earns sufficient amount of profits. In case of non-cumulative preference shares, the arrear dividend cannot be claimed by the shareholders if the payment is not made in the relevant year. The holders of such shares have a preferential current dividend right.
2. ***Redeemable and irredeemable preference shares:*** Redeemable preference shares are redeemable during the lifetime of the company whereas the irredeemable preference shares are to be redeemed only in the event of winding up of the company. However, as per the Companies Act, 2013, a company can issue only such preference shares which are redeemable within 20 years from the date of issue if not otherwise mentioned.
3. ***Convertible and non-convertible preference shares:*** Convertible preference shares are those which have the right to get themselves converted into equity shares after a stipulated period of time and as per the agreed terms. Non-convertible preference shares are the ones which do not enjoy any such right.
4. ***Participating and non-participating preference shares:*** Participating preference shares are those shares which have the right to participate in the surplus profit of the company. In this case, the preference shareholders are paid at the fixed rate, then out of the remaining profit the equity shareholders are paid a reasonable amount of dividend, and then if any profit remains the preference shareholders can participate in that profit. Similar is the case for assets in the event of liquidation of the company. However, such mode of division is mentioned in the Articles of Association. Non-participating preference shares do not have such rights, they get dividend only at a fixed rate.

Features of Preference Shares

Some of the important features of preference shares are as follows:

1. ***Ownership:*** Though the preference shareholders do not enjoy controlling power in the affairs of the company they form a part of ownership of the company.
2. ***Characteristics of both debt and equity:*** Preference shares are a mixture of both Debt Capital and Equity Capital. They have some characteristics of both Debt Capital and Equity Capital.
3. ***Dividend:*** The preference shareholders are paid dividend at a fixed rate. Such a rate of dividend is declared at the time of issue of shares. The dividend of the preference shares accumulates in the year of insufficient profits unless and otherwise mentioned.
4. ***Claim on income:*** The dividends on preference shares are to be paid before payment of dividend to equity shareholders are made; hence, the preference shares have a superior claim over the equity shares.
5. ***Claim on assets:*** Similar to the dividends, the preference shareholders also enjoy a superior right over the assets, in the event of liquidation of the company, over the equity share capital.
6. ***Redeemable:*** The preference shares are redeemable in nature. As per Companies Act, 2013, a company can issue only such preference shares which are redeemable within 20 years from the date of issue if not otherwise mentioned. Now the companies cannot issue irredeemable preference shares.

Advantages of Preference Shares

Preference shares have several advantages; some of the important ones have been highlighted as follows:

1. ***Less costly:*** Preference shares, as an instrument of financing, are less costly compared to equity share capital as they are paid dividend on a pre-fixed moderate rate of dividend.
2. ***Rate of dividend:*** The rate of dividend enjoyed by the preference shareholders is fixed. The payment of dividend is not mandatory even in the years of sufficient profits but if the equity shareholders are paid dividend then the payment of dividend to preference shareholders are to be made in full.
3. ***Preferential rights:*** The preference shareholders enjoy a preferential right over the equity shareholders in reference to payment of dividend and the repayment of capital in the event of liquidation of the company.
4. ***Hedge against inflation:*** The preference share financing provides hedge against inflation as the fixed financial commitment is unaffected by the inflation.
5. ***Less risk:*** The investors who do not want to take risk and still become the owners of the company can invest in preference shares as the return on the investment is fixed.
6. ***Control:*** Since the preference shareholders do not have voting rights, the company can retain more control on the affairs of the company.

7. ***Refund:*** The preference shares issued are redeemable in nature; hence, the preference shareholders are assured that they will get back the invested amount of capital after a definite period of time.
8. ***Flexibility:*** Since the Preference Share Capital is redeemed after a specific period of time, it ensures flexibility of the Capital Structure of the company.
9. ***No charge on assets:*** Long-term capital can be raised by the companies by issuing preference shares without creating any charge on assets.
10. ***Trading on Equity:*** The advantage of Trading on Equity can be taken by the company by issue of preference shares.

Disadvantages of Preference Shares

Some of the important limitations of preference shares are as follows:

1. ***Cost of capital:*** The issue of preference shares is costlier than the issue of debt as the rate of dividend is higher than the rate of interest.
2. ***Compulsory redemption:*** Since the Preference Share Capital has to be redeemed within 20 years from the date of issue, it means that there will be a substantial Cash Outflow of the company.
3. ***No participation in management:*** The preference shareholders do not enjoy voting rights in the company; hence, they do not have a voice in the affairs of the company.
4. ***Affects the value of the firm:*** Though there is no compulsion to pay preference dividend yet the non-payment may adversely affect the market price of the equity shares, thus, affecting the value of the firm.
5. ***Fixed rate of dividend:*** Since the rate of dividend is fixed, the preference shareholders have to remain satisfied with pre-fixed moderate rate of dividend.
6. ***Decrease in EPS for equity shareholders:*** If the company cannot earn a return at least equal to the cost of Preference Share Capital, it may result in decrease in earnings per share (EPS) for the equity shareholders.

3.4.3 Debentures

According to Section 2(30) of the Companies Act, *debentures* include debenture stock, bonds or any other instrument of a company evidencing a debt, whether or not constituting a charge on the assets of the company. A company can raise long-term capital by issue of debentures. It is actually borrowed capital dissimilar to the ones which we already discussed in the previous sections, i.e. equity share capital and Preference Share Capital, which represent owned capital. A debenture holder is a creditor of the company. They get an interest at a fixed rate and payment has to be made to them even in the years when the company does not make any profit.

Classification of Debentures

1. ***Bearer or unregistered debentures:*** The names of unregistered debenture holders are not recorded in the books of the company since they are transferable from one person to

another by mere delivery. These debentures are similar to bearer cheques and currency notes; they are also payable to the bearer. Anyone who possesses this type of debentures is entitled to interest at a stipulated rate. The bearer is entitled to receive the principal sum on maturity, even though the bearer might not be the actual owner.

2. ***Registered debentures:*** The names and addresses of registered debenture holders are registered with the company. These debentures are not transferrable by delivery. The debentures are to be transferred by execution of regular transfer deed and the transfer must be registered by the company. The interest payment is made to the registered holder and the registered holder receives the principal sum on maturity.
3. ***Secured debentures:*** Secured debentures are secured by a charge on some property or assets of the company. In the event of liquidation of the company, the holders of these debentures can get back the principal amount and the unpaid amount of interest out of the proceeds from the property or assets mortgaged.
4. ***Simple or naked or unsecured debentures:*** Simple or naked or unsecured type of debentures do not have any charge on assets of the company. This means that no asset is to be mortgaged to raise loan by issuing a debenture paper. At the time of winding up of the company the holders of these debentures are treated as ordinary creditors of the company and do not enjoy any priority over the ordinary creditors.
5. ***Redeemable debentures:*** Redeemable debentures are to be repaid after the expiry of a specified period. Generally the debentures are redeemable in nature unless otherwise stated.
6. ***Irredeemable or perpetual debentures:*** Perpetual debentures are irredeemable in nature; they are not repayable unless the company is liquidated. The debenture holders cannot demand payment of principal amount as long as the company is a going concern and does not default in payment of interest. Hence, there is no fixed time within which the company is bound to pay.
7. ***Convertible debentures:*** Convertible debentures give an option to its holders to convert them into preference shares or equity shares after a certain period. The terms of conversion are mentioned in the Articles of Association. The conversion may take place at a given ratio. After the holders exercise the right of conversion they no longer remain the creditors of the company instead become an owner or member of the company. Convertible debentures may be of two types—Fully Convertible Debentures (FCD) and Partly Convertible Debentures (PCD). When the full amount of debentures are converted into shares after the expiry of a specified period then it is called fully convertible debentures. When a part of the total amount of debentures is converted into shares at the end of a specified period and the remaining amount continue to remain debentures it is called partly convertible debentures. The portion of PCD which is not converted is redeemed to the holders after the expiry of a specified period.
8. ***Non-convertible debentures:*** Non-convertible debentures do not enjoy the option of conversion to equity shares. Such debenture holders are repaid after the lapse of a specified time. The debenture holders do not get an option of converting their status from

a creditor to the owners of the company. All debentures are generally non-convertible in nature.

9. ***Mortgage debentures:*** Mortgage debentures can be of two types—first mortgage debentures and second mortgage debentures. The first mortgage debentures are those which get priority of redemption at the time of winding up of the company. The second mortgage debentures also known as ordinary debentures and are paid after the redemption of the first mortgage debentures.
10. ***Right debentures:*** These debentures are issued to the existing Indian shareholders in the proportion of their shareholdings. They are redeemed after the expiry of a specific period as stated in the offer document.

Features of Debentures

Some of the important features of debentures are highlighted as follows:

1. ***Credit instrument:*** The debenture holder is actually the creditor of the company. They are entitled to receive payment on interest and principal sum at the end of a specified period.
2. ***Trustee:*** A trustee is usually a bank or financial institution or a firm that looks over the interest of the debenture holders and is appointed at the time of issue of debenture.
3. ***Interest rate:*** The debenture holders receive interest at a fixed rate on a periodical basis. The rate of interest is also known as the *coupon rate*.
4. ***Maturity:*** The debentures holders are redeemed or repaid at the expiry of a specified period as mentioned at the time of the issue.
5. ***Collateral:*** The debenture may or may not be secured by the charge of an asset and depending on this the debenture may be a secured or unsecured debenture.
6. ***Claim on income:*** The debenture holders enjoy a preferential right in reference to claim on income over preference and equity shareholders. The interest payment to the debenture holders are to be made before payment is made to the preference shareholders or equity shareholders.
7. ***Priority in liquidation:*** In the event of liquidation of the company, the debenture holders enjoy a priority over the preference or equity shareholders. Generally, the debentures carry a charge on the asset.
8. ***Voting rights and control:*** The Companies Act strictly prohibits the debenture holders from receiving any voting rights in the company meetings. Hence, they do not have any control over the management affairs of the company; they are treated as a creditor of the company.
9. ***Face value:*** Every debenture has a face value and a maturity value.

Advantages of Debentures

The debentures have certain advantages, some of which are discussed as follows:

1. ***Fixed income:*** The debenture holders enjoy a fixed income in the form of interest periodically.

2. ***Less risk:*** Investment in debentures is considered a less risky option as the investors can get interest at a fixed rate on a periodical basis.
3. ***Less costly:*** From the company's viewpoint the debentures are less costly option of raising finance. Though the rate of interest is fixed, it is lower than the rate of dividend paid on shares.
4. ***Retention of control:*** The company can retain control over the management of company affairs as the debenture holders do not enjoy voting rights in the meetings of the company.
5. ***Priority in liquidation:*** Since the debenture holders are the creditors of the company they have a priority over the preference and equity shareholders in respect of the claim on assets in the event of liquidation.
6. ***Interest protection:*** The trustees appointed at the time of issue of debentures to the public protect the interest of the debenture holders.
7. ***Flexibility:*** Since the companies can redeem the debentures after the expiry of the time specified at the time of issue of the debentures, it makes the Capital Structure flexible.
8. ***Liquidity:*** Debentures are liquid investment as the holders can at any time sell the debentures. They can also get loans from financial institutions by mortgaging the debenture.
9. ***Ownership:*** Though the debenture holders are the creditors of the company, the holders of convertible debentures get the opportunity to become the owners of the company when their debentures are converted into shares.

Disadvantages of Debentures

Some of the important disadvantages of the debentures are as follows:

1. ***No voting rights and control:*** The debenture holders do not enjoy any voting rights in the meetings of the company. Hence, they do not have any control over the workings of the company.
2. ***Fixed rate of interest:*** Since the rate of interest is fixed the debenture holders do not get an opportunity to participate in surplus profits.
3. ***Permanent liability:*** The company has to pay the interest to the debenture holders even in the years of no profit, which creates a permanent liability for the company.
4. ***Huge outflow:*** At the time of maturity, the company suffers a huge outflow of cash which can hamper the cash position of the company.
5. ***Liquidation:*** If the company fails to pay the interest or the principal amount at the time of repayment, the company may be forced to go into liquidation.

3.4.4 Institutional Financing

Institutional financing refers to the process of raising funds by the companies from various financial institutions. The financial institutions generally provide loans to the companies for medium-term (i.e. period ranging from 1 year to 5 years) and long-term periods (i.e. beyond 5 years). It is also called *Term Financing*. These loan amounts can be utilised by the companies

for expansion, modernisation and diversification purposes. The loans can also be used to repay the Preference Share Capital, debentures and bonds. An interest has to be paid on the loan amount to the financial institutions.

Institutions Proving Finance

Some of the important financial institutions which provide institutional financing are as follows:

1. ***Industrial Finance Corporation of India (IFCI):*** IFCI was the first financial institution set up in India. It was established in July 1948 by passing a special Act in the Parliament. The main objective behind setting up of this institution was to provide medium-term and long-term funds to the industries. The functions performed by IFCI include providing financial assistance to industries, act as an underwriter, to provide technical advice, etc.
2. ***State Financial Corporations (SFCs):*** Since IFCI was not able to provide funds to small and medium industries, State Financial Corporations Act was passed in the Parliament that gave power to the State Governments to set up financing corporations. The first SFC to be set up was Punjab State Financial Corporation by Punjab State Government in the year 1953. At present, 18 SFCs are operating in the country.
3. ***National Industrial Development Corporation (NIDC):*** NIDC was set up in 1954 as a statutory corporation. The major objectives for setting up NIDC were to formulate and execute projects for setting up new industries, for helping in modernisation of the industries, to provide advice and consultancy services, etc.
4. ***Industrial Credit and Investment Corporation of India (ICICI):*** ICICI was set up in January 1955 with the support from Government of India, advice of World Bank and help of the United States of America. It is the second largest development bank of India. It was formed with the objective of promoting new industries, providing managerial and technical advice, modernisation of industries, encouragement of private ownership, etc.
5. ***Life Insurance Corporation of India (LICI):*** LICI was established in 1956 by passing an act in the Parliament. With the formation of LICI, the insurance business was nationalised in India. It was formed with the objective of spreading life insurance, mobilisation of savings, aid to capital formation, etc.
6. ***State Industrial Development Corporation (SIDC):*** SIDC was first set up in 1960 in Andhra Pradesh and Bihar. At present, 28 SIDCs are operating in the country. They are working alongside SFCs for the development of the state industries. The major objectives of setting up SIDC were to provide financial assistance to state industry, providing technical advice to small-scale industries, encouraging entrepreneurs to set up new industries and to establish industries in backward areas.
7. ***Industrial Development Bank of India (IDBI):*** IDBI was set up under the IDBI Act, 1964. It was founded and managed by Reserve Bank of India but since February 1976 it has become an autonomous corporation. Some of the major objectives behind the setting

up of IDBI were to fulfil the capital need of the industry, to provide managerial and technical advice, coordination among development banks, etc.

8. ***Unit Trust of India (UTI):*** UTI came into existence in 1963 by passing of Unit Trust of India Act in the Parliament. UTI began functioning from July 1964. The major objectives for formation of UTI were to encourage investment and savings of investors, to assist in economic development, capital formation, etc.
9. ***Industrial Reconstruction Bank of India (IRBI):*** IRBI was established in 1985 under the IRBI Act, 1984. Some of the important objectives of formation are reconstruction of the industries, to solve management issues in the industries, to enquire into the reason of sickness of the industries, etc. In 1997, IRBI was changed into a government company under the Companies Act, 1956 under the name of Industrial Investment Bank of India (IIBI).
10. ***Small Industries Development Bank of India (SIDBI):*** SIDBI was established in April 1990 by passing a special act in the Parliament for the development of small industries. Some of the important objectives for setting up of SIDBI were to develop small-scale industries and financial assistance, coordination with other financial institutions, managing funds created by IDBI for development purposes, etc.

In addition to the above financial institutions, National Bank for Agricultural and Rural Development (NABARD), Export–Import Bank of India (EXIM Bank), National Small Industries Corporation Ltd. (NSIC), etc., are few other institutions which function in a similar manner to provide funds to the industries.

Features of Institutional Financing

The following are few of the important features of institutional financing:

1. ***No flotation cost:*** For raising the loan, no flotation cost is required to be paid as the loan is granted by these institutions after thorough checking of the application of the borrower.
2. ***Interest:*** Interest has to be paid by the borrower at a fixed rate compulsorily.
3. ***Security:*** Institutional financing is secured by the asset acquired using the loan funds.
4. ***Maturity:*** Loans are provided generally for a period of 6–10 years and a grace period of 2 or 3 years may be allowed.
5. ***Repayment of loan:*** Repayment of loan implies payment for interest as well as the principal amount. It can be made annually, half-yearly or quarterly as per the requirement of the institution.
6. ***Penal interest:*** A penal interest has to be paid at a specified rate for the period of default on the amount of total default in case the borrower fails to pay both interest and principal.

Advantages of Institutional Financing

Some of the advantages of institutional financing are emphasised as follows:

1. ***Security:*** The loans are secured by the charge on assets, thus, it is less risky in nature.
2. ***Interest:*** The lender gets an interest at a fixed rate which means a steady flow of income for the lender.

3. ***Cost:*** The company incurs a lower cost as the cost of this type of financing is lower than equity and preference capital financing.
4. ***No flotation cost:*** In this type of financing no flotation cost is associated.
5. ***Control:*** The company retains full control over the management of affairs as the lenders do not have voting rights.

Disadvantages of Institutional Financing

This type of financing has some disadvantages; some of the important ones are as follows:

1. ***No voting rights:*** The lenders do not enjoy any voting rights in the meetings of the company.
2. ***Compulsory payment:*** The interest has to be paid by the company compulsorily and the principal amount of the loan has to be repaid after the specified period.
3. ***Penal interest:*** The borrower needs to pay a penal interest in case of default of interest payment or repayment of loan.

3.4.5 Lease Financing

Lease is an arrangement where the owner of an asset allows the other party to use the asset for a specified payment and for a specified period of time. The owner of the asset is called the *lessor* and the party which uses the asset is called the *lessee*. The lessee gets to use the asset without ownership. The title of the asset is retained by the lessor. The lease agreement specifies the period of lease, the amount and timing of payments to be made to the lessor, provisions for renewal of the lease or purchase of the asset at expiration, etc. Lease is also known as *off balance sheet financing* as neither the leased asset nor the leased liability under the lease contracts appear on a firm's balance sheet.

Types of Lease Financing

There are two types of lease—finance lease and operating lease. These are explained as follows:

1. ***Finance lease:*** A finance lease is also known as *capital lease* or *long-term lease*. According to Financial Accounting Standards Board Statement No. 13, finance lease is defined as the lease which meets one or more of the specified criteria at the inception:
   - The lessor transfers the title to the lessee at the end of the lease period
   - The lessee contains an option to purchase the asset at a bargain price
   - The lease period is equal to or greater than 75% of the estimated life of the asset
   - At the beginning of the lease, the Present Value of the minimum lease payments equals or exceeds 90% of the fair value of the leased property to the lessor. This type of lease is non-cancellable in nature and does not provide for maintenance services.
2. ***Operating lease:*** An operating lease is also known as *service lease*. Simply put, a lease agreement which does not satisfy any of the criteria mentioned in Financial Accounting Standards Board Statement No. 13 is known as *operating lease*. It is basically a rental

agreement. It requires the lessor to maintain and service the leased equipment and the cost of the maintenance is built into the lease payments. It is generally for a short-term period. An operating lease also contains a cancellation clause.

Features of Lease Financing

Some of the important features of lease financing are listed as follows:

1. ***Parties:*** The parties of the lease agreement are known as lessor and lessee. Lessor is the person who gives the right of use of asset and the party to whom the right is given is called the lessee.
2. ***Agreement:*** A lease agreement is made between the lessor and the lessee and contains all the terms and conditions related to lease.
3. ***Ownership:*** The ownership of the asset is retained by the lessor—it does not pass on to the lessee.
4. ***Period:*** The lease agreement specifically mentions the period of the lease agreement; it may or may not be for the entire economic life period of the asset.
5. ***Payment:*** A payment has to be made by the lessee to the lessor, periodically, for the use of the asset. This payment is known as *lease rentals*.
6. ***Depreciation:*** Since the ownership of the assets is retained by the lessor he/she can claim depreciation on the assets.

Advantages of Lease Financing

Lease financing has various advantages; some of the important ones are listed as follows:

1. ***Ownership:*** The lessor continues to remain the owner of the asset.
2. ***Lease rentals:*** Since the lessor gets a fixed payment form the lessee known as lease rental, it is a steady income for the lessor.
3. ***Convenient:*** It is also convenient for the lessee as the lessee does not have to buy the costly asset though he gets to use it for a nominal charge.
4. ***Risk of obsolescence:*** Since the lessee does not purchase the asset though it gets to use it, he can avert the risk of obsolescence of the asset.
5. ***Cost:*** The lessee can also avert the maintenance cost related to the asset like insurance, taxes, etc. to the lessor.
6. ***Security:*** As the lessor retains ownership of the asset his interest is fully secured, and he can take back the possession of the asset in case of default in payment.

Disadvantages of Lease Financing

Some of the disadvantages of lease financing are as follows:

1. ***Restriction on use:*** The lessor can impose some restrictions on the usage of the asset as the ownership is retained by the lessor.
2. ***Possession:*** The possession of the asset may be taken back by the lessor in case of default in payment of lease rental.

3. ***Cost borne by lessor:*** Though the lessee gets to use the asset but the cost of maintenance has to be borne by the lessor.
4. ***Obsolescence:*** The lessor has to bear the risk of obsolescence of the asset.

3.4.6 Term Loans

This is also an important source of long-term financing. There are different financial institutions (national level as well as state level) which provide financial assistance for taking up projects. Term loan, as a source of long-term finance, is discussed in detail, at a later stage in this chapter.

Sometimes, the funds are required in foreign currency to make payment for acquisition and import of plants and equipment. In 1992, the Government of India permitted Indian Companies with good track record of 3 years or more to raise funds by issue of equity/Debt Capital in international market. There are different means of arranging long-term finance in foreign currency.

3.4.7 Internal Finance

A company can mobilize finance through external and internal sources. A new company may not raise internal sources of finance and can raise only external sources of finance such as shares, debentures and loans, but an existing company can raise both internal and external sources of finance for its financial requirements. Internal finance is also one of the important sources of finance and it consists of Cost of Capital when compared to other sources of finance. Internal source of finance may be broadly classified into two categories—depreciation funds and retained earnings.

Depreciation Funds

Depreciation funds are the major part of internal sources of finance, which is used to meet the Working Capital requirements of the concerned business. Depreciation is a non-cash expense as it does not involve any Cash Flow. Depreciation refers to a decrease in the value of asset due to wear and tear, lapse of time, obsolescence, exhaustion and accident. The purpose of depreciation is replacement of the assets after the expired period. It is one kind of provision of fund, which is needed to reduce the tax burden and to increase the overall profitability of the company.

Retained Earnings

Retained earnings are another method of internal sources of finance. Actually it is not a method of raising finance, but is called as accumulation of profits by a company for its expansion and diversification activities. Retained earnings are called by different names such as self-finance, inter finance and plugging back of profits. According to the Companies Act, 1956, certain percentage [as prescribed by the Central Government (not exceeding 10%) of the net profits after tax of a financial year] has to be compulsorily transferred to reserve by a company before declaring dividends for the year. Under the retained earning sources of finance, a part of

the total profits is transferred to various reserves such as general reserve, replacement fund, reserve for repairs and renewals, reserve funds and secrete reserves, etc.

Advantages of Retained Earnings

Retained earnings consist of the following important advantages:

1. ***Useful for expansion and diversification:*** Retained earnings are most useful to expansion and diversification of the business activities.
2. ***Economical sources of finance:*** Retained earnings are one of the least costly source of finance since it does not involve any flotation cost as in the case of raising of funds by issuing different types of securities.
3. ***No fixed obligation:*** If the companies use equity finance they need to pay dividend and if the companies use debt finance, they need to pay interest. However, if the company uses retained earnings as sources of finance, they need not pay any fixed obligation regarding the payment of dividend or interest.
4. ***Flexible sources:*** Retained earnings allow the financial structure to remain completely flexible. The company need not raise loans for further requirements, if it has retained earnings.
5. ***Increase in the share value:*** When the company uses the retained earnings as the sources of finance for their financial requirements, the Cost of Capital is very cheaper than the other sources of finance; hence, the value of the share is bound to increase.
6. ***Avoid excessive tax:*** Retained earnings provide opportunities for evasion of excessive tax in a company when it has small number of shareholders.
7. ***Increase earning capacity:*** Retained earnings consist of the least Cost of Capital and also are most suitable to those companies which go for diversification and expansion.

Disadvantages of Retained Earnings

Retained earnings also have certain disadvantages:

1. ***Misuses:*** The management can misuse the retained earnings by manipulating the value of the shares in the stock market.
2. ***Leads to monopolies:*** Excessive use of retained earnings leads to monopolistic attitude of the company.
3. ***Over capitalisation:*** Retained earnings lead to over capitalisation, because if the company uses more and more retained earnings, it leads to insufficient source of finance.
4. ***Tax evasion:*** Retained earnings lead to tax evasion. Since, the company reduces tax burden through the retained earnings.
5. ***Dissatisfaction:*** If the company uses retained earnings as sources of finance, the shareholder cannot get more dividends. Hence, the shareholder does not like to use the retained earnings as a source of finance in all situations.

3.4.8 International Sources

In the early 1990s, Indian Economy faced crisis due to deceleration of foreign exchange reserve. At that time it was a challenging situation for the Indian companies to obtain loan from International Banks. In February 1992, the Government announced its decision to allow FII to invest in Indian Capital Market and allowed Indian companies to acquire capital from outside India through Euro issue. The most commonly used securities under Euro issues are American Depository Receipts (ADR), Global Depository Receipts (GDR), European Depository Receipts (EDR), Foreign Currency Convertible Bond (FCCB) etc.

Global Depository Receipts

Global Depository Receipt (GDR) is also known as *international depository receipts*. GDR is a negotiable instrument. GDR is a certificate which is issued by a depository bank, in more than one country representing a fixed number of shares in a foreign company. GDR is issued in Europe. GDR is listed in non-US stock exchanges like London Stock Exchange or Luxembourg Stock Exchange. There are more than 900 GDR's listed on exchanges worldwide with more than 2,100 issuers from 80 countries. In India only the ICICI direct allows Indian investors to invest abroad. Many companies in India have expanded their market to foreign platforms with the help of GDRs and gained access to investment capital overseas.

Salient Features of GDR:

1. GDR's are issued to investors by the depository bank and not the issuing company.
2. GDR is freely negotiable.
3. There is no lock-in period for the GDR issued.
4. GDR holders are not entitled to any voting rights.
5. There is no restriction in issue of GDR by any company in a financial year.
6. GDR holders are entitled to all corporate benefits available to equity holders such as dividend, bonus and rights in the same proportion as their entitlement.

Advantages of GDR:

1. GDR eliminates the equity funding risk because GDR holders have no voting rights, and therefore the promoters are not in danger of losing management control.
2. Global investors of GDR have no need to be registered with SEBI.
3. Huge amount of funds can be raised easily through GDR from the global market.
4. GDR is freely transferable by non-residents.

Disadvantages of GDR:

1. GDR have foreign exchange risk, i.e. currency of issuer is different from currency of GDR.

American Depository Receipts

American Depositary Receipts (ADR) were introduced in 1927 as an easier way for the U.S. investors to purchase stock in foreign companies. ADR is a negotiable certificate. ADRs are denominated in U.S. dollars. ADR can be issued by a foreign company other than non-United

States company in accordance with the provisions stipulated by the Securities and Exchange Commission of the United States.

Foreign Currency Convertible Bonds

The Foreign Currency Convertible Bond (FCCB) refers to the bonds issued in accordance with the relevant scheme and subscribed by a non-resident in foreign currency and convertible into ordinary shares of the issuing company in any manner, either in whole or in part, on the basis of any equity-related warrants attached to debt instruments. The FCCBs are unsecured; carry a fixed rate of interest and an option for conversion into a fixed number of equity shares of the issuer company. Interest and redemption price (if conversion option is not exercised) is payable in dollars. Interest rates are very low by Indian domestic standards. FCCBs are denominated in any freely convertible foreign currency.

External Commercial Borrowings

Indian promoters can also borrow directly from foreign institutions, foreign development bank, World Bank, etc. It is also known as *Foreign Currency Term Loans*. Foreign institutions provide foreign currency loans and financial assistance towards import of plants and equipment. The interest on these loans is payable in foreign currency. On the payment date, interest amount is converted into domestic currency at the prevailing foreign exchange rate. The borrowings, repayment and interest payments can be tailor-made in view of the Cash Flow position of the project.

3.5 SHORT-TERM SOURCES OF FINANCE

A project requires Working Capital margin to take up day-to-day operations. The Working Capital amount is divided into two parts—Permanent Working Capital and temporary Working Capital. The Permanent Working Capital should be financed from long-term sources while temporary Working Capital should be financed from short-term sources. Some of the short-term sources are listed as follows.

3.5.1 Trade Credit

When a firm buys goods from another firm, it may not be required to pay for these goods immediately. During this period, before the payment becomes due, the purchaser has a debt outstanding to the supplier. This debt is recorded in the buyer's balance sheet as creditors; and the corresponding account for the supplier is that of debtors. The amount of such financing depends on the volume of purchases and the timing of payment. Small and new firms are usually more dependent on the trade credit as they find it difficult to obtain funds from other sources. Trade credit may take form of open account or bills payable.

3.5.2 Accrued Expenses

Another source of short-term financing is the accrued expenses or the outstanding expense liabilities. The accrued expenses refer to the services availed by the firm, but the payment for

which has not yet been made. It is a built-in and an automatic source of finance as most of the services, are paid only at the end of a period. The accrued expenses represent an interest-free source of finance. There is no explicit or implicit cost associated with the accrued expenses and the firm can save liquidity by accruing these expenses.

3.5.3 Commercial Papers

Commercial Paper (CP) is an unsecured promissory note issued by a firm to raise funds for a short period, generally, varying from a few days to a few months. For example, in India, the maturity period of CP varies between 15 days and 1 year. It is a money market instrument and generally purchased by commercial banks, money market mutual funds and other financial institutions desirous to invest their funds for a short period. As the CP is unsecured, the firms having good credit rating can only issue the CP.

The interest cost of the CP depends upon the amount involved, maturity period and the prime lending rates of commercial banks. The main advantage of CP is that the cost involved is lower than the prime lending rates. In addition to this cost, the borrowing firm has to bear another cost in the form of placement fees payable to the dealer of CP who arranges the sale.

Issue of Commercial Papers in India

Commercial Paper was introduced as money markets instrument in India in January 1990 with a view to enable the companies to borrow for short term. Since the CP represents an unsecured borrowing in the money market, the regulation of CP comes under the purview of the Reserve Bank of India:

- CP can be issued in multiples of 5 lakhs.
- CP can be issued for a minimum duration of 15 days and maximum period of 12 months.
- For issuing CP, the company's net worth should be more than 4 crores.
- CP can neither be redeemed before maturity nor can be extended beyond the maturity period.
- CP issue requires a credit rating of P2 from CRISIL or A2 from ICRA.

3.5.4 Inter-corporate Deposits

Sometimes, the companies borrow funds for a short-term period, say up to 6 months, from other companies which have surplus liquidity for the time being. The Inter-Corporate Deposits (ICDs) are generally unsecured and are arranged by a financier. The ICDs are very common and popular in practice as these are not marred by the legal hassles. The convenience is the basic virtue of this method of financing. There is no regulation at present in India to regulate these ICDs. Moreover, these are not covered by the Section 58A of the Companies Act, 1956, as the ICDs are not for long term. The transactions in the ICD are generally not disclosed as the borrowing under the ICDs implies a liquidity shortage of the borrower. The rate of interest on ICDs varies depending upon the amount involved and the time period. The entire working of ICD market is based upon the personal connections of the lenders, borrowers and the financiers.

3.5.5 Short-term Unsecured Debentures

Companies have raised short-term funds by the issue of unsecured debentures for periods up to 17 months and 29 days. The rate of interest on these debentures may be higher than the rate on secured long-term debentures. It may be noted that no credit rating is required for the issue of these debentures because as per the SEBI guidelines, the credit ratings are required for debentures having maturity period of 18 months or more. The use of unsecured debentures as a source of short-term financing, however, depends upon the state of capital market in the economy. During sluggish period, the companies may not be in a position to issue these debentures. Moreover, only established firms can issue these debentures as a new company will not find favour from the investors. Another drawback of this source is that the company procures funds from retail investors instead of getting a lump-sum from one source only. Further, that the issue of securities in capital market is a time-consuming process and the issue must be planned in a proper way.

3.5.6 Bank Credit

Credit facility provided by commercial banks, to meet the short-term and Working Capital requirements, has been an important short-term source of finance in India. The bank credit, in general, is a short-term financing, say, for a year or so. This short-term financing to business firm is regarded as self-liquidating in the sense that the uses to which the borrowing firm is expected to put the funds are ordinarily expected to generate Cash Flows adequate to repay the loan within a year. Further, these loans are called self-liquidating because the bank's motive to provide finance is to meet the seasonal demand, e.g. to cover the seasonal increase in inventories or receivables. In principle, the bank credit is intended to carry the firm through seasonal peaks in financing need. The amount of credit extended by a bank may be referred to as a credit limit which denotes the maximum limit of loan which the firm can avail from the bank. Sometimes, the bank may approve separate limits for peak season and non-peak season.

3.6 COST OF CAPITAL—CONCEPT AND DEFINITION

A firm requires long-term finance for its new projects, expansion of existing business and other operational activities. As we know, the finance can be obtained from the issue of equity share, preference share, debentures etc. When share is issued dividend is paid, when debenture is issued interest is given by the firm. So, the company has to bear some cost for getting the finance. Hence, cost of capital can be referred as the cost of having capital for long period from different sources of finance. Now, if we think from the view point of the investor, then any investor who have invested in any firm in the form of share, debenture, bond, etc., expects a return from his investment. So, to an investor, cost of capital is the minimum rate of return that he expects from the investment.

Cost of Capital is the minimum required Rate of Return on various types of financing. It is the Rate of Return that a firm must earn on its project or investment to maintain its market value and to attract fund.

According to **Prof. I. M. Pandey**, 'Cost of Capital for a project is the discount rate for discounting its Cash Flows. The project Cost of Capital is the minimum required Rate of Return on funds invested in the project, which depends on the riskiness of its Cash Flows'.

James C. Van Horne defined Cost of Capital as 'a cut-off rate for the allocation of capital to investments of projects. It is the Rate of Return on a project that will leave unchanged the market price of the stock'.

As per **Soloman Ezra,** 'Cost of Capital is the minimum required rate of earnings or the cut-off rate of capital expenditure'.

Thus, the Cost of Capital is the minimum Rate of Return which will maintain the market value per share at its current level. If the firm earns more than the cost of capital, the market value per share is expected to increase. In other words, it is the rate that suppliers of funds expect to get. It is determined by the cost of various sources of finance. It is also referred to as the Weighted Average Cost of Capital (WACC) or composite/combined cost of capital.

3.7 IMPORTANCE/SIGNIFICANCE/RELEVANCE OF COST OF CAPITAL

Cost of Capital is a concept of vital importance in the financial decision making of a business. It provides the basic input information for taking decision in the field of Capital Budgeting, Capital Structure, dividend policy, etc. The correct Cost of Capital helps in the following areas:

1. ***Capital Budgeting Decision or investment evaluation:*** Cost of Capital is usually taken as the cut-off rate or minimum required Rate of Return for an investment project. In the Net Present Value (NPV) method, an investment is accepted if it has a positive NPV. The projects' NPVs are calculated by discounting its Cash Flows by the cost of capital. The Cost of Capital is the minimum required Rate of Return on the investment project that keeps the present wealth of shareholders unchanged. Thus, for a profitable investment project, the NPV should be greater than zero.

   Again, when Internal Rate of Return (IRR) method is used, the computed IRR is compared with the Cost of Capital and the investment proposal is accepted if it has an IRR greater than the cost of capital. So, it provides a benchmark to measure the worth of investment proposal and perform the role of accept-reject criterion. This is why, Cost of Capital is also called as *cut-off rate, target rate, hurdle rate, minimum required Rate of Return, standard return,* etc.
2. ***Capital Structure decision:*** Cost of Capital plays an important role in designing the Capital Structure and debt policy of a firm. The decision about debt equity mix in the Capital Structure is taken with reference to the impact of the same on the average cost of capital. Debt helps to save taxes, as interest on debt is a tax-deductible expense. The interest tax shield as a result of use of debt in capital reduces the overall cost of capital, but it also increases the Financial Risk of the firm. On deciding the proportion of the debt and equity in the Capital Structure, the firm aims at maximising the firm value by minimising the overall cost of capital.

3. ***Appraisal of financial performance:*** The financial performance of the top management can be appraised by using the cost of capital. The performance of a project or business, i.e. the return from the business is compared against the Cost of Capital to evaluate the profitability of the project investment. If the management has been able to earn higher return over its cost of capital, the management will be treated as an efficient one and vice versa.
4. ***Designing of optimum credit policy:*** Credit sale is an integrated part of today's business and the decision of credit period to be allowed to the customers is an important one. To achieve the optimum credit policy the cost of allowing credit period is compared against the benefits or profit earned by providing credit to customers. While doing this, Cost of Capital is used to arrive at the Present Value of cost and benefits received.
5. ***Inventory management:*** While taking the decision regarding the inventory management, Cost of Capital can be used as a guide to evaluate financial cost of carrying inventory.
6. ***Dividend decision:*** The dividend policy of the firm can also be formulated after considering the cost of capital. Here, Internal Rate of Return (r) is compared with the Cost of Capital (k) for fixing up the percentage of dividend to be distributed to the shareholders.

3.8 FACTORS DETERMINING COST OF CAPITAL

Cost of capital, like all other costs, is a variable term, subject to changes in a number of factors. The various factors that play a part in determination of Cost of Capital are described as follows:

1. ***Risk profile of the project:*** Given a particular set of economic conditions, the Cost of Capital might vary between industries and between firms in the same industry. This happens because of variation in the risk profile of the firm. A project considered risky would attract capital at a higher cost than a project in the same industry having lesser risk.
2. ***Market conditions***: If the security is not readily marketable when the investor wants to sell, or even if a continuous demand for the security exists but the price varies significantly, an investor will require a relatively high Rate of Return. Conversely, if a security is readily marketable and its price is reasonably stable, the investor will require a lower Rate of Return and the company's Cost of Capital will be lower.
3. ***General economic conditions:*** The structure of interest rates is linked to the general economic conditions prevalent in the economy. Cost of capital, in turn, is related to the interest rate structure. Fluctuation in interest rates occurs as a result of changes in the demand supply equilibrium of investible funds. When investment demand is more than the supply, the rate of interest tends to rise and hence the Cost of Capital is also more during these periods. On the other hand, during times of slack investment demand, the Cost of Capital declines due to available supply of funds being more than the demand. The fluctuation in the Cost of Capital may not be as frequent as the changes in interest rates because the deployment of funds in the debt component of capital is for a longer period of time.

4. ***Amount of financing:*** As the financing requirements of the firm become larger, the weighted Cost of Capital increases for several reasons. For instance, as more securities are issued, additional flotation costs, or the cost incurred by the firm from issuing securities, will affect the percentage cost of the funds to the firm. Also, as management approaches the market for large amounts of capital relative to the firm's size, the investors' required Rate of Return may rise. Suppliers of capital become hesitant to grant relatively large sums without evidence of management's capability to absorb this capital into the business.

3.9 DIFFERENT TYPES OF COST OF CAPITAL

Cost of Capital can be classified in several ways. Broadly it can be categorised into four classes:

- Explicit and implicit cost
- Specific cost and composite cost
- Average cost and marginal cost
- Historical cost and future cost

3.9.1 Explicit and Implicit Cost

Explicit cost of any source of finance is the discount rate which equates the Present Value of Cash Inflows with the Present Value of Cash Outflows. *Van Horne* defined explicit cost as 'the discount rate that equates the Present Value of the funds received by the firm, net of underwriting and other cost, with the Present Value of expected outflows.' These outflows are interest payment, repayment of principal or dividends, etc.

For example, a firm raises ₹1,00,000 by issue of 10% debenture. In this case, there will be an initial inflow of cash of ₹1,00,000 and an annual Cash Outflow of ₹10,000. So, explicit cost is that Rate of Return which equates the Present Value of Cash Inflows ₹1,00,000 with the Present Value of Cash Outflows ₹10,000 over the years.

The process of calculation of explicit Cost of Capital is similar to the determination of IRR. In case of IRR, Cash Outflow are involved in beginning followed by Cash Inflow subsequently. But in explicit Cost of Capital it is just the opposite, i.e. Cash Inflows takes places only once at the beginning and there are series of Cash Outflow subsequently. The explicit Cost of Capital can be determined by the following formula:

$$I_0 = \frac{C_1}{(1+K)^1} + \frac{C_2}{(1+K)^2} + \cdots + \frac{C_n}{(1+K)^n}$$

where,

I_0 = Initial Cash Inflow, i.e. net amount of funds received by the firm at time 0

C = Cash Outflow in period concerned

K = Explicit cost of capital/discount factor appropriate for the cash investment

n = No. of years

Finally, it can be said that explicit Cost of Capital is the Internal Rate of Return that the firm pays to procure financing.

Implicit cost also known as the *opportunity cost* is the cost of the opportunity foregone in order to take up a particular project. The implicit cost can be defined as 'the Rate of Return associated with the best investment opportunity for the firm and its shareholders that would be foregone, if the projects, presently under consideration by the firm, were accepted.' For example, the implicit cost of retained earnings is an opportunity cost or implicit Cost of Capital to the shareholders as they could have invested the fund anywhere else if the retained earnings were distributed to them as dividend.

Now, it can be said that explicit cost arises where funds are raised, whereas the implicit cost arises when funds are used.

3.9.2 Specific Cost and Composite Cost

The cost of each component or source of capital is known as the specific cost or component cost. The cost of finance is the minimum return expected by the investors which again depends on the degree of risk involved in the investment. Cost of equity share capital or cost of preference share capital are the examples of specific cost.

When all the specific costs of individual sources are combined together to obtain a single Cost of Capital of the firm, it is known as *overall or composite or combined or Weighted Average Cost of Capital.* Composite cost is commonly referred to as the firm's cost of capital. It represents the minimum return that a firm must earn on its existing investment or asset base to satisfy its creditors, owners and other providers of capital.

3.9.3 Average Cost and Marginal Cost

An average cost is the combined cost or weighted average cost of various sources of capital. When the aggregate of the Cost of Capital of each such source is divided by the aggregate of the weight of sources, the average Cost of Capital is obtained. The weight represents the proportion of each source of capital in the Capital Structure.

Marginal cost refers to the average cost of new additional funds required by a firm. It is simply the cost of additional funds raised. Marginal Cost of Capital is an important tool for evaluating a new project. The return of the new project is compared with the marginal Cost of Capital to decide on the acceptance or rejection of the project.

3.9.4 Historical Cost and Future Cost

Historical cost is the cost which has already been incurred for financing a particular project. It is based on the actual cost incurred in the previous project. Historical cost is useful for analysing the existing Capital Structure of the firm.

The expected cost which is to be borne in future for raising finance in order to make investment in a new project is called 'Future Cost of Capital'. In Financing Decisions, the future cost is more important than the historical cost as most of the Financing Decisions are related with the future or proposed projects that will be taken up in future period. But at the same time, the future cost is estimated on the basis of previous experience or historical data, thus, both are related.

3.10 DETERMINATION OF COST OF CAPITAL

The Cost of Capital from a firm's viewpoint is actually the overall cost of capital. This is the proportionate average of the costs of various sources of the firm's financing. More specifically, it is the combined cost of the specific costs associated with specific sources of financing. Hence, to know the overall Cost of Capital of the firm, first we have to calculate the cost of individual sources of funds.

The computation of Cost of Capital of firm involves two steps:

1. Computation of cost of specific source of a capital, i.e. the cost of debt, preference capital, equity and retained earnings.
2. Computation of the overall Cost of Capital by combining all specific costs.

In this section the procedure of computation of specific cost for the following sources of finance has been discussed:

- Cost of long-term debt (including debenture)
- Cost of preference share
- Cost of equity
- Cost of retained earnings

3.10.1 Cost of Long-term Debt

Cost of Debt Capital is the required Rate of Return on Investment of the lenders of a company. Long-term debt means long-term loans from financial institutions, capital from issuing debentures or bonds, etc. These long-terms debts do not have ownership to the providers of finance. The providers of debt finance do not participate in the affairs of the firm but they enjoy the charge on Profit Before Tax (PBT). This means they are paid before the payment to the preference shareholders or equity shareholders.

For calculation of cost of debt, first we have to compute *Net Cash Proceed* out of the issue and *Net Cash Outflow*. Net Cash Proceed are the funds actually received from the sale of securities. Debt such as debenture may be issued at a premium or discount and sometime the issue involves flotation cost such as underwriting, brokerage, etc. So, the amount of discount, premium or flotation cost should be adjusted for calculation of Net Cash Proceed.

Net Cash Proceeds = Face value of the debt – Flotation cost – Discount allowed at the time of issue (if any) + Premium charged at the time of issue (if any)

The Net Cash Outflow is the amount of periodic interest and repayment of principal in instalment or in lump-sum at maturity.

Note: Flotation costs are incurred by a company when it issues new securities, and includes expenses such as underwriting fees, legal fees and registration fees. Issue of securities requires the fulfilment of some formalities, e.g. issue of prospectus, printing and distribution of application forms, etc. Also the firm has to pay brokerage, commission, underwriting fees, banking charges, etc., to complete the issue of securities. These expenses are referred to as flotation cost. Because of flotation cost, full value of the issue cannot be realised, so these costs are deducted from the issue price to arrive at the net issue price.

The calculation of cost of loan from a financial institution is similar to that of redeemable debenture. So, the discussion is mainly on debenture and bonds. Financing through debenture or bonds have some specific features and some benefits.

Features of Debenture and Bonds/Important Issue for Computation of Cost of Debenture and Bonds

1. ***Benefits of tax shield:*** The interest paid on debt is a tax deductible expense. The higher the interest charge, the lower will be the amount of tax payable by the firm. This means that government indirectly pays a part of lenders required Rate of Return. Interest paid to the debenture holders save the tax liability of the company. Saving the tax liability is also known as *tax shield*.

   If the before tax cost of debt is K_d, and the corporate tax rate is T, then the after tax cost of debt = $K_d (1 - T)$

   For example, the before tax cost of bond is 12% and the corporate tax rate is 30%, then the after tax cost of the bond will be as follows:

   $$K_d (1 - T) = 0.12(1 - 0.3) = 0.084 \text{ or } 8.4\%$$

   Hence, as a result of interest tax shield the after tax cost of debt to the firm has decreased substantially. However, the tax benefit of interest deductibility would be available only when the firm is profitable and is paying taxes. An unprofitable firm is not required to pay any taxes, so it would not gain any tax benefit associated with payment.

   Consider another example—the benefits of tax shield can be better understood with another example. Let there be two companies, namely, A Ltd. which is fully financed by share capital and B Ltd. which use debt fund also. Following is the profitability statements of the companies:

	A Ltd. (₹ in lakh)	B Ltd. (₹ in lakh)
Earnings before interest and tax (EBIT)	200	200
Interest paid to debenture holders	—	80
Profit before tax (PBT)	200	120
Tax @ 30%	60	36
Profit after tax (PAT)	140	84

   The above table shows that the interest payment by B Ltd. of ₹80 lakh result in the tax shield (saving of tax) of ₹24 lakh (₹80 lakh paid as interest × 30% tax rate). Therefore, the effective interest is ₹(80 – 24)= ₹56 lakh only.

2. ***Face value and interest (coupon) rate:*** The values in which the debenture or bonds are denominated are called *face value*. Interest is charged on the face value of the debenture or bonds. The interest is also termed as coupon rate. Each debenture bears a fixed interest (coupon) rate except zero coupon bonds and deep discount bond.
3. ***Maturity:*** Generally the debenture or bonds have fixed maturity period for redemption but for irredeemable debenture, there is no such maturity period.

4. ***Redemption value:*** On the maturity date, the redeemable debentures are redeemed at prefixed value. The debenture or bonds may be redeemable at par, or at discount or at premium so the redemption value may vary from the face value of the debenture.

Computation of Cost of Long-term Debt

A debenture or bond may be issued at par or at discount or at premium as compared to its face value. Again the debenture or bond may be redeemable or irredeemable (perpetual) in nature. The method of computation of cost of irredeemable, redeemable and convertible debentures are discussed below:

1. ***Cost of irredeemable/perpetual debenture:*** Debts may be issued for Perpetuity. The debentures which are not redeemed by the issuer are known as irredeemable debentures. Practically, a firm follows the policy of maintaining a given proportion of debt in its Capital Structure. Individual debts may be repaid but they are replaced by new ones. So debts are never really paid. So the permanent part of the Debt Capital continues for Perpetuity.

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

where,

K_d = Cost of debt after tax

I = Annual interest payment

NP = Net proceeds of debentures or current market price

t = Tax rate

The cost of debt will be different if the bonds or debentures are issued: (i) at par or (ii) at discount or (iii) at premium. The following example will make it clear.

Illustration 3.1

When debentures are issued (i) at par or (ii) at discount or (iii) at premium

Problem

X Ltd. has 10% perpetual debt of ₹1,00,000. The tax rate is 35%. Determine the Cost of Capital (before tax as well as after tax) assuming the debt is issued at (i) par, (ii) 10% discount and (iii) 10% premium.

Solution

(i) Debt issued at par:

Before-tax cost, $K_i = \frac{I}{NP} = \frac{(1{,}00{,}000 \times 10\%)}{1{,}00{,}000} = \frac{10{,}000}{1{,}00{,}000} = 10\%$

After-tax cost, $K_d = K_i\,(1-t) = 10\%\,(1-0.35) = 6.5\%$

(ii) Issued at discount:

Before-tax cost, $K_i = ₹\frac{10{,}000}{90{,}000} = 11.11\%$

After-tax cost, $K_d = 11.11\%\,(1-0.35) = 7.22\%$

(iii) Issued at premium:

Before-tax cost, $K_i = ₹\frac{10,000}{1,10,000} = 9.09\%$

After-tax cost, $K_d = 9.09\% (1 - 0.35) = 5.91\%$

Illustration 3.2

When both Net Proceed of Issue and market price of debenture are given

Problem

5 years ago, KPM Ltd. issued 12% irredeemable debentures at ₹105, a ₹5 premium to their par value of ₹100. The current market price of these debentures is ₹95. If the company pays corporate tax at a rate of 35%, what is its current cost of debenture capital?

Solution

Cost of irredeemable debenture:

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

K_d = Cost of debt after tax

I = Annual interest payment = 12

NP = Net proceeds of debentures or current market price = 95

t = Tax rate = 35%

$$K_d = \frac{12(1 - 0.35)}{95}$$

$K_d = 0.08211$ or 8.21%

Note: If both net proceed and market price of the debenture or bond is given, the market price to be taken for computation of cost of debt.

Illustration 3.3

When coupon is mentioned, issued at premium or discount

Problem

XYZ Ltd. keeps a perpetual fixed amount of debt in its books. It pays coupon of 15%. Its debt sells at par in the market at ₹100. What is the cost of debt if the firm pays 35% tax? What is the cost of debt if it sells (a) at 5% premium (b) at 5% discount to the face value?

Solution

Cost of perpetual (non-redeemable) debt is calculated by using following formula:

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

where,

I = Coupon rate = 15%

NP = Market price = ₹100 (as sold at par)

T = Tax = 35%

Cost of debt = $K_d = \frac{15(1 - 0.35)}{100} = 9.75\%$

(a) If the market price is at 5% premium to the face value (₹105) then:

$$\text{Cost of debt} = K_d = \frac{15(1-0.35)}{105} = 9.25\%$$

(b) If the market price is at 5% discount to the face value (₹95) then:

$$\text{Cost of debt} = K_d = \frac{15(1-0.35)}{95} = 10.26\%$$

2. ***Cost of redeemable debenture:*** The cost of debenture (K_d) will be calculated as follows:

$$\text{Cost of debenture} = K_d = \frac{I(1-t) + \frac{\text{RV} - \text{NP}}{n}}{\frac{\text{RV} + \text{NP}}{2}}$$

where,

I = Interest payment

NP = Net proceeds from debentures in case of new issue of debt or current market price in case of existing debt

RV = Redemption value of debentures

t = Tax rate applicable to the company

n = Life of debentures

The above formula to calculate cost of debt is used where only interest on debt is tax deductible. Sometime, debts are issued at discount and/or redeemed at a premium. If discount on issue and/or premium on redemption are tax deductible, the following formula can be used to calculate the cost of debts.

$$\text{Cost of debenture} = K_d = \frac{I + \frac{\text{RV} - \text{NP}}{n}}{\frac{\text{RV} + \text{NP}}{2}}(1-t)$$

In absence of any specific information, students may use any of the above formulae to calculate the cost of debt (K_d) with logical assumption.

Illustration 3.4

When Net Proceed of debenture is given

Problem

ABC Ltd. issued 5,000, 12% debentures of ₹100 each at a premium of 10% on April 1, 2016 to be matured on April 1, 2021. The debentures will be redeemed on maturity. Compute the cost of debentures assuming 35% as tax rate.

Solution

The cost of debenture (K_d) will be calculated as follows:

$$\text{Cost of debenture } (K_d) = \frac{I(1-t) + \frac{\text{RV} - \text{NP}}{n}}{\frac{\text{RV} + \text{NP}}{2}}$$

I = Interest on debenture = 10% of ₹100 = ₹12
NP = Net Proceeds = 110% of ₹100 = ₹110
RV = Redemption Value = ₹100
n = Period of debenture = 5 Years
t = Tax Rate = 35 % or 0.35

$$K_d = \frac{12(1-0.35) + \frac{(100-110)}{5}}{\frac{(100+110)}{2}}$$

or
$$K_d = \frac{12 \times 0.65 - 2}{105} = \frac{5.8}{105} = 0.05524 \text{ or } 5.52\%$$

Illustration 3.5

When market price of debenture is given

Problem

PQR Ltd. issued 5,000, 12% debentures of ₹100 each on April 1, 2016 to be matured on April 1, 2021. The market price of the debenture is ₹80. Compute the cost of existing debentures assuming 35% tax rate.

Solution

$$\text{Cost of debenture } (K_d) = \frac{I(1-t) + \frac{\text{RV} - \text{NP}}{n}}{\frac{\text{RV} + \text{NP}}{2}}$$

I = Interest on debenture = 10% of ₹100 = ₹12
NP = Net Proceeds = ₹80
RV = Redemption Value = ₹100
n = Period of debenture = 5 Years
t = Tax rate = 35% or 0.35

$$K_d = \frac{12(1-0.35) + \frac{(100-80)}{5}}{\frac{(100+80)}{2}}$$

or
$$K_d = \frac{12 \times 0.65 + 4}{90} = \frac{11.8}{90} = 13.111 = 13.11\%$$

Illustration 3.6

When issue of debenture involves flotation cost

Problem

Rima & Co. has issued 12% debenture of face value ₹100 for ₹10 lakh. The debenture is expected to be sold at 5% discount. It also involves flotation cost of ₹5 per debenture. The debentures are redeemable at a premium of 5% after 10 years. Calculate the cost of debenture if the tax rate is 50%.

[C.U. B.Com. (H), 2007]

Solution

After tax cost of debenture (K_d) may be calculated as follows:

$$\text{Cost of debenture } (K_d) = \frac{I(1-t) + \dfrac{\text{RV} - \text{NP}}{n}}{\dfrac{\text{RV} + \text{NP}}{2}}$$

where,

K_d = Cost of debt after tax

I = Rate of interest, i.e. 12% or ₹12 per debenture

t = Tax rate, i.e. 50% or 0.50

n = Number of years in which debenture is to be redeemed, i.e. 10 years

RV = Principal value at the time of redemption, i.e. ₹100 + (5% of ₹100) or ₹105 per debenture

NP = Net cash proceeds at the time of issue, i.e. [₹100 – (5% of ₹100) – ₹5] or ₹90 per debenture

Therefore,
$$K_d = \frac{12(1-0.50) + \dfrac{105-90}{10}}{\dfrac{105+90}{2}} = \frac{6+1.5}{97.5} = 0.07692 \text{ or } 7.69\%$$

3. ***Cost of convertible debenture:*** A convertible debenture is a type of loan issued by a company that can be converted into stock. Holders of the convertible debentures have the option to either get the debentures redeemed into the cash or get specified numbers of companies' shares in lieu of cash. The calculation of cost of convertible debentures is very much similar to the redeemable debentures. While determining the Redeemable Value (RV) of the debentures, it is assumed that all debenture holders will choose the option which has the higher value and accordingly it is considered to calculate the cost of debt.

Illustration 3.7

Problem

AB Ltd. issued 10,000, 12% convertible debentures of ₹100 each with a maturity period of 5 years. At maturity the debenture holders will have the option to convert the debentures into equity shares of the company in the ratio of 1:10 (10 Shares for each debenture). The current market price of the equity shares is ₹14 each and historically the growth rate of the shares are 5% per annum. Compute the cost of debentures assuming 35% tax rate.

Solution

Determination of Redemption value:

Higher of

(i) The cash value of debentures = ₹100

(ii) Value of equity shares = 10 shares × ₹14$(1 + 0.05)^5$
= 10 shares × 17.868 = ₹178.68

₹178.68 will be taken as redemption value as it is higher than the cash option and attractive to the investors.

Calculation of cost of convertible debenture (using approximation method):

$$\frac{I(1-t)+\frac{\text{RV}-\text{NP}}{n}}{\frac{\text{RV}+\text{NP}}{2}}=\frac{12(1-0.35)+\frac{178.68-100}{5}}{\frac{178.68+100}{2}}=\frac{7.8+15.736}{139.34}=0.1689=16.89\%$$

Note: In practice, the corporates are normally likely to have multiple debt issues most likely subject to different interest rates. To determine the overall cost of debt, cost of each debt issue is to be computed separately. The weighted average of costs of all debt issues would be the cost of debt of the firm as a whole.

3.10.2 Cost of Preference Share Capital

The preference shares are those shares which carry the right to receive dividend at a fixed percentage before any dividend is paid on equity shares. The dividend payable to the preference shareholders are to be treated as the cost of Preference Share Capital. The payment of dividend to the preference shareholders are not charged as expenses but treated as appropriation of after-tax profit. Thus, dividend paid to preference shareholders does not reduce the tax liability of the firm. Hence, for preference share before-tax cost of Preference Share Capital is considered not the after-tax cost. The costs of Preference Share Capital are of two types—cost of Redeemable Preference Share Capital and cost of Irredeemable Preference Share Capital.

Cost of Redeemable Preference Share Capital

The preference shares capital which are redeemed after a certain period of times which was mentioned in terms of issue, are known as redeemable preference shares. The cost of redeemable Preference Share Capital is given as:

$$\text{Cost of Preference Shares } (K_p)=\frac{D+\frac{\text{RV}-\text{NP}}{n}}{\frac{\text{RV}+\text{NP}}{2}}\quad \textbf{(when dividend tax is not considered)}$$

and

$$K_p=\frac{D(1+D_t)+\frac{\text{RV}-\text{NP}}{n}}{\frac{\text{RV}+\text{NP}}{2}}\quad \textbf{(when dividend tax is considered)}$$

where,

K_p = Cost of Preference Share Capital
D = Annual preference dividend
D_t = Dividend tax
RV = Redeemable value
NP = Net Proceeds of the share
N = Number of years

Note: Dividend Tax/Dividend Distribution Tax is the tax which is required to be paid by the company who has declared, distributed or paid any amount as dividend. The provision of Dividend Distribution Tax (DDT) are governed by the Section 115-O under Chapter XII-D and were introduced by the Finance Act, 1997. The current rate of DDT is 15%.

Computation of Dividend Tax	
Tax on dividend	000
Add: Surcharge (to be calculated on the Tax on dividend)	000
	000
Add: Education cess (to be calculated on the sum total of Tax on dividend and surcharge)	000
Add: Secondary and Higher Education cess (to be calculated on the sum total of tax on dividend and surcharge)	000
Dividend tax (D_t)	000

Note: As per an amendment in 2014, now the DDT is calculated on gross dividend instead of net dividend paid.

Illustration 3.8

When issue of preference share involved Flotation Cost and redeemable at premium

Problem

Z Ltd. issued 60,000, 12% redeemable preference share of ₹100 each at a premium of ₹5 each, redeemable after 10 years at a premium of ₹10 each. The flotation cost of each share is ₹3.

You are required to calculate cost of Preference Share Capital ignoring dividend tax.

Solution

Calculation of Cost of Preference Shares (K_p)

Preference Dividend (PD) = ₹100 × 60,000 shares × 0.12 = ₹7,20,000

Flotation Cost = 60,000 shares × ₹3 = ₹1,80,000

Net Proceeds (NP) = ₹105 × 60,000 shares – 1,80,000 = ₹61,20,000

Redemption Value (RV) = 60,000 shares × ₹110 = ₹66,00,000

$$\text{Cost of Redeemable Preference Shares} = \frac{\text{PD} + (\text{RV} - \text{NP})/n}{\frac{\text{RV} + \text{NP}}{2}}$$

$$= \frac{7,20,000 + \frac{(66,00,000 - 61,20,000)}{10}}{\frac{66,00,000 + 61,20,000}{2}} = \frac{7,20,000 + \frac{4,80,000}{10}}{\frac{1,27,20,000}{2}} = \frac{7,20,000 + 48,000}{63,60,000}$$

$$= \frac{7,68,000}{63,60,000} = 0.1208 = 12.08\%$$

Alternative Solution: $K_p = \dfrac{D + \dfrac{RV - NP}{n}}{\dfrac{RV + NP}{2}}$

where, K_p = Cost of Preference Share

D = Annual Preference Dividend = 12%

RV = Redeemable value of Preference Share = (100 + 10% of 100) = 110

NP = Net Proceed of Issue = [100 + (5% of 100) – 3] = 102

$$K_p = \frac{12 + \frac{110 - 102}{10}}{(110 + 102)/2} = \frac{12 + 0.8}{106} = \frac{12.8}{106} = 12.08\%$$

Illustration 3.9

When Dividend Tax is considered

Problem

Y company Ltd. issues 10,000 12% preference shares of ₹100 each at a premium of 10% but redeemable at a premium of 20% after 5 years. The company pays underwriting commission at the rate of 5%. If tax on dividend is 12.5%, surcharge is 2.5% and education cess is 3%, calculate the cost of Preference Share Capital. *[C.U. B.Com. (H), 2009]*

Solution

The Cost of Capital of redeemable preference share K_p may be computed as follows:

$$K_p = \frac{D(1 + D_t) + \dfrac{\text{RV} - \text{NP}}{n}}{\dfrac{\text{RV} + \text{NP}}{2}}$$

where,

K_p = Cost of Preference Share Capital

D = Annual Preference Dividend, i.e. ₹12 per share

RV = Redeemable Value, i.e. ₹100 + (20% of ₹100) = ₹120

NP = Net Proceeds of the Share, ₹100+ (10% of ₹100) – 5% of ₹110 = ₹104.50

N = Number of years for redemption, i.e. 5 years

D_t = Dividend Tax = 12.5+ surcharge at the rate of 2.5% + education cess at the rate of 3%

= 12.5 + 2.5% of (12.5) + 3% of (12.5 + 0.3125) = 12.5 + 0.3125 + 0.3844

= 13.1969% or 0.1319

Therefore,

$$K_p = \frac{12(1 + 0.1319) + \dfrac{120 - 104.50}{5}}{\dfrac{120 + 104.50}{2}} = \frac{12(1.1319) + 3.1}{112.25} = 0.1486 \text{ or } 14.86\%$$

Cost of Irredeemable Preference Share Capital

The preference shares capital which are not redeemed before the winding up of the company, are known as irredeemable preference shares. The cost of irredeemable Preference Share Capital is calculated as follows:

Cost of Preference Shares (K_p)

$$K_P = \frac{D}{\text{NP}} \text{ (**when dividend tax is not considered**)}$$

$$K_P = \frac{D}{\text{NP}} (1 + D_t) \text{ (**when dividend tax is considered**)}$$

where,

K_p = Cost of Preference Share Capital

D = Annual Preference Dividend

D_t = Dividend Tax

NP = Net Proceeds of the Share

Note: Issuance of irredeemable preference shares is not allowed as per the Companies Act, 2013, but for the academic knowledge purpose it has been presented.

Note: Here DDT is calculated on net dividend, however currently it is calculated on gross dividend.

Illustration 3.10

When Preference Shares are issued (i) at par, (ii) at 10% premium and (iii) at 10% discount

Problem

X Ltd. issues 10% irredeemable preference share of ₹100 each for ₹10,00,000. What will be the cost of Preference Share Capital (K_p), if preference shares are issued: (i) at par, (ii) at 10% premium and (iii) at 10% discount. Assume that there is no dividend distribution tax.

Solution

The cost of preference share K_p will be:

$$K_P = \frac{D}{NP} \quad \text{(as there is no dividend distribution tax)}$$

(i) When shares are issued at par, i.e. at ₹100 per share

$D = 10$

NP = 100

$$K_P = \frac{10}{100} = 0.10 \text{ or } 10\%$$

(ii) When shares are issued at 10% premium, i.e. at ₹110 per share

$D = 10$

NP = 110

$$K_P = \frac{10}{110} = 0.0909 \text{ or } 9.09\%$$

(iii) When shares are issued at 10% discount, i.e. at ₹90 per share

$D = 10$

NP = 90

$$K_P = \frac{10}{90} = 0.1111 \text{ or } 11.11\%$$

3.10.3 Cost of Equity Shares

The amount raised through issue of equity shares is called equity share capital which is permanent in nature. Equity share capital cannot be redeemed until the company has not wind up its operations. The cost of equity share capital is not so easy to calculate like cost of preference shares or cost of debenture. The cost of equity share capital is the equity dividends, which depends upon the market price of the equity shares. If the company performs well then the market price will be higher and the equity shareholder will get the maximum benefit but if it is not then the ultimate sufferer will be the equity shareholders. The equity shareholders

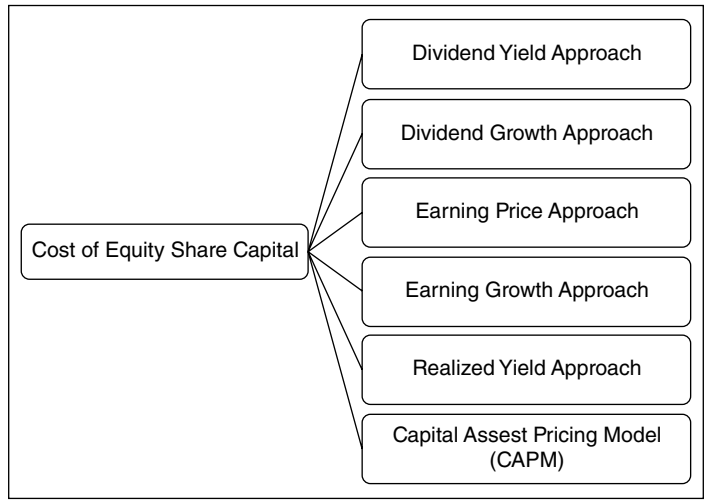


Figure 3.2 Different Methods to Compute Cost of Equity Share Capital

expect to get higher return because equity share capital is the risk capital of a company which carries the highest risk. Different methods are employed to compute the cost of equity share capital as shown in Figure 3.2.

Dividend Yield/Price Approach

According to this approach, the cost of Equity Capital (K_e) is defined as the discount rate that equates the Present Value of all expected future dividends per share with the net proceeds of the sale (or the current market price) of a share. This method is based on the assumption that the Market Price per Share (MPS) is the Present Value of its future dividends. According to this method, there is a direct relation between market value of equity shares and future dividends. Another assumption of this approach is that future dividend is constant which implies there is zero growth in dividend. This method can be used in constant and variable growth situations and also in no-growth companies for estimation of cost of equity. This approach is based on the following assumptions:

1. Market values of the shares are directly related to the future dividends on the shares.
2. Future dividend per share is expected to be constant and the company is expected to earn at least this yield over a period of time.

There are certain limitations in this approach. The limitations are as follows:

1. This method does not consider any growth rate, i.e. future dividend is assumed to be constant. However, practically, shareholders used to expect that the return on their equity investment would grow over time.
2. It does not include the effect of future earnings or retained earnings.
3. This approach can lead to ignoring the capital appreciation of value of share.

Formula:

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

where,

K_e = Cost of equity share capital

D = Divined per share

P_0 = Current market price per share

Illustration 3.11

When it is expected that dividend to be received at a uniform rate over the period

Problem

Y Ltd. paid dividend per share of ₹4 and the current market price of equity share is ₹20. Calculate the cost of equity share capital.

Solution

$$K_e = \frac{D}{P_0} \times 100$$

where,

K_e = ?

D = ₹4

P_0 = ₹20

$$K_e = \frac{₹4 \times 100}{₹20}$$

$= 20\%$

Illustration 3.12

Problem

AB Ltd. issued shares of ₹100 each at a premium of 10%. The issue involved underwriting commission of 5%. The rate of dividend expected by the shareholders is 12%. Determine the cost of Equity Capital (K_e).

Solution

Cost of Equity Capital = $K_e = \frac{D}{P_0}$

D = Divined per Share = $100 \times 12\% = 12$

P_0 = Current Market Price per Share = issue price = $100 + 100 \times 10\% = 110$

Selling price of the share = 110 – 5% of 110 = 104.50

$$K_e = \frac{12}{104.50} = 0.1148 = 11.48\%$$

Dividend Growth Approach

Every equity shareholder expects dividend to increase year after year and not to remain constant. In this case, the expected growth in dividend is taken into consideration for computation of cost of equity. The growth in expected dividend in future may be either at a uniform normal rate or it may vary. Therefore, the dividend growth approach takes into

account expected dividend under different growth assumptions. This approach is based on certain assumptions which are listed as follows:

1. The current market price of share depends on future expected dividend.
2. The initial dividend D_0 is greater than 0.
3. The dividend payout ratio is constant.

Formula:

$$K_e = \frac{D_1}{P_0} + g \quad \text{or} \quad \frac{DPs_1}{MPS} + g$$

where,

K_e = Cost of Equity Share Capital
$D_1 = DPs_1$ = Next Expected Divined = $[D_0 (1 + g)]$
$P_0 = MPS$ = Current Market Price per Share
g = Constant growth rate of dividend

If flotation cost is considered in case of newly issued equity shares then cost of equity under this approach will be calculated as follows:

$$K_e = \frac{D_1}{P_0 - F} + g$$

where,

K_e = Cost of Equity Share Capital
D_1 = Next Expected Divined = $[D_0 (1 + g)]$
P_0 = Current Market Price per Share
g = Constant growth rate of dividend
F = Flotation cost

Illustration 3.13

When dividend are expected to grow at a uniform rate in each year

Problem

A company's share is currently quoted in the market at ₹20. The company pays a dividend of ₹2 per share and the investors expect a growth rate of 5% per year. You are required to calculate (a) cost of Equity Capital of the company and (b) the market price per share if the anticipated growth rate dividend is 7%. *[C.U. B.Com. (H), 2009]*

Solution

(a) The cost of Equity Capital (K_e) may be ascertained as follows:

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

where,

D_1 = Dividend per share at the end of the current year, i.e. ₹2
P_0 = Market price per share, i.e. ₹20
g = Expected growth rate of dividend, i.e. 5% or 0.05

Therefore,

$$K_e = \frac{2}{20} + 0.05 = 0.10 + 0.05 = 0.15 \text{ or } 15\%$$

(b) We know,

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

where, D_1 = ₹2, K_e = 0.15, g = 0.07

$$K_e = 0.15 = \frac{2}{P_0} + 0.07$$

$$P_0 = \frac{2}{0.15 - 0.07} = \frac{2}{.08} = ₹25 \text{ per share}$$

Earning Price Approach

According to this approach, the cost of equity share capital is determined by dividing the Earning per Share (EPS) by the current Market Price per Share. The cost of equity share is determined on the basis of EPS. EPS is calculated by dividing the earnings available to equity shareholder by the number of equity shares. Again, earnings available to equity shareholder are computed after giving the preference dividend to the preference shareholders. When firm has no need of Debt Capital in its Capital Structure, firm uses this method to determine the cost of equity share capital. This method depends on the assumption that if the firm is not distributing its earning as dividend, the earning is kept as the retained earnings by the firm. These retained earnings will lead to future growth of the earnings and as a result the future market price of the share will increase.

Formula

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

where,

K_e = Cost of Equity Share Capital

E = Earnings per Share

P = Current Market Price per Share

Illustration 3.14

When EPS and Market Price of Share in given

Problem

The earnings available to the shareholders amount to ₹40,000. Firm is represented by 10,000 Equity shares and the current market price of equity share is ₹25. Calculate the cost of equity share capital.

Solution

$$K_e = \frac{E}{P} \times 100$$

$$K_e = ?$$

E = ₹40,000/10,000 equity shares = ₹4

$$P = ₹25$$

$$K_e = \frac{₹4}{₹25} \times 100$$

$$= 16\%$$

Note: If the shares are newly issued then 'expected earning per equity share' will be taken as E, but if the shares were issued in the past then 'current earnings per share' will be taken. Again, for newly issued share the 'net selling price of each share' will be considered as P and if the shares were issued in the past then 'current market price per share' will be considered.

Earnings Growth Approach

This method is similar to the dividend growth approach. The cost of equity share capital is determined under this approach as follows:

$$K_e = \frac{E}{P_0} + g$$

where,

K_e = Cost of Equity Share Capital
E = Earnings per Share
P_0 = Current Market Price per Share
g = Growth rate in earnings

Illustration 3.15

When earnings are expected to grow

Problem

If the earning per share of the firm is ₹4 and the market price per share is ₹40 and the growth rate in earnings of the firm is 5%. Calculate the cost of equity share capital.

Solution

$$K_e = \frac{E}{P_0} + g$$

K_e = ?
E = ₹4
P_0 = ₹40
g = 5% or 0.05

$$K_e = \frac{₹4}{₹40} + 0.05$$

$$K_e = (0.10 + 0.05)$$

K_e = 0.15 or 15%

Under this method, the calculation of value for 'g' is difficult. The main approach to calculation of 'g' is 'derivation of future growth rate'.

Derivation of Future Growth Rate

Under this method, the future growth rate is determined on the basis of dividend growth. American Economist Myron Gordon suggested this method. According to this method, a growing stream of future dividends arises from a growing level of investment by the firm in profitable projects, and it will, therefore, be this rate of investment which will partially determine the growth rate. This model is based on the following assumptions:

1. The firm is an all equity firm.
2. Only source of additional investment are retained earnings.

3. Every year firm re-invested a constant portion of retained earnings.
4. Retained earnings produce a constant amount of annual return

It can be calculated as follows:

$$\text{Growth } (g) = b \times r$$

where,

g = Future dividend growth rate

b = Constant portion of retained earnings each year

r = Average Rate of Return fund invested

According to Gordon's assumption b and r to be calculated as follows:

$$b = \frac{\text{Net Profit (after dividend paid)}}{\text{Net Profits}}$$

$$r = \frac{\text{Net Profits}}{\text{Book Value of Capital Employed}}$$

Illustration 3.16

Problem

AB Ltd. is expected to earn ₹30 per share. Company follows fixed payout ratio of 40%. The market price of its share is ₹200. Find the cost of existing equity if dividend tax of 15% is imposed on the distributed earnings when (a) current level of dividend amount is maintained and (b) dividend to the shareholders is reduced by the extent of dividend tax.

Solution

(a) When dividend net of tax to shareholders is maintained at the same level, such policy would reduce the retained earnings, which in turn reduces the growth.

t = Dividend tax = 15%

D_1 = Dividend = $(30 \times 40\%)$ = ₹12

Amount of tax = (Dividend $12 \times 15\%$ tax) = ₹1.8

Retained earnings = $(30 - 12 - 1.8)$ = ₹16.2

Growth,

$$g = b \times r = \frac{\text{Net Profit (after dividend paid)}}{\text{Net Profits}} \times \frac{\text{Net Profits}}{\text{Book value of capital employed}}$$

$$\frac{\text{Net Profit (after dividend paid)}}{\text{Book value of capital employed}} = \frac{\text{Retained Earnings}}{\text{Price}} = \frac{16.2}{200} = 0.081 = 8.1\%$$

Cost of equity

$$K_e = \frac{D_1}{P} + g = \frac{12}{200} + 0.081 = 0.141 = 14.1\%$$

(b) When dividend gross of tax to shareholders is maintained at the same level, such policy would keep the level of retained earnings and growth same but the amount of dividend to the shareholders would reduce by the extent of dividend tax.

t = Dividend tax = 15%

Amount of tax = (Dividend 12 × 15% tax) = ₹1.8

D_1 = Dividend (net of tax) = (12 – 1.8) = ₹10.2

Retained earnings = (30 – 12)= ₹18

$$g = b \times r = \frac{\text{Net Profit (after dividend paid)}}{\text{Net Profits}} \times \frac{\text{Net Profits}}{\text{Book value of capital employed}}$$

$$\frac{\text{Net Profit (after dividend paid)}}{\text{Book value of capital employed}} = \frac{\text{Retained Earnings}}{\text{Price}} = \frac{18}{200} = 0.09 = 9\%$$

$$K_e = \frac{D_1}{P} + g = \frac{10.2}{200} + 0.09 = 0.141 = 14.1\%$$

Realised Yield Approach

It is an easy method for calculating cost of Equity Capital. Under this method, cost of equity is calculated on the basis of return actually realised by the investor in a company on their Equity Capital.

$$K_e = \text{PV}f \times D$$

where,

K_e = Cost of Equity Capital

PVf = Present Value of discount factor

D = Dividend per share

Capital Asset Pricing Model

The Capital Asset Pricing Model (CAPM) was developed by William F. Sharpe and John Linter in the 1960s. This model is useful for measuring the cost of Equity Capital of the firm; it shows the relationship between the unavoidable risk and expected return from a security. The model is based on the following assumptions:

1. The capital markets are highly efficient.
2. No investor is large enough to affect the market.
3. All investors have the same expectations about the risk and return.
4. There are negligible restrictions on investment.
5. There are two types of investment opportunities, i.e. risk-free security and market portfolio of common stock.

According to CAPM,

$$R_i = R_F + \beta (R_M - R_F)$$

where,

R_i = Expected Rate of Return to the investors or cost of Equity Share Capital (K_e)

R_F = Risk-free Rate of Return
R_M = Market Rate of Return
β = Beta coefficient by which the market risk is determined

Here, β co-efficient measures the systematic market risk of a given share. The amount of risk premium in the CAPM equation, i.e. $\beta (R_M - R_F)$ depends on the relative value of beta coefficient, other factors remaining constant. The higher the value of beta the greater is the riskiness of a share and vice versa.

If $\beta = 1$ of a share then the share is called neutral share; it means that the price of the share will be changed at the same rate as market index changes.

If $\beta > 1$ of a share then the share is called aggressive share, which implies that the price of the share changes at a higher rate than that of the changes in market index.

If $\beta < 1$ of a share then the share is called defensive share, which implies that the price of the share changes at a low rate than that of the changes in market index.

If $\beta = 0$ of a share, then the share is called risk-free share.

CAPM model describes the risk-return trade-off for securities. It describes the linear relationship between risk and return for securities.

The risks, to which a security is exposed, can be classified into two groups:

(i) Unsystematic Risk: This is also called company-specific risk as the risk is related to the company's performance. This type of risk can be eliminated by the diversification of the securities portfolio. This is also known as diversifiable risk as the risk can be reduced by the investor through diversification of portfolio.

(ii) Systematic Risk: It is the macro-economic or market-specific risk under which a company operates. This type of risk cannot be eliminated by diversification; hence, it is non-diversifiable. A few examples of systematic risk are inflation, government policy, interest rate, etc.

As diversifiable risk can be eliminated by an investor through diversification, the non-diversifiable risk is the risk which cannot be eliminated; therefore, a business should be concerned as per CAPM method, solely, with non-diversifiable risk.

The non-diversifiable risks are assessed in terms of beta coefficient (b or β) using fitting regression equation between return of a security and the return on a market portfolio.

Therefore, *Required Rate of Return = Risk-Free Rate + Rate Premium*

The idea behind CAPM is that investors need to be compensated in two ways—Time Value of Money and Risk.

- The Time Value of Money is represented by the risk-free rate in the formula and compensates the investors for placing money in any investment over a period of time.
- The other half of the formula represents risk and calculates the amount of compensation the investor needs for taking an additional risk. This is calculated by taking a risk measure (beta) which compares the returns of the asset to the market over a period of time and compares it to the market premium.

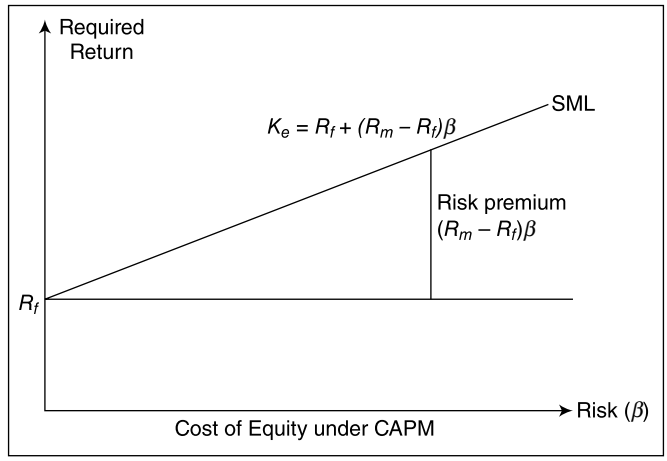


Figure 3.3 Cost of Equity Under CAPM
(Abbreviation: SML—Security Market Line)

The CAPM says that the expected return of a security or a portfolio equals the rate on a risk-free security plus a risk premium. If this expected return does not meet or beat the required return, then the investment should not be undertaken. The shortcomings of this approach are as follows:

1. Estimation of betas with historical data is unrealistic
2. Market imperfections may lead investors to unsystematic risk

Despite these shortcomings, the main criterion for determining the cost of equity share capital is to measure the expectation of investors from the equity shares of that particular company.

Therefore, the whole question of determining the cost of equity shares hinges upon the factors which go into the expectations of a particular group of investors in a company of a particular risk class.

Illustration 3.17

Problem

Calculate the cost of Equity Capital of H Ltd., whose risk-free Rate of Return equals 10%. The firm's beta equals 1.75 and the return on the market portfolio equals to 15%.

Solution

$$R_i \text{ or } K_e = R_f + \beta(R_m - R_f)$$
$$K_e = 0.10 + 1.75(0.15 - 0.10)$$
$$= 0.10 + 1.75(0.05)$$
$$= 0.1875 \text{ or } 18.75\%$$

Illustration 3.18

Problem

If the risk-free Rate of Return and the market Rate of Return of an investment are 14% and 18%, respectively, calculate the cost of equity share capital if (a) $\beta = 1$, (b) $\beta = 2/3$ and (c) $\beta = 5/4$.

Solution

We know

$$R_i = R_f + \beta (R_m - R_f)$$

where,

R_i = Expected Rate of Return to the investors, or cost of capital

R_f = Risk-free Rate of Return, i.e. 14%

R_m = Market Rate of Return, i.e. 18%

β = Beta coefficient by which the market risk is determined

(a) When $\beta = 1$,

$$R_i = 14\% + 1\,(18\% - 14\%)$$
$$= 14\% + 4\%$$
$$= 18\%$$

(b) When $\beta = 2/3$,

$$R_i = 14\% + 2/3\,(18\% - 14\%)$$
$$= 14\% + 2.6667\%$$
$$= 16.6667\%$$

(c) When $\beta = 5/4$,

$$R_i = 14\% + 5/4\,(18\% - 14\%)$$
$$= 14\% + 5\%$$
$$= 19\%$$

Illustration 3.19

Problem

From the following information in respect of a company you are required to calculate the cost of equity using CAPM approach:

(i) Risk-free Rate of Return 12%

(ii) Expected market price of equity shares at the year-end is ₹1,400

(iii) Initial price of investment in equity shares of the company is ₹1,200

(iv) Beta risk factor of the company is 0.70

(v) Expected dividend at the year-end is ₹140

Solution

We know that under CAPM approach, cost of equity can be calculated as follows:

$$R_i \text{ (or } K_e) = R_f + \beta (R_m - R_f)$$

where,

R_f = Risk-free Rate of Return, i.e. 12% or 0.12

β = Beta coefficient, i.e. 0.70

R_m = Expected return on market portfolio, i.e.

$$= \frac{\text{Expected Dividend} + \text{Capital Appreciation}}{\text{Initial Investment}} \times 100$$

$$= \frac{₹140 + ₹200 \text{ (i.e. } ₹1,400 - ₹1,200)}{₹1,200} \times 100$$

= 0.2833 or 28.33%

R_i = 0.12 + 0.70 (0.2833 – 0.12)

= 0.23431 or 23.43%

Illustration 3.20

Problem

From the following information, calculate β (beta), and determine the cost of equity, assuming risk-free return (R_F) = 7% and market return R_M = 14%.

Month	Return on Security A (%)	Market Return (%)
1	10	–12
2	6	4
3	12	11
4	7	6
5	–9	–11
6	11	15

[C.U., M.Com., 2007]

Solution

Month	Security A Return, R_A (%)	Market Return, R_M (%)	$(R_A - \bar{R}_A)$	$(R_M - \bar{R}_M)$	$(R_A - \bar{R}_A)(R_M - \bar{R}_M)$	$(R_M - \bar{R}_M)^2$
1	10	–12	3.8	–14.2	–53.96	201.64
2	6	4	–0.2	1.8	–0.36	3.24
3	12	11	5.8	8.8	51.04	77.44
4	7	6	0.8	3.8	3.04	14.44
5	–9	–11	–15.2	–13.2	200.64	174.24
6	11	15	4.8	12.8	61.44	163.84
	37	13			261.84	634.84

$$\bar{R}_A = 37/6 = 6.16667 \text{ or } 6.2$$

$$\bar{R}_M = 13/6 = 2.16667 \text{ or } 2.2$$

$$\Sigma (R_A, \bar{R}_M) = \frac{\Sigma(R_A - \bar{R}_A)(R_M - \bar{R}_M)}{n-1} = 261.84/5 = 52.368$$

$$\sigma^2_M = 1/n \, \Sigma (R_M - \bar{R}_M)^2 = 1/6 \times 634.84 = 105.80$$

$$\beta = \text{Cov} (\bar{R}_A, \bar{R}_M)/\sigma^2_M = 52.368/105.80 = 0.4949$$

R_i (or K_e) = $R_F + \beta (R_M - R_F)$

= 7% + 0.4949 (14% – 7%)

= 10.4643%

Illustration 3.21

Problem

You are given the following data for risk-free return (R_F) and expected market return (R_M) along with the risk involved in respect of a number of projects:

Project	R_F (%)	R_M (%)	
E	7.5	13	0.96
F	9.0	16	1.00
G	10.0	20	1.75

What is the required Rate of Return on equity in each project under Capital Asset Pricing Model (CAPM)? What generalisations can you make? *[C.U. M.Com., 2009]*

Solution

Project	Equation, i.e. R_i (or K_e) = $R_F + \beta (R_M - R_F)$	Required Return (%)
E	7.5% + 0.96 (13% – 7%)	13.26
F	9% + 1 (16% – 9%)	16.00
G	10% + 1.75 (20% – 10%)	27.50

Generalisations:

1. The greater the risk-free return, the greater is the expected return on the market folio and vice versa.
2. The greater the beta, the higher the risk and greater the risk premium. So the greater will be the required return on equity all other factors remaining constant.

Cost of Retained Earnings

The part of the distributable profit which is set aside without distributing among the shareholders in order to strengthen the financial position of the business is called retained earnings. Though these funds do not cost anything there is an opportunity cost involved. The opportunity cost of retained earnings is simply the dividend foregone by the shareholders. The two methods for measuring this cost are as follows:

1. It assumes that the shareholders would have invested the dividend on receipt. So the cost of equity is to be adjusted by the marginal tax rate and the applicable commission, brokerage, etc. The formula for calculating K_r would be as follows:

$$K_r = K_e (1 - t) (1 - C)$$

where,

K_e = Cost of equity
t = Marginal tax rate
C = Commission, brokerage, etc.

2. The second method assumes the retained earnings as the investment of existing shareholders in the firm itself. So the retained earnings may be treated at par with the

equity share capital. This is known as the ***external yield criterion***. The cost of retained earnings may be measured in the same way as that of equity share capital.

Illustration 3.22

Problem

A firm's K_e (return available to shareholders) is 10%, the average tax rate of shareholders is 30% and it is expected that 2% is brokerage cost that shareholders will have to pay while investing their dividends in alternative securities. What is the cost of retained earnings?

Solution

Cost of Retained Earnings, $K_r = K_e (1 - t) (1 - b)$

where,

K_e = Rate of Return available to shareholders

t = tax rate

b = brokerage cost

So, $K_r = 10\% (1 - 0.5) (1 - 0.02)$

$= 10\% \times 0.5 \times 0.98$

$= 4.9\%$

Illustration 3.23

Problem

A Ltd. retains ₹1,00,000 out of its current earnings. The expected Rate of Return to the shareholders, if they had invested the funds elsewhere is 10%. The brokerage is 2% and the shareholders come in 30% tax bracket. Calculate the cost of retained earnings.

Solution

Computation of cost of Retained Earnings (K_r)

$$K_r = k_e (1 - t)(1 - b)$$

where,

k = Opportunity cost; t_p = Shareholders' personal tax

$K_r = 0.10 (1 - 0.30)(1 - 0.02) = 0.686$ or 6.86%

Alternatively

Cost of retained earnings is equal to opportunity cost for benefits forgone by the shareholders. We assume that 100% of the retained earning have been distributed among shareholders as dividend.

	₹
Dividend to Shareholders	1,00,000
Less: Tax (30% of ₹1,00,000)	30,000
After Tax Dividend	70,000
Less: Brokerage (2% of ₹70,000)	1,400
Net amount available for investment	**68,600**
Now, Earnings to the shareholder on reinvestment is = 10% of 68,600 =	6,860

So, Cost of Retained Earnings = $\frac{6,860}{1,00,000} \times 100 = 6.86\%$

3.11 WEIGHTED AVERAGE COST OF CAPITAL OR OVERALL COST OF CAPITAL

The term Cost of Capital is used to denote composite or weighted average or overall cost of capital. Once the component costs have been calculated, they are multiplied by the proportions of the respective source of capital to obtain the WACC. Here weighted average concept is used not the simple average. The simple average Cost of Capital is not appropriate to use because firms hardly use various sources of funds equally in the Capital Structure. It is also important to remember that the weighted average after-tax costs of the individual component of capital is to be taken not the before-tax weighted average cost.

The main reason behind the computation of overall Cost of Capital is to use this rate as the decision criterion in Capital Budgeting or Investment Decision. Generally, it may be stated that this Cost of Capital is taken to be the cut-off rate for determining the profitability of proposed projects.

3.11.1 Steps Taken for Calculation of WACC

Step 1: Compute the specific cost of each source of capital.

Step 2: Calculate the proportion (or %) of each source of capital to the total capital (weight).

Step 3: Multiply the cost of each source by its proportion in the Capital Structure.

Step 4: Add the weighted component cost to get the WACC.

This is noted that the weighted average Cost of Capital may change due to change in the cost of each component; change in the relative importance of each company, i.e. the change in proportion or weight; or change in both.

Weighted average Cost of Capital can be computed by using the following three types of weight:

1. Book value weight
2. Market value weight
3. Marginal book value weight

Book Value Weight

In this method, weighted average Cost of Capital is computed by taking relative proportions of various sources of capital to the Capital Structure of the firm. The main advantage of book value weight is that book values are readily available from the published annual accounts or other records. The other advantage is that it depicts the real situation of the firm.

The main ***advantages*** of this method are stated as follows:

1. Book value weight is easier to calculate as the book values of various source of finance are readily available from the published annual report of the company.
2. A firm set Capital Structure target on the basis of book value rather than market value. Therefore, computation of overall Cost of Capital on the basis of book value weight provides real situation of the firm.

3. Computation of debt-equity ratio for the purpose of analysing the Capital Structure also depends on the book values.
4. If the securities of the company are not listed in the stock exchange, then it is not possible to make available the market value of the sources of finance, or even if available it is not reliable. In such a situation there is no other alternative, rather than using book value weights for the purpose of computation of weighted average cost of capital.

The main ***disadvantages*** of this method are stated as follows:

1. There is no relationship between book value weight and the market value of various sources of finance.
2. Management cannot take decision relating to Capital Budgeting, financing, etc. on the basis of book value weight.
3. Computation of weighted average Cost of Capital on the basis of book value weight is in conflict with the concept of Cost of Capital because the latter is computed by considering the market value of various sources of finance.

Market Value Weight

In this method, the proportions of market values of various sources of capital are assigned as weight in computing the WACC. Book value weight may be operationally convenient but market value is theoretically more consistent sound and better indicatory of firm's Capital Structure. The desirable practice is to employ market weight to compute the firm's Cost of Capital as it aims to maximise the value of the firm.

The main ***advantage*** of using market value weights are stated as follows:

1. Costs of specific sources are computed on the basis of their respective market value. Now, if the market values of various sources of finance are used as weights in computing the weighted average cost of capital, a consistency in the approach is maintained.
2. Use of market value weights are in consistent with the objective of maximisation of value of the firm.
3. Use of market value of various sources of finance which constitute the Capital Structure of the firm will reflect the current cost of capital. Therefore, it will provide a better picture of the firm's cost of capital.

But there are some ***practical difficulties*** for using market value weights which are stated as follows:

1. Market value of the securities may change frequently. This will, in turn, change the overall Cost of Capital which will make the decision criterion for investment somewhat difficult.
2. Market value of all sources of finance is not readily available such as book value, particularly, the market value of retained earnings.
3. If the securities of the company are not listed in the stock exchange then market values are not available or even if they are available, they are not reliable.

Although market value weights are operationally inconvenient compared to book value weights, yet theoretically it is more consistent and sound in reflecting a better picture of the firm's true Capital Structure.

Marginal Value Weight

Marginal weight refers to giving weight to the specific costs by proportion of each type of funds to the total funds to be raised. In the method, the value of new or incremental capital is considered rather than the past or current market values.

In using marginal weight, the firm is concerned with the actual amount of each type of financing used in raising additional funds to finance new project by the company. Marginal weight is more helpful/applicable to the actual process of financing project.

Comparison between Book Value and Market Value Weight

It has been observed that Cost of Capital ascertained by using market value weight is higher than that by using book value weight. This is mainly due to the fact, equity and Preference Share Capital usually have higher market values than their book values. Thus higher Cost of Capital resulted due to greater emphasis assigned to these sources of finance.

While book value weights are readily available from the records of the company, the market value weight are not always available, particularly in the case of retained earnings. In brief, while the book value weights are operationally convenient, market value weights are theoretical consistent and sound enough and as such a better indicator of a firms true Capital Structure.

Book value weights use accounting values to measure the proportion of each type of capital in the firm's financial structure. *Market value weights* measures the proportion of each type of capital at its market value. Market value weights are appealing because the market values of securities closely approximate the actual rupees to be received from their sale. Moreover, because firms calculate the costs of the various types of capital by using prevailing market prices, it seems reasonable to use market value weights. In addition, the long-term investment Cash Flows to which the Cost of Capital is applied are estimated in terms of current as well as future market values. Market value weights are clearly preferred over book value weights.

Historical versus Target Weight

Historical weights can be either book or market value weights based on actual Capital Structure proportions. For example, past or current book value proportions would constitute a form of historical weighting, as would past or current market value proportions. Such a weighting scheme would therefore be based on real, rather than desired, proportions. However, *Target weights*, which can also be based on either book or market values, reflect the firm's desired Capital Structure proportions. Firms using target weights establish such proportions on the basis of the 'optimal' Capital Structure they wish to achieve. When one considers the somewhat approximate nature of the calculation of weighted average cost of capital, the choice of weights may not be critical. However, from a long-term perspective, the preferred weighting scheme should be target market value proportions.

Illustration 3.24

Problem

X Ltd. has the following Capital Structure on October 31, 2015:

Source of Capital	₹
Equity Share Capital (1,00,000 shares of ₹10 each)	10,00,000
Reserve and Surplus	10,00,000
12% Preference Shares	5,00,000
9% Debentures	15,00,000
	40,00,000

The market price of equity share is ₹50. It is expected that the company will pay a dividend of ₹5 per share next year which will grow at 7% forever. Assume 30% income tax rate. You are required to compute weighted average Cost of Capital using market value weights.

Solution

Workings:

(i) Cost of Equity $(K_e) = \frac{D_1}{P_0} + g = \frac{5}{50} + 0.07 = 0.1 + 0.07 = 17\%$

(ii) Cost of Debentures $(K_d) = (1 - t) = 0.09(1 - 0.3) = 0.063$ or 6.3%

Computation of Weighted Average Cost of Capital (WACC using market value weights)

Source of Capital	Market Value of Capital	Weight	Cost of Capital (%)	WACC (%)
9% debentures	15,00,000	0.2143	6.30	1.35
12% Preference Shares	5,00,000	0.0714	12.00	0.86
Equity Share Capital (₹50 × 1,00,000)	50,00,000	0.7143	17.00	12.14
Total	70,00,000	1.00		14.35

Here, Weighted Average Cost of Capital is 14.35%.

Illustration 3.25

Problem

Indrani Ltd. has the following Capital Structure:

	₹(in Lakhs)
Equity Share Capital (10 lakhs shares)	100
12% Preference Share Capital (10,000 shares)	10
Retained Earnings	120
14% Debentures (70,000 Debentures)	70
14 % Term Loan	100
	400

The Market Price per Equity Share is ₹25. The next expected dividend per share is ₹2 and is expected to grow at 8%. The preference shares are redeemable after 7 years at par and are currently quoted at ₹75 per share. Debentures are redeemable after 6 years at par and their current market quotation is ₹90 per debenture. The tax rate applicable to the firm is 50%.

You are required to compute of Weighted Average Cost of Capital of the Company using (a) Book value and (b) Market value as weights *[C.U. B.Com. (H), 2006]*

Solution

(a) **Under Book Value Method**

(i) Cost of Equity Shares (K_e)

$$K_e = \frac{\text{Expected dividend per equity share}}{\text{Market price per share}} \times 100 + \text{Expected growth rate}$$

$$= \frac{2}{25} \times 100 + 8\%$$

$$= 16\%$$

(ii) Cost of Equity Shares (K_p)

$$K_P = \frac{\text{Pref. dividend } (D) + \dfrac{(\text{Redeemable Value} - \text{Net Proceeds})}{\text{No. of Years}}}{\dfrac{\text{Redeemable Value} + \text{Net Proceeds}}{2}} \times 100$$

$$K_p = \frac{12 + \dfrac{100 - 75}{7}}{\dfrac{100 + 75}{2}} \times 100$$

$$= 17.80\%$$

(iii) Cost of Debentures (K_d)

$$K_d = \frac{\text{Interest } (I) + \dfrac{(\text{Redeemable Value} - \text{Net Proceeds})}{\text{No. of Years}}}{\dfrac{\text{Redeemable Value} + \text{Net Proceeds}}{2}} \times (1 - t)$$

$$K_d = \frac{14 + \dfrac{(100 - 90)}{6}}{\dfrac{100 + 90}{2}} \times (1 - .5)$$

$$K_d = \frac{12 + \dfrac{(100 - 75)}{7}}{\dfrac{100 + 75}{2}} \times 100$$

$$= 8.25\%$$

(iv) Cost of Term Loan (K_d)

$$K_d = \text{Interest} \times (1 - t)$$

$$= 14\% \ (1 - 0.5)$$

$$= 7\%$$

Computation of WACC of Indrani Ltd. (Weights under Book Value)

Sources of Finance	Book Value (in lakhs)	Weights	Specific Cost	Weighted Cost
Equity shares capital	100	0.250	16.00%	4.000
12% Preference Share Capital	10	0.025	17.80%	0.446
Retained earnings	120	0.300	16.00%	4.800
14% Debentures	70	0.175	8.25%	1.443
14% Term loan	100	0.250	7.00%	1.750
	400	1.000		12.439

Therefore Weighted Average Cost of Capital under Book Value is 12.439%

(b) **Under Market Value Method**

Total market value of equity shares = 10,00,000 shares@ ₹25 = ₹2,50,00,000

Ratio between equity shares and retained earnings

= 100:120

= 5:6

Market value equity = ₹2,50,00,000 × 5/11

= ₹1,13,63,637

Market value of Retained earnings = ₹2,50,00,000 × 6/11

= ₹1,36,36,363

Computation of WACC of Indrani Ltd. (Weights under Market Value)

Sources of Finance	Market Value	Weights	Specific Cost	Weighted Cost (%)
Equity shares capital	1,13,63,637	0.2700	16.00%	4.32
12% Preference Share Capital	7,50,000	0.0178	17.80%	0.3168
Retained earnings	1,36,36,363	0.3243	16.00%	5.1888
14% Debentures	63,00,000	0.1498	8.25%	1.2356
14% Term loan	1,00,00,000	0.2381	7.00%	1.6667
	4,20,50,000	1.000		12.7279

Therefore, Weighted Average Cost of Capital under Market Value is 12.728%.

Illustration 3.26

Problem

The Capital Structure and Cost of Capital of a company are given as follows:

Source	Book Value (₹/lakh)	After tax Cost of Capital (%)
Equity	200	16
Retained Earnings	200	?
Debentures	400	7
	800	

Equity shares represent shares of ₹10 each. The current market value of each share is ₹80 and the corporate tax rate is 40%.

(i) Compute weighted average Cost of Capital of the company using both book values and market values as weights.

(ii) How would you account for the difference, if any, in the average Cost of Capital under (i) above? *[C.U. M.Com., 2008]*

Solution

Calculation of Specific Cost of Capital:

(i) For Equity Share Capital (K_e)

K_e = 16% (given)

(ii) For Retained Earnings (K_r)

$K_r = K_e$ = 16%, assuming external yield criterion

(iii) For Debentures (K_d)

K_d = 7% (given)

Calculation of Weighted Average Cost of Capital (K_0) using Book Value and Market Values as Weights

Source of Capital	After-tax Cost (%)	Book Value Weights			Market Value Weights		
		Amount	Weights	Weighted Cost	Amount	Weights	Weighted Cost
Equity Share Capital	16.00	20,00,0000	0.25	4.00	8,00,00,000	0.40	6.40
Retained Earnings	16.00	2,00,00,000	0.25	4.00	8,00,00,000	0.40	6.40
Debentures	7.00	4,00,00,000	0.50	3.50	4,00,00,000	0.20	1.40
		8,00,00,000	1.00	11.50	20,00,00,000	1.00	14.20

Note: *The total market value of equity of ₹16,00,00,000 (i.e. 20,00,000 shares at the rate of ₹80 per share) has been divided into equity share capital and retained earnings in the ratio of their book value, i.e. 1:1.

Weighted Average Cost of Capital (K_0) using:

Book value as weights= $\frac{11.50}{1.00}$ or 11.50%

Market value as weights= $\frac{14.20}{1.00}$ or 14.20%

(ii) It has been observed that the calculation of weighted average Cost of Capital using market value is higher than that using book value; the reason being that the market value of equity shares is considerably greater than their book value. Therefore, it provides higher specific Cost of Capital and gives greater emphasis to this source of finance.

3.12 MARGINAL COST OF CAPITAL

Marginal Cost of Capital may be defined as the cost of raising additional rupee of capital. The weighted average cost of new or incremental capital is also known as marginal cost of capital. The marginal Cost of Capital is derived when we calculate the weighted average Cost of Capital by using marginal weight.

This concept is used in Capital Budgeting Decision. It is used as cut-off rate for any investment. To calculate the marginal cost of capital, the intended financing proportion should be applied as weight to marginal component cost. When a firm raises funds in a proportional manner and the cost of the components remains unchanged, there can be no difference between average Cost of Capital of the total funds and the marginal cost of capital.

Illustration 3.27

Problem

The following is the Capital Structure of Cisco Company Ltd. as on December 31, 2016:

	₹
Equity Shares: 5,000 shares (of ₹100 each)	5,00,000
10% Preference Shares (of ₹100 each)	2,00,000
12% Debentures	3,00,000
	10,00,000

The market price of the company's share is ₹110 and it is expected that a dividend of ₹10 per share would be declared for the year 2017. The dividend growth rate is 6%.

(i) If the company is in the 50% tax bracket, compute the weighted average cost of capital.

(ii) Assuming that in order to finance an expansion plan, the company intends to borrow a fund of ₹5 lakhs bearing 14% rate of interest, what will be the company's revised weighted average cost of capital? This financing decision is expected to increase dividend from ₹10 to ₹12 per share. However, the market price of equity share is expected to decline form ₹110 to ₹105 per share.

Solution

(i) Computation of the Weighted Average Cost of Capital (using Market Value Weights)

Source of Finance (a)	**Market Value of Capital**	**Weight (b)**	**After-tax Cost of Capital(%) (c)**	**WACC(%) (d) = (b) × (c)**
Equity Share (Working note 1) [₹110 × 5,000 shares]	5,50,000	0.5238	15.09	7.9041
10% Preference Share	2,00,000	0.1905	10.00	1.9050
12% Debenture	3,00,000	0.2857	6.00	1.7142
	10,50,000	1.0000		11.5233

(ii) Computation of Revised Weighted Average Cost of Capital (using Market Value Weights)

Source of Finance (a)	Market Value of Capital	Weight (b)	After-tax Cost of Capital (%) (c)	WACC (%) (d) = (b) × (c)
Equity shares (working note 2) [₹105 × 5,000 shares]	5,25,000	0.3443	17.43	6.0011
10% Preference Share	2,00,000	0.1311	10.00	1.3110
12% Debenture	3,00,000	0.1967	6.00	1.1802
14% Loan	5,00,000	0.3279	7.00	2.2953
	15,25,000	**1.0000**		**10.7876**

Working Notes:

1. Cost of equity shares (K_e)

$$K_e = \frac{\text{Dividend per share } (D_1)}{\text{Market price per share } (P_0)} + \text{Growth rate } (g)$$

$$= \frac{10}{110} + 0.06 = 0.1509 \text{ or } 15.09\%$$

2. Revised cost of equity share (K_e)

$$\text{Revised } K_e = \frac{12}{105} + 0.06 = 0.1742 \text{ or } 17.43\%$$

Illustration 3.28

Problem

ABC Ltd. has the following book value Capital Structure:

Equity Capital (in share of ₹10 each, fully paid up at par)	₹30 Crores
10% Preference Capital (in shares of ₹100 each, fully paid up at par)	₹2 Crores
Retained Earnings	₹40 Crores
14% Debentures (of ₹100 each)	₹20 Crores
15% Term Loans	₹25 Crores

The next expected divide on equity shares per share is ₹3.60; the dividend per share is expected to grow at the rate of 5%. The market price per share is ₹30.

Preference share are redeemable after 10 years and current market price is ₹80 per preference share.

Debentures, redeemable after 6 years, are selling at ₹90 per debenture.

The income tax rate for the company is 30%

(i) Required to calculate the current weighted average Cost of Capital using
   (a) Book value proportions and
   (b) Market value proportions

(ii) Determine the weighted marginal Cost of Capital schedule for the company, if it raises ₹20 crores next year, given the following information.
   (a) The amount will be raised by equity and debt in equal proportions
   (b) The company expects to retain ₹3 crores earning next year

(c) The additional issue of equity shares will result in the net price per share being fixed at ₹25

(d) The Debt Capital raised by way of term loans will cost 15% for the first ₹5 crores and 16% for the next 5 crores.

Solution

(i) (a) Statement showing Computation of Weighted Average Cost of Capital (using Book Value Proportions)

Source of Finance	Amount (Book Value) (₹ in crores)	Weight (Book Value Proportion) (a)	Cost of Capital (%) (b)	Weighted Cost of Capital (%) (c) = (a) × (b)
Equity Capital (W.N.1)	30.00	0.256	17.00	4.352
10% Preference capital (W.N.2)	2.00	0.017	13.33	0.227
Retained earnings (W.N.1)	40.00	0.342	17.00	5.814
14% Debentures (W.N.3)	20.00	0.171	12.07	2.064
15% Term loans (W.N.4)	25.00	0.214	10.50	2.247
	117.00	1.000		14.704

(b) Statement showing Computation of Weighted Average Cost of Capital (using Market Value Proportions)

Source of Finance	Amount (₹ in crores)	Weight (Market Value Proportion) (a)	Cost of Capital (%) (b)	Weighted Cost of Capital (%) (c) = (a) × (b)
Equity Capital (W.N.1)	90.00 (3 crores × 30)	0.6687	17.00	11.368
10% Preference capital (W.N.2)	(2 lakh × ₹80) = 1.60	0.0119	13.33	0.159
14% Debentures (W.N.3)	(20 lakh × ₹90) = 18.00	0.1337	12.07	1.614
15% term loans (W.N.4)	25.00	0.1857	10.50	1.949
	134.60	1.000		14.942

Note: Since retained earnings are treated as Equity Capital for purposes of calculation of cost of specific source of finance, the market value of the ordinary shares may be taken to represent the combined market value of equity shares and retained earnings. The separate market values of retained earnings and ordinary shares may also be worked out by allocating to each of these a percentage of total market value equal to their percentage share of the total based on book value.

Working Notes:

1. Cost of Equity Capital and retained earnings (K_e)

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

where,

K_e = Cost of Equity Capital

D_1 = Expected dividend at the end of year 1

P_0 = Current market price of equity share

G = Growth rate of dividend

Now, it is given that D_1 = ₹3.60, P_0 = ₹30 and g = 5%

Therefore, $$K_e = \frac{₹3.60}{₹30} + 0.05$$

$$K_e = 0.12 + 0.05 = 0.17 \text{ or } 17\%$$

2. Cost of preference capital (K_p)

$$\frac{\text{PD} + \frac{(\text{RV} - \text{NP})}{n}}{\frac{\text{RV} + \text{NP}}{2}}$$

where,

PD = Preference dividend

RV = Redeemable value of preference shares

NP = Current market price of preference shares

n = Redemption period of preference shares

Now, it is given that PD = 10%, RV = ₹100, NP = ₹80 and n = 10 years

Therefore $$K_p = \frac{10 + \frac{(100 - 80)}{10}}{\frac{100 + 80}{2}} \times 100 = \frac{10 + 2}{90} = 13.33$$

3. Cost of Debenture (K_d)

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

where,

I = Interest payment

NP = Current market price of debentures

RV = Redemption value of debentures

t = Tax rate applicable to the company

n = Redemption period of debentures

Now it is given that I = 14, t = 30%, RV = ₹100, NP = ₹90 and n = 6 years

Therefore, $K_d = \dfrac{14(1-0.30) + \dfrac{(100-90)}{6}}{\dfrac{(100+90)}{2}} \times 100 = \dfrac{9.8 + 1.667}{95} \times 100$

$= 12.07\%$

4. Cost of Term Loans (K_t)

$K_t = r\,(1-t)$

where,

r = Rate of interest on term loans

t = Tax rate applicable to the company

Now, $r = 15\%$ and $t = 30\%$

Therefore, $K_t = 15\,(1 - 0.30) = 10.50\%$

(ii) Statement showing weighted marginal Cost of Capital schedule for the company, if it raises ₹20 crores next year, given the following information:

Source of Finance	Amount (₹ in crores)	Weight (a)	After Tax Cost of Capital (%) (b)	Weighted Cost of Capital (%) (c) = (a) × (b)
Equity shares (W.N.5)	7.00	0.35	19.4	6.79
Retained earnings	3.00	0.15	19.4	2.91
15% Debt (W.N.6)	5.00	0.25	10.5	2.625
16% Debt (W.N.6)	5.00	0.25	11.20	2.8
	20.00	1.000		15.125

Working Notes:

5. Cost of equity share (K_e) (including fresh issue of equity shares)

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

Now, D_1 = ₹3.60, $P_0 = 25$ and $g = 0.05$

Therefore, $K_e = \dfrac{₹3.60}{₹25} + 0.05$

$K_e = 19.40\%$

6. Cost of debt (K_d) = $r(1-t)$

(For first ₹5 crores)

$r = 15\%$ and $t = 30\%$

Therefore, $K_d = 15\,(1 - 0.30) = 10.50\%$

(For first ₹5 crores)

$r = 16\%$ and $t = 30\%$

Therefore, $K_d = 16\,(1 - 0.30) = 11.20\%$

3.13 ADDITIONAL SOLVED PROBLEMS

1. Wisconson Company has assets of ₹32,00,000 that have been financed by ₹18,00,000 of equity (shares of ₹100 each), general reserve of ₹3,60,000 and debt of ₹10,40,000. For the year ended March 31, 2002 the company's total profits before interest and taxes were ₹6,23,200. Wisconson pays 8% interest on borrowed capital and is in a 40% tax bracket. The market value of equity as on March 31, 2002 was ₹150 per share. What was the weighted average cost of capital? Use market values as weights.

[C.U. M.Com., 2002]

Solution

Calculation of Specific Cost of Capital:

(a) For Equity Share Capital (K_e)

$$K_e = \frac{\text{EPS}}{\text{MPS}} \quad \text{or} \quad \frac{E}{P_0}$$

where,

EPS = Earnings per share

MPS = Market price per share, i.e. ₹150

Calculation of EPS	₹
Earnings before interest and taxes	6,23,200
Less: Interest (8% of ₹10,40,000)	83,200
EBT	5,40,000
Less: Tax @ 40%	2,16,000
EAT	3,24,000

$$\text{Therefore, EPS} = \frac{\text{EAT}}{\text{No. of equity shares}}$$

$$= \frac{₹3,24,000}{(₹18,00,000/₹100)}$$

$$= ₹18$$

$$K_e = \frac{₹18}{₹150}$$

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

(b) For general reserve (K_r)

$K_r = K_e = 12\%$, assuming external yield criterion

(c) For Debt (K_d)

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

where,

I = Fixed annual interest payment, i.e. 8% of ₹10,40,000 = ₹83,200

ND = Net cash proceeds from the issue of debt, i.e. ₹10,40,000

t = Tax rate, i.e. 40% or 0.40

$$K_d = \frac{₹83,200}{₹10,40,000} (1 - 0.40)$$

$$= 0.048 \text{ or } 4.8\%$$

Calculation of Weighted Average Cost of Capital (K_0)
(using Market Values as Weights)

Source of Capital	Amount (Market Value) ₹	Proportion or Weights	After-tax Cost (%)	Weighted Cost
Equity Share Capital (5/6)*	22,50,000	0.6016	12.0	7.2192
General Reserve (1/6)*	4,50,000	0.1203	12.0	1.4436
Debt	10,40,000	0.2781	4.8	1.3349
	37,40,000	1.0000		9.9977

Note: *The total market value of equity of ₹27,00,000 (i.e. 18,000 shares at the rate of ₹150 per share) has been divided into equity share capital and general reserve in the ratio of their book value, i.e. 18,00,000:3,60,000 or 5:1

$$K_0 = \frac{9.9977}{1.0000} \text{ or } \mathbf{10\%}$$

2. From the following information in respect of a company for the year ended December 31, 2002, calculate weighted average Cost of Capital taking market values as weights. *[C.U. M.Com., 2003]*

(i) Capital Structure

	₹/lakh
Equity (Shares of ₹100 each)	*300*
Retained Earnings	200
11% Convertible Debentures (₹100 each)	200
12% Institutional Loan	300
	1,000

(ii) Current market price is ₹200 per share. Corporate tax is 40%

(iii) Current dividend per share is ₹12. Tax on dividend is 10%. Future growth rate in dividend may be taken as a proxy of the average of the annual growth rates. The company's past dividends per share were as follows:

Year	Dividend per Share (₹)
1997	6.50
1998	7.00

1999	8.00
2000	8.50
2001	10.00

Solution

Calculation of Specific Cost of Capital:

(i) For Equity Share Capital (K_e):

$$K_e = \frac{DPS_1(1+t)}{MPS} + g \quad \text{or} \quad \frac{D_1(1+t)}{P_o} + g$$

where,

$D_1 = DPS_1$ = Dividend per share at the end of the current year, i.e. ₹12

P_o = MPS = Market price per share, i.e. ₹200

t = Corporate dividend tax rate, i.e. 10% or 0.10

g = Expected growth rate of dividend, i.e. 11.47 % or 0.1147 which may be calculated as follows:

Growth rate in 1998 = $\frac{(₹7 - ₹6.50)}{₹6.50} \times 100 = 7.692\%$

Growth rate in 1999 = $\frac{(₹8 - ₹7)}{₹7} \times 100 = 14.286\%$

Growth rate in 2000 = $\frac{(₹8.50 - ₹8)}{₹8} \times 100 = 6.25\%$

Growth rate in 2001 = $\frac{(₹10 - ₹8.50)}{₹8.50} \times 100 = 17.467\%$

Simple Average = $\frac{7.692 + 14.286 + 6.25 + 17.467}{4}$

$= \frac{45.875}{4} = 11.47\%$ or 0.1147

Therefore, $K_e = \frac{₹12(1+0.10)}{₹200} + 0.1147$

$= \frac{13.2}{200} + 0.1147 = 0.1807$ or 18.07%

(ii) For Retained Earnings (K_r):

$K_r = K_e = 18.07\%$, assuming external yield criterion

(iii) For 11% Convertible Debentures (K_d):

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

where,

I = Rate of interest, = 11%

ND = Net cash proceeds from issue of debt = ₹100

t = Corporate tax rate, i.e. 40% or 0.40

Therefore, $K_d = \frac{11}{100}(1 - 0.40)$

$= 0.066$ or 6.6%

(iv) For 12% institutional loan (K_{IL}):

$$K_{IL} = I(1 - t)$$

where,

I = Rate of interest = 12%

T = Corporate tax rate, i.e. 40% or 0.40

Therefore, $K_d = 12(1 - 0.40) = 0.072$ or 7.2%

Calculation of Weighted Average Cost of Capital (K_0)
(using Market Values as Weights)

Source of Capital	Amount (Market Value) ₹	Proportion or Weights	After-tax Cost (%)	Weighted Cost
Equity Share Capital*	3,60,00,000	0.327	18.07	5.909
Retained Earnings*	2,40,00,000	0.218	18.07	3.939
11% Convertible Debentures	2,00,00,000	0.182	6.6	1.201
12% Institutional Loan	3,00,00,000	0.273	7.2	1.966
	11,00,00,000	1		13.015

Note: *The total market value of equity of ₹6,00,00,000 (i.e. 3,00,000 shares at the rate of ₹200 per share) has been divided into equity share capital and general reserve in the ratio of their book value, i.e. 3:2.

$$K_0 = \frac{13.015}{1.000} \text{ or } 13.02\%$$

3. From the following information in respect of a company for the year ended December 31, 2003, calculate weighted average Cost of Capital taking market values as weights.

(i) **Capital Structure**	**₹/lakh**
Equity (Shares of ₹100 each)	200
Reserves and Surplus	100
10% Bonds (₹1,000 each)	200
	500

(ii) Current market prices: Equity, ₹300 per share; Bond, ₹1,010 per unit
(iii) Corporate tax is 40%
(iv) Current dividend per share is ₹20. Tax on dividend is 10%. Future growth rate in dividend may be taken as a proxy of the average of the annual growth rates. The company's past dividends per share were follows:

Year	Dividend per Share (₹)
1998	12.50
1999	13.00
2000	14.00
2001	15.50
2002	17.50

[C.U. M.Com., 2004]

Solution

Calculation of Specific Cost of Capital:

(i) For Equity Share Capital (K_e):

$$K_e = \frac{DPS_1(1+t)}{MPS} + g$$

where,

DPS_1 = Dividend per share at the end of the current year, i.e. ₹20
MPS = Market price per share, i.e. ₹300
t = Corporate dividend tax rate, i.e. 10% or 0.10
g = Expected growth rate of dividend, i.e. 8.8275% or 0.0883, which may be calculated as follows:

$$\text{Growth rate in 1999} = \frac{(₹13 - ₹12.50)}{₹12.50} \times 100 = 4\%$$

$$\text{Growth rate in 2000} = \frac{(₹14 - ₹13)}{₹13} \times 100 = 7.6923\%$$

$$\text{Growth rate in 2001} = \frac{(₹15.50 - ₹14)}{₹14} \times 100 = 10.7143\%$$

$$\text{Growth rate in 2002} = \frac{(₹17.50 - ₹15.50)}{₹15.50} \times 100 = 12.9032\%$$

$$\text{Simple Average} = \frac{4 + 7.6923 + 10.7143 + 12.9032}{4}$$

$$= \frac{35.3098}{4} = 8.8275\% \text{ or } 0.0883$$

Therefore, $K_e = \frac{₹20\,(1 + 0.10)}{₹300} + 0.0883$

$= \frac{22}{300} + 0.0883 = 0.1616$ or 16.16%

(ii) For Reserves and Surplus (K_r):

$K_r = K_e = 16.16\%$, assuming external yield criterion

(iii) For 10% bonds (K_d):

$K_d = I\,(1 - t)$

where,

I = Rate of interest, i.e. ₹10

t = Corporate tax rate, i.e. 40% or 0.40

Therefore, $K_d = 10\,(1 - 0.40)$

$= 6\%$

Calculation of Weighted Average Cost of Capital (K_0)
(using Market Values as Weights)

Source of Capital	Amount (Market Value) ₹	Proportion or Weights	After-tax Cost (%)	Weighted Cost
Equity Share Capital*	4,00,00,000	0.4987	16.16	8.0590
Reserve and Surplus*	2,00,00,000	0.2494	16.16	4.0303
10% Bonds**	2,02,00,000	0.2519	6.00	1.5114
	8,02,00,000	1.0000		13.6007

Note: *the total market value of equity of ₹6,00,00,000 (i.e. 2,00,000 shares at the rate of ₹300 per share) has been divided into Equity Share Capital and General Reserve in the ratio of their book value, i.e. 2:1

**Market value of 10% bonds = (2,00,00,000/1,000) × 1,010 = ₹2,02,00,000

$K_0 = \frac{13.6007}{1.000}$ or 13.60%

4. While considering the most desirable Capital Structure of a company, the following estimates of the cost of debt and Equity Capital (after tax) have been made at various levels of the debt–equity mix:

Debt as Percentage of Total Capital Employed	Cost of Debt (%)	Cost of Equity (%)
0	—	15
10	7	15
20	7	16

(Contd.)

30	8	17
40	9	18
50	10	21
60	11	24

What is composite Cost of Capital at different levels of debt-financing? Can you suggest an optimal debt–equity mix in the above case? *[C.U. M.Com., 2005]*

Solution

The following table shows Cost of Capital at different levels:

Equity			Debt			Total Cost of Capital (K_0)
Proportion	**Cost**	**Weighted Cost**	**Proportion**	**Cost**	**Weighted Cost**	
1.00	15	15	—	—	—	15
0.90	15	13.5	0.10	7	0.7	14.2
0.80	16	12.8	0.20	7	1.4	14.2
0.70	17	11.9	0.30	8	2.4	14.3
0.60	18	10.8	0.40	9	3.6	14.4
0.50	21	10.5	0.50	10	5	15.5
0.40	24	9.6	0.60	11	6.6	16.2

From the above table, it is evident that the Cost of Capital is minimum at two levels, i.e. (a) when equity is 90% and debt is 10% and (b) when equity is 80% and debt is 20%; hence, either of the two levels may be adopted.

5. The current Capital Structure of a firm is given as follows:

	Amount (₹/lakh)
Equity share capital (₹100 each)	400
Retained earnings	200
12% debentures (₹100 each)	400
	1,000

You are given the following further information:

(i) Current market value per share is ₹300
Dividend paid per share in the last year was ₹45
Growth rate in dividend is 10%

(ii) The market value of debenture is ₹110 per debenture

(iii) Corporate tax rate is 40%

Using market values as weights, find out the average Cost of Capital of the firm.
[C.U. M.Com., 2006]

Solution

Calculation of Specific Cost of Capital:

(i) For Equity Share Capital (K_e)

$$K_e = \frac{DPS_0(1+g)}{MPS} + g$$

where,

DPS_0 = Previous year dividend per share, i.e. ₹45

MPS = Market price per share, i.e. ₹300

g = Expected growth rate in dividend, i.e. 10% or 0.10

$$K_e = \frac{45(1+0.10)}{300} + 0.10$$

$$= 0.265 \text{ or } 26.5\%$$

(ii) For Retained Earnings (K_r)

$K_r = K_e$ = 26.5%, assuming external yield criterion

(iii) For 12% Debentures (K_d)

$$K_d = I(1-t)$$

where,

I_i = Cost of debentures before tax, i.e. 12%

t = Corporate tax rate, i.e. 40% or 0.40

$K_d = 12\ (1 - 0.40)$

$K_d = 7.20\%$

Calculation of Weighted Average Cost of Capital (K_0)
(using Market Values as Weights)

Source of Capital	Amount (Market value) ₹	Proportion or Weights	After-tax Cost (%)	Weighted Cost
Equity Share Capital (2/3)*	8,00,00,000	0.4878	26.50	12.9267
Retained Earnings (1/3)*	4,00,00,000	0.2439	26.50	6.4634
12% Debentures (4,00,000 × ₹110)	4,40,00,000	0.2683	7.20	1.9318
	16,40,00,000	1.0000		21.3219

***Note:** The total market value of equity of ₹12,00,00,000 (i.e. 4,00,000 shares at the rate of ₹300 per share) has been divided into equity share capital and retained earnings in the ratio of their book value, i.e. 2:1

$$K_0 = \frac{21.3219}{1.0000} \text{ or } 21.32\%$$

6. You are given the following Capital Structure of a public limited company:

	₹/lakh
Equity (₹10 each)	100
Reserves and Surplus	50
9% Debentures (₹100 each)	150
	300

The other particulars are as follows:

(i) Current market price per share is ₹90. Current dividend per share is ₹13.50. Growth rate in dividend is 5%.

(ii) Corporate tax rate is 40%.

Calculate cost of each of the sources of capital and weighted average Cost of Capital taking market value as weights. *[C.U. M.Com., 2010]*

Solution

Calculation of Specific Cost of Capital:

(i) For Equity Share Capital (K_e)

$$K_e = \frac{DPS_1}{MPS} + g$$

where,

DPS_1 = Dividend per share at the end of current year, i.e. ₹13.50

MPS = Market price per share, i.e. ₹90

g = Growth rate in dividend, i.e. 5% or 0.05

$$K_e = \frac{13.50}{90} + 0.05$$

$$= 0.20 \text{ or } 20\%$$

(ii) For Retained Earnings (K_r)

$K_r = K_e$ = 20%, assuming external yield criterion

(iii) For 9% Debentures (K_d)

$$K_d = I(1 - t)$$

where,

I = Annual Interest Rate = 9%

t = Corporate Tax rate, i.e. 40% or 0.40

= 9 (1 – 0.40)

= 5.4%

Calculation of Weighted Average Cost of Capital (K_0)
(using Market Values as Weights)

Source of Capital	Amount (Market value) ₹	Proportion or Weights	After-tax Cost (%)	Weighted Cost
Equity Share Capital (2/3)*	6,00,00,000	0.5714	20	11.428
Retained Earnings (1/3)*	3,00,00,000	0.2857	20	5.714
12% Debentures	1,50,00,000	0.1429	5.4	0.772
	10,50,00,000	1		17.914

Note: *the total market value of equity of ₹9,00,00,000 (i.e. 10,00,000 shares at the rate of ₹90 per share) has been divided into equity share capital and retained earnings in the ratio of their book value, i.e. 2:1

$K_0 = 17.914\%$

7. Using Dividend Growth Model, calculate cost of equity (K_e) in the following case:

Equity share capital (shares of ₹10 each)	₹2,00,000
Earnings for 2011	₹60,000
Current market price per share	₹180

Dividends per share:	₹
2008	7
2009	8
2010	10
2011	11

[C.U. M.Com., 2011]

Solution

For Equity Share Capital (K_e):

$$K_e = \frac{DPS_1}{MPS} + g$$

where,

DPS_1 = Dividend per share at the end of the current year, i.e. ₹11

MPS = Market price per share, i.e. ₹180

g = Expected growth rate of dividend, i.e. 0.1643 or 16.43% which may be calculated as follows:

$$\text{Growth rate in 2009} = \frac{(₹8 - ₹7)}{₹7} \times 100 = 14.29\%$$

$$\text{Growth rate in 2010} = \frac{(₹10 - ₹8)}{₹8} \times 100 = 25\%$$

$$\text{Growth rate in 2011} = \frac{(₹11 - ₹10)}{₹10} \times 100 = 10\%$$

$$\text{Simple Average} = \frac{14.29 + 25 + 10}{3}$$

$$= \frac{49.29}{3} = 16.43\% \text{ or } 0.1643$$

$$\text{Therefore,} \quad K_e = \frac{₹11}{₹180} + 0.1643$$

$$= 0.2254 \text{ or } 22.54\%$$

8. XYZ Ltd. is considering its shares in the market at ₹20. The company pays a dividend of ₹1 per share and g = 5% p.a. Compute (i) K_e, (ii) if g = 6% p.a. what would be current market price P_o, (iii) if K_e = 8% and g = 5% p.a. and D = ₹1 per share what would be P_o? (where, K_e, cost of equity; g, growth rate; P_o, current market price)

[C.U. M.Com., 2012]

Solution

(i) $K_e = \frac{\text{DPS}}{\text{MPS}} + g$

where,

DPS = Dividend per share, i.e. ₹1

MPS = Market price per share, i.e. ₹20

g = Growth rate, i.e. 0.05

$$K_e = \frac{1}{20} + 0.05$$

$$= 0.05 + 0.05 = 0.10 \text{ or } 10\%$$

(ii) $K_e = \frac{\text{DPS}}{\text{MPS}} + g$

where,

DPS = Dividend per share, i.e. ₹1

MPS = Market price per share

g = Growth rate, i.e. 0.06

K_e = Cost of Equity Capital, i.e. 0.10

$$0.10 = \frac{1}{\text{MPS}} + 0.06$$

or $0.10 - 0.06 = 1/\text{MPS}$

or $\text{MPS} = 1/0.04 = ₹25$

(iii) $K_e = \frac{\text{DPS}}{\text{MPS}} + g$

where,

DPS = Dividend per share, i.e. ₹1

MPS = Market price per share

g = Growth rate, i.e. 0.05

K_e = Cost of Equity Capital, i.e. 0.08

$$0.08 = \frac{1}{\text{MPS}} + 0.05$$

or $0.08 - 0.05 = 1/\text{MPS}$

or $\text{MPS} = 1/0.03 = ₹33.33$

9. A company is planning to issue 14% perpetual preference shares with face value of ₹100 each. Flotation cost is estimated to be 4%. Compute the (i) cost of preference shares if they are issued at (a) face value, (b) 10% premium and (c) 5% discount and (ii) compute the cost of preference share under these conditions assuming 5% dividend tax.

[C.U. M.Com., 2013]

Solution

(i) Cost of preference share can be calculated as follows:

$$K_p = D/\text{NP}$$

where, D = Rate of dividend = 14%

NP = Net cash proceeds from issue of preference shares

The Floatation cost for the issue = 4%

(a) When preference shares are issued at face value

$K_p = 14/100 - 4\%$ of $100 = 14/96 = 14.58\%$

(b) When preference shares are issued at 10% premium

$K_p = 14/(110 + 10\%$ of $100) - (4\%$ of $110) = 14/110 - 424 = 14/105.6 = 13.26\%$

(c) When preference shares are issued at 5% discount

$K_p = 14/(100 - 5\%$ of $100) - (4\%$ of $95) = 14/95 - 3.8 = 14/91.2 = 15.35\%$

Note: We assume that the company computes floatation cost on the net proceeds of the issue.

(ii) Cost of preference shares under the above-mentioned conditions when dividend tax is 5%

$$K_p = \frac{D(1+t)}{\text{NP}}$$

where, D = Rate of dividend

NP = Net cash proceeds from issue of preference shares

t = Dividend tax

(d) When preference shares are issued at face value

$K_p = 14(1 + 0.05)/96 = 15.31\%$

(e) When preference shares are issued at 10% premium

$K_p = 14(1 + 0.05)/105.6 = 13.92\%$

(f) When preference shares are issued at 5% discount

$K_p = 14(1 + 0.05)/91.2 = 16.12\%$

10. A company supplied the following information to you and requested to compute Cost of Capital based on book values as well as market values.

Sources of Finance	Book Value (₹)	Market Value (₹)	After-Tax Cost (%)
Equity Capital	10,00,000	15,00,000	12
Long-term Debt	8,00,000	7,50,000	7
Short-term Debt	2,00,000	2,00,000	4
	20,00,000	24,50,000	

[C.U. M.Com., 2014]

Solution

Calculation of Weighted Average Cost of Capital (K_0)
(using Book Value and Market Values as Weights)

Source of Capital	After-Tax Cost (%)	Book Value Weights			Market Value Weights		
		Amount	Weights	Weighted Cost	Amount	Weights	Weighted Cost
Equity share capital	12	10,00,000	0.5	6	15,00,000	0.612	7.344
Long-term debt	7	8,00,000	0.4	2.8	7,50,000	0.306	2.142
Short-term debt	4	2,00,000	0.1	0.4	2,00,000	0.082	0.328
		20,00,000	1	9.2	24,50,000	1	9.814

Weighted Average Cost of Capital (K_0) using

Book value as weights = $\frac{9.2}{1.00}$ or 9.2%

Market Value as weights = $\frac{9.814}{1.00}$ or 9.814%

11. Shye Electronic Company is planning to raise ₹4,00,000 by way of 14% perpetual debt. The tax rate is 40 %. Determine cost of Debt Capital (pre-tax and post-tax) if the debt is raised at (i) face value, (ii) 10% premium and (iii) 10% discount. *[C.U. M.Com., 2015]*

Solution

Cost of debt can be calculated as follows:

(a) If debt is raised at face value

After tax

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

where,

I = Fixed annual interest payment, i.e. ₹56,000

t = Corporate Tax rate, i.e. 40% or 0.40

ND = Net cash proceeds from issue of debt, i.e. ₹4,00,000

$$K_d = \frac{56,000}{4,00,000} (1 - 0.40)$$

$$= 0.084 \text{ or } 8.4\%$$

Before Tax

$$K_i = \frac{I}{\text{ND}}$$

where,

I = Fixed annual interest payment, i.e. ₹56,000

ND = Net cash proceeds from issue of debt, i.e. ₹4,00,000

$$K_d = \frac{56{,}000}{4{,}00{,}000} = 0.14 \text{ or } 14\%$$

(b) If debt is raised at 10% premium

After tax

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

where,

I = Fixed annual interest payment, i.e. ₹56,000

t = Corporate tax rate, i.e. 40% or 0.40

ND = Net cash proceeds from issue of debt, i.e. ₹4,40,000

$$K_d = \frac{56{,}000}{4{,}40{,}000} (1 - 0.40)$$

$$= 0.0764 \text{ or } 7.64\%$$

Before Tax

$$K_i = \frac{I}{\text{ND}}$$

where,

I = Fixed annual interest payment, i.e. ₹56,000

ND = Net cash proceeds from issue of debt, i.e. ₹4,40,000

$$K_d = \frac{56{,}000}{4{,}40{,}000} = 0.1273 \text{ or } 12.73\%$$

(c) If debt is raised at 10% discount

After tax

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

where,

I = Fixed annual interest payment, i.e. ₹56,000

t = Corporate tax rate, i.e. 40% or 0.40

ND = Net cash proceeds from issue of debt, i.e. ₹3,60,000

$$K_d = \frac{56{,}000}{3{,}60{,}000} (1 - 0.40)$$

$$= 0.093 \text{ or } 9.3\%$$

Before Tax

$$K_i = \frac{I}{\text{ND}}$$

where,

I = Fixed annual interest payment, i.e. ₹56,000

ND = Net cash proceeds from issue of debt, i.e. ₹3,60,000

$$K_d = \frac{56{,}000}{3{,}60{,}000} = 0.1555 \text{ or } 15.55\%$$

3.14 SUMMARY

1. Cost of Capital	Cost of Capital is the return expected by the providers of capital (i.e. shareholders, lenders and the debt-holders) to the business as a compensation for their contribution to the total capital. It is also known as discount rate, minimum Rate of Return, etc. It can also be stated as the opportunity cost of an investment, i.e. the Rate of Return that a company would otherwise be able to earn at the same risk level as the investment that has been selected.
2. Sources of Capital	Sources of capital may include: (i) Equity shares (ii) Preference shares (iii) Debentures/bond/other debt instruments (iv) Loan from financial institutions, etc.
3. Cost of Debt	(a) Cost of Debt: A debt may be in the form of bond or debenture. (i) Cost of Debentures: The cost of debentures and long-term loans is the contractual interest rate adjusted further for the tax liability of the company. • Cost of Irredeemable Debentures: Cost of debentures not redeemable during the life time of the company. $K_d = \frac{I}{\text{NP}}(1-t)$ • Cost of Redeemable Debentures: If the debentures are redeemable after the expiry of a fixed period, the cost of debentures would be as follows: $K_d = \frac{1(1-t) + \frac{(\text{RV} - \text{NP})}{n}}{\frac{(\text{RV} + \text{NP})}{n}}$ (This formula to calculate cost of debt is used where only interest on debt is tax-deductible)

	or $$K_d = \frac{1(1-t) + \frac{(\text{RV} - \text{NP})}{n}}{\frac{(\text{RV} - \text{NP})}{n}}(1-t)$$ (This formula to calculate cost of debt is used where not only interest on debt, but discount on issue of debt and premium on redemption of debt are also tax-deductible) In absence of any specific information, students may use the above formulae to calculate the cost of debt (K_d) with logical assumption.
4. Amortisation of Bond	A bond may be amortised every year, i.e. principal is repaid every year rather than at maturity. In such a situation, the principal will go down with annual payments and interest will be computed on the outstanding amount. $$V_B = \sum_{t=1}^{n} \frac{C_t}{(1+K_d)^t}$$
5. Cost of Preference Share	The cost of Preference Share Capital is the dividend expected by its holders. • **Cost of Irredeemable Preference Share** Cost of irredeemable Preference shares (K_p) = $\frac{\text{PD}}{P_0}$ • **Cost of Redeemable Preference Shares:** If the preference shares are redeemable after the expiry of a fixed period the cost of preference shares would be as follows: $$K_P = \frac{\text{PD} + (\text{RV} - \text{NP})/n}{\frac{\text{RV} + \text{NP}}{2}}$$
6. Cost of Equity	Cost of Equity Capital is the Rate of Return which equates the Present Value of expected dividends with the market share price. **Methods for Computation of Cost of Equity Capital** • **Dividend Price Approach:** Here, cost of Equity Capital is computed by dividing the expected dividend by market price per share.

	$$K_e = \frac{D_1}{P_0}$$ • **Earning/Price Approach:** The advocates of this approach correlate the earnings of the company with the market price of its share. $$K_e = \frac{E}{P}$$ • **Realised Yield Approach:** According to this approach, the average Rate of Return realised in the past few years is historically regarded as 'expected return' in the future. The yield of equity for the year is as follows: $$Y_t = \frac{D_t + P_t}{P_{t-1}}$$ • **Capital Asset Pricing Model Approach (CAPM):** CAPM model describes the risk-return trade-off for securities. It describes the linear relationship between risk and return for securities. $$K_e = R_f + \beta(R_m - R_f)$$
7. Cost of Retained Earnings	It is the opportunity cost of dividends foregone by shareholders. • $\text{DCF} = K_s = \frac{D_1}{P_0} + g$ • CAPM $$K_e = R_f + \beta(R_m - R_f)$$ If personal tax rate (t_p) is given, then $K_s = K_e (1 - t_p)$
8. Weighted Average Cost of Capital (WACC)	It is an average Rate of Return expected by all contributors of capital taking the weight of each element of capital to total capital $\text{WACC}(K_O)$ = % (Debt × K_d) + (%Pref. capital × K_p) + (%Equity Capital × K_e)
9. Marginal Cost of Capital	It may be defined as 'the cost of raising an additional rupee of capital'. To calculate the marginal cost of capital, the intended financing proportion should be applied as weights to marginal component costs. The marginal Cost of Capital should, therefore, be calculated in the composite sense. The marginal weights represent the proportion of funds the firm intends to employ.

EXERCISES

A. Short-answer Type Questions **(5 Marks)**

1. State the role of lease financing. *[C.U. B.Com. (H), 2006]*
2. Write the merits and demerits of convertible debenture. *[C.U. B.Com. (H), 2007]*
3. Write short note on Commercial Paper. *[C.U. B.Com. (H), 2007]*
4. Write short note on lease financing in India. *[C.U. B.Com. (H), 2008]*
5. Write a short note on the popularity of trade credit as a source of short term finance. *[C.U. B.Com. (H), 2008]*
6. State the prospect of lease financing. *[C.U. B.Com. (H), 2010]*
7. What do you mean by the term financing? Write down its features briefly. *[C.U. B.Com. (H), 2012]*
8. Discuss the advantages and disadvantages of ploughing back of profit. *[C.U. B.Com. (H), 2012]*
9. State in brief the weights that you would take into consideration for computing weighted average cost of capital. Why market value weights are considered superior to the book value weights?
10. Distinguish between specific costs and weighted average cost of capital. What is the rationale for computing after-tax weighted average cost of capital?
11. State the various methods of computation of cost of equity. Which of them do you consider superior and why?
12. Explain in brief the relevance of cost of capital. What are the pros and cons of market value weights used for computing overall Cost of Capital of a firm?
13. 'Cost of Capital is used as a decision criterion' Explain.
14. How would you justify the use of after-tax weighted average cost of capital?
15. Examine how Capital Asset Pricing Model serves as a useful tool in measuring cost of Equity Capital of a firm. How would you measure value of beta (β)?
16. State pros and cons of book value weights and market value weights in measuring weighted average Cost of Capital (K_0) of a firm.
17. Explain any two short-term sources of capital. *[C.U. M.Com., 2013]*
18. Explain the role of Cost of Capital in Financial Management.
19. What are the steps involved in calculating a firm's weighted average cost of capital? *[C.U. M.Com., 2014]*
20. Explain any two long-term sources of capital. *[C.U. M.Com., 2014]*

B. Practical Problems

1. X Ltd. furnishes the following information:

Earnings per share (EPS)	₹4
Dividend payout ratio	25%
Market price per share	₹40
Rate of tax	30%
Growth rate of dividend	8%

Compute the cost of equity. **[Ans. K_e=10.5%]**

2. B Ltd. issued 40,000, 12% Redeemable Preference Shares of ₹100 each at a premium of ₹5 each, redeemable after 10 years at a premium of ₹10 each. The floatation cost of each share is ₹2. Calculate cost of Preference Share Capital ignoring dividend tax.

[Ans. K_p = 11.92%]

3. Y Ltd. issues 25,000, 14% debentures of ₹1,000 each. The debentures are redeemable after expiry period of 5 years. Tax rate applicable to the company is 35%. Calculate the cost of debt if debentures are issued at 5% discount with 2% floatation cost.

[Ans. K_d = 10.37%]

4. S Ltd. has its share quoted in the stock exchange. The current market price per share is ₹24. The gross dividend per share over the last four years has been ₹1.20, ₹1.32, ₹1.45 and ₹1.60. Compute the cost of equity share. **[Ans. K_e = 17%]**

5. RS Ltd. has 50,000 equity shares of ₹10 each. Current market price per share is ₹50, and the earning available to equity shareholders at the end of the period is ₹4,00,000. The earnings rate are expected to grow @ 6% p.a. Floatation cost 5% of current market price. Calculate the cost of equity share. **[Ans. K_e = 22.84%)]**

6. X Ltd. issues ₹50,000, 12% debentures of ₹100 each. The debentures are redeemable after the expiry of fixed period of 5 years. The Company is in 30% tax bracket.
   Required:
   (i) Calculate the cost of debt after tax, if debentures are issued at
   (a) Par; (b) 10% Discount; (c) 10% Primium.
   (ii) If brokerage is paid at 2%, what will be the cost of debentures, if issue is at par?

[Ans. (i) (a) K_d = 8.4%, (b) K_d = 10.95% (c) K_d = 6.09% (ii) K_d = 8.89%]

7. PQR Ltd. Has the following book-value Capital Structure as on March 31, 2016.

Sources of capital	₹
Equity share capital(1,00,000 shares)	20,00,000
12% Preference share	5,00,000
10% Debentures	15,00,000
	40,00,000

The equity shares of the company are sold for ₹25. It is expected that the company will pay next year a dividend of ₹2 per equity share, which is expected to grow by 6% p.a. forever. Assume a 30% corporate tax rate.

Required:

(i) Compute weighted average Cost of Capital (WACC) of the company based on the existing Capital Structure.

(ii) Compute the new WACC, if the company raises an additional ₹10 lakhs debt by issuing 12.5% debentures. This would result in increasing the expected equity dividend to ₹2.40 and level the growth rate unchanged, but the price of equity share will fall to ₹20 per share.

[Ans. (i) K_e = 14%, K_p = 12%, K_d = 7%, K_o = 11.125%,
(ii) K_e = 18%, K_d = 8.75%, K_o = 12.25%]

8. XYZ Ltd. has the following book value Capital Structure:

Equity Share Capital (300 million shares, ₹10 par)	₹3,000 million
Reserves and Surplus	₹4,500 million
11% Preference Share Capital (2 million shares, ₹100 par)	₹200 million
10% Debentures (3 million debentures, ₹1,000 par)	₹3,000
9% Term Loans from Financial Institutions	₹500 million

The debentures of X Ltd. are redeemable after three years and are quoting at ₹982.5 per debenture. The applicable income tax rate for the company is 30%.

The current market price per equity share is ₹60. The prevailing default-risk free interest rate on 10 year GOI Treasury Bonds is 5.5%. the average market risk premium is 8%. The beta of the company is 1.1875.

The preferred stock of the company is redeemable after 5 years is currently selling at ₹98.15 per preference share.

Required:

(i) Calculate weighted average Cost of Capital of the company using market value weights.

(ii) Define the marginal Cost of Capital schedule for the firm if it raises ₹1500 million for a new project. The firm plans to have a debt of 20% of the newly raised capital. The beta of new project is 1.4375. The Debt Capital will be raised through term loans, it will carry interest rate of 10% for the first ₹200 million and 10.5% for the next ₹100 million.

[Ans. (i) K_e = 15%, K_p = 11.48%, K_d = 7.65%, K_t = 6.30%, K_o = 13.598%,
(ii) K_e = 17%, K_d = 6.30% & K_d = 7.35%, K_o = 14.93%]

9. The Capital Structure of ABC Ltd. as follows:

Source of capital	Book value (₹)	Market value(₹)
Equity shares @ ₹100 each	40,00,000	80,00,000
10% Cumulative preference shares @ ₹100 each	10,00,000	12,00,000
12% Debentures	30,00,000	33,00,000
Retained earnings	20,00,000	—
	1,00,00,000	1,25,00,000

The current market price of the company's equity share is ₹200. For the last year the company had paid equity dividend at 20% and its dividend is likely to grow 6% every year. The corporate tax rate is 30% and shareholders personal income tax rate is 20%.
You are required to calculate:

(i) Cost of Capital for each source of capital.
(ii) Weighted average Cost of Capital on the basis of book value weights
(iii) Weighted average Cost of Capital on the basis of market value weights

[Ans. (i) K_e = 16.6%, K_p = 10%, K_d = 8.4%, K_r = 13.26%
(ii) K_o = 12.812%
(iii) K_o = 13.802%]

4A CHAPTER

Leverage

CHAPTER OUTLINE

4A.1 Introduction
4A.2 Business Risk
4A.3 Financial Risk
4A.4 Leverage
4A.5 Concept of Trading on Equity
4A.6 Additional Solved Problems
4A.7 Summary

4A.1 INTRODUCTION

In finance, leverage is very closely associated with fixed expenses. It can be stated that by the introduction of expenses which are fixed in nature, we are leveraging a firm. Fixed expenses are those expenses whose amount remains unchanged irrespective of the activity of the business. For example, an amount of investment made in fixed assets or interest paid on loans does not change with a normal change in number of sales. Fixed expenses can be classified into two types—operating fixed expenses such as depreciation on fixed assets, salaries, etc.; and financial fixed expenses such as interest and dividend on preference shares. Likewise, Leverages are also of two types—financial Leverage and operating Leverage.

4A.2 BUSINESS RISK

The term 'business risk' refers to the inherent uncertainty in the physical operations of the firm. Its impact is shown in the variability of the firm's operating income (EBIT). Degree of Operating Leverage (DOL) is only one component of business risk and becomes active only in the presence of sales and production cost variability. DOL magnifies the variability of Operating Profits and, hence, business risk. It is also termed as 'operating risk'. It is associated with the normal day-to-day operations of business. Every firm operates within a particular internal and external operating environment. The impact of the operating environment is reflected in the operating costs of the firm. Operating cost is the sum total of fixed costs and

variable costs. Existence of excessive fixed cost is disadvantageous to the firm. Business risk is independent of the Capital Structure because the Rate of Return is not affected by the sources from which the funds have been raised. It is important to keep in mind that a business unit cannot make its operating risk zero but it can minimize the risk by controlling factors like early recovery of fixed costs, minimising the effects of inflation by making a long-term contracts with the suppliers, etc.

4A.3 FINANCIAL RISK

Financial risk arises from the Financing Decisions of a firm. The origin of this type of risk lies in the Capital Structure, i.e. the use of Debt Capital. The presence of debt in the Capital Structure of a firm necessitates fixed payments in the form of interest. It is a type of compulsory payment that must be made regardless of the fact the firm makes a profit or not. By using Debt Capital, a firm can increase the Rate of Return on equity because Debt Capital is usually cheaper. Therefore, it can be said that the use of Debt Capital can have a magnifying effect on the earnings of the equity shareholders, but at the same time, it adds financial risk. The variability in earnings of the equity shareholders because of the presence of Debt Capital in the Capital Structure of a firm is known as financial risk. Accordingly, a firm having no Debt Capital in its Capital Structure has no financial risk. As such, financial risk is an avoidable risk. However, it is desirable because without employing debt in the Capital Structure, the benefit of debt financing to increase the return of shareholders cannot be enjoyed.

4A.4 LEVERAGE

4A.4.1 Meaning

Leverage is a general term in Financial Management which entails the ability to magnify results at a relatively low cost. Basically, Leverage refers to debt or to the borrowing of funds to finance the purchase of a firm's assets. In order to finance or buy the firm's assets either debt or equity can be used. Use of debt, or Leverage, usually increases the risk of bankruptcy. It also enhances the firm's returns, specifically its return on equity. If debt financing is used, then the owner's equity is not diluted by issuing more shares of stock.

In broad terms, Leverage means an association between two interrelated variables. While studying the idea of Leverage, it is to be kept in mind that the two variables are related to each other in such a way that one variable depends on the other variable. The dependent variable is shown as a numerator whereas independent variable is shown as a denominator. In the financial world, these variables can be cost and profit, sales and profit, EBIT-EPS, etc.

Consequently, Leverage may be defined as a percentage change in dependent variable divided by percentage change in independent variable. Alternatively, it can be shown as:

$$\text{Leverage} = \frac{\text{Percentage change in dependent variable}}{\text{Percentage change in independent variable}}$$

As a result, Leverage may be defined as a percentage change in one variable due topercentage change in some other interrelated variable. It can also be explained as a responsiveness of a dependent variable due to a change in the independent variable.

4A.4.2 Concept of Operating Leverage

One potential 'effect' of operating Leverage is that a change in the volume of sales results in a 'more than proportional' change in Operating Profit.

High operating Leverage results from large amounts of fixed costs. In order to mitigate the effect of higher amount of fixed costs, a company must earn a large profit on sale. The higher the fixed costs in the cost structure of a firm,the higher the DOL. High operating Leverage in turn refers to greater risk because in this situation a small sales decline will cause a big Operating Profit decline. Companies with a substantial amount of fixed cost must generate a high volume of sales to push beyond the break-even point.

Low operating Leverage results from lower amount of fixed costs.

Break-Even Analysis (BEA) is frequently used in conjunction with operating Leverage. As sales are increased beyond the break-even point (BEP), the effects of operating Leverage diminish.

Degree of Operating Leverage implies that by using Fixed Operating Costs, a small change in sales is magnified into a larger change in operating income. A value of DOL = 3 implies that a 1% increase in sales will result in 3% increase in operating income (EBIT).

Degree of Operating Leverage is a quantitative measure of the 'sensitivity' of a firm's Operating Profit to a change in the firm's sales. The closer a firm operates to its, the higher is the absolute value of its DOL. When making comparisons between firms, the firm with the highest DOL is the firm that will be most 'sensitive' to a change in sales.

If there is no Fixed Operating Cost, then there will be no operating Leverage or DOL will be 1. A positive operating Leverage means that a firm is operating at a higher level than break-even point (BEP). On the other hand, a negative operating Leverage signifies that a firm is operating at lower level than BEP and firm's EBIT will be negative.

Measurement

Degree of Operating Leverage can be calculated with the help of the following formula:

$$\text{DOL} = \frac{C}{\text{OP}}$$

$$\text{DOL} = \frac{C}{\text{EBIT}}$$

where,

DOL = Degree of Operating Leverage

C = Contribution

OP = Operating Profits
EBIT = Earnings before interest and tax

In this context OP and EBIT are the same.

Again, operating Leverage can be calculated with the help of the following formula:

$$\text{DOL} = \frac{q(p-v)}{q(p-v)-f}$$

where,

q = Quantity
p = Selling price per unit
v = Variable cost per unit
f = Total operating fixed costs

Another way of defining DOL is as follows:

$$\text{DOL} = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in sales}}$$

Derivation of Formula

(i) $\text{DOL} = \dfrac{C}{\text{OP}}$

$$\text{DOL} = \frac{(S-V)}{\text{OP}} \quad [\text{since } C = S - V, \textit{ where } S = \text{Sales and V} = \text{Variable cost}]$$

C = Contribution = Quantity (SPPU – VCPU) = $q(p-v)$

[where SPPU = Selling price per unit and VCPU = Variable cost per unit]

$$\text{DOL} = \frac{q(p-v)}{q(p-v)-f} \qquad [\text{since OP} = C - f\,]$$

(ii) Derivation of DOL = $\dfrac{\text{Contribution}}{\text{EBIT}}$

Suppose

q = Quantity or volume of sales
p = Selling price per unit
v = Variable cost per unit
f = Total operating fixed costs

So, $(p-v)$ = Contribution per unit

And $q\,(p-v)$ = Total contribution

Again, Δq = Change in sales

Now, EBIT = Total contribution – Total operating fixed costs
$= q(p-v) - f$

Hence, Change in EBIT = ΔEBIT = $\Delta q(p - v)$ [since f is fixed]

$$\text{DOL} = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in sales}}$$

$$C = \frac{\text{Change in EBIT/EBIT)}}{\text{(Change in sales/sales)}}$$

$$= \frac{(\Delta\text{EBIT}/\text{EBIT})}{(\Delta q/q)}$$ [where ΔEBIT = Percentage change in EBIT and Δq = percentage change in sales]

$$= (\Delta\text{EBIT}/\text{EBIT}) \times (q/(\Delta q))$$

$$= \{\Delta q\ (p - v)/\text{EBIT})\} \times (q/(\Delta q))$$

$$= \frac{q(p - v)}{\text{EBIT}}$$

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

Relationship between Operating Leverage and CVP Analysis

We know that Margin of Safety (MOS) = Actual Sales (S) – Break-even Sales (BES)

Again, Margin of Safety Ratio (MOSR)

$$= \frac{(S - \text{BES})}{S}$$

$$= 1 - \frac{\text{BES}}{S}$$

$$= 1 - \frac{(F/\text{PV Ratio})}{S}$$

[*where, F* = Fixed cost, PV Ratio = Profit-Volume ratio, BES = Fixed cost/Profit-Volume ratio]

$$= 1 - \frac{\left(\frac{F}{\frac{C}{S}}\right)}{S}$$ [*where, C* = Contribution, PV ratio = Contribution/Sales]

$$= 1 - (F/C)$$

$$= \frac{(C - F)}{C}$$

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

$$= \frac{1}{(C/\text{EBIT})}$$

$$= \frac{1}{\text{DOL}}$$ [since DOL = C/EBIT, DOL = Degree of Operating Leverage]

So, it is evident that there exists an inverse relationship between DOL and margin of safety. It implies that with an increase in DOL, margin of safety decreases and vice versa.

Illustration 4A.1

Problem

Particulars	Firm X	Firm Y
Sales	1,00,000	1,00,000
Less: Variable cost	75,000	75,000
Contribution	25,000	25,000
Less: Fixed Operating Cost	10,000	15,000
EBIT	15,000	10,000
DOL (Contribution/EBIT)	1.67	2.50

As per the given data, give comments.

Solution

The greater the amount of Fixed Operating Cost in the cost structure of a firm, the greater the Degree of Operating Leverage and vice versa. Here, the amount of Fixed Operating Cost is higher in Firm Y. Accordingly, DOL is also higher for Firm Y.

Illustration 4A.2

Problem

	Year 1	Year 2 (20% increase in sales)
Sales	1,00,000	1,20,000
Less: Variable cost	75,000	90,000
Contribution	25,000	30,000
Less: Fixed Operating Cost	10,000	10,000
EBIT	15,000	20,000
Percentage change in sales	—	20%
Percentage change in EBIT	—	33⅓% [{(20,000 – 15,000)/15,000} × 100]

As per the given data, give comments.

Solution

Due to the existence of Fixed Operating Cost in the cost structure of a firm, the percentage change in EBIT (Operating Profit) is more than percentage change in sales. Here, 20% increase in sales results in 33⅓% increase in EBIT.

Illustration 4A.3

Problem

Particulars	Year 1	Year 2 (20% increase in sales)
Sales	1,00,000	1,20,000
Less: Variable cost	75,000	90,000
Contribution	25,000	30,000
Less: Fixed Operating Cost	Nil	Nil
EBIT	25,000	30,000
Percentage change in sales	—	20%
Change in EBIT	—	20% [{(30,000 – 25,000)/25,000} × 100]
DOL (Contribution/EBIT)	1	1

As per the given data, give comments.

Solution

Observation 1: When there is no operating fixed cost in the cost structure of a firm, the percentage change in EBIT (Operating Profit) is same as the percentage change in sales.

Observation 2: Non-existence of operating fixed cost in the cost structure of a firm means that DOL will be 1.

Illustration 4A.4

Problem

Particulars	Firm X	Firm X (increase in sales by 30%)	Firm Y	Firm Y (increase in sales by 30%)
Sales	1,00,000	1,30,000	1,20,000	1,56,000
Less: Variable cost	75,000	97,500	90,000	1,17,000
Contribution	25,000	32,500	30,000	39,000
Less: Fixed Operating Cost	10,000	10,000	15,000	15,000
EBIT	15,000	22,500	15,000	24,000
DOL (Contribution/EBIT)	1.67		2.50	
Change in EBIT	—	7,500	—	9,000
Percentage change in EBIT	—	50%	—	60%

As per the given data, give comments.

Solution

EBIT of a firm having a higher DOL increases at a faster rate than increase in sales and vice versa. Here, Firm Y has higher DOL. For an increase of 30% in sales for both the firms, the EBIT of Firm Y has increased by 60% whereas the EBIT of Firm X has recorded an increase of 50%.

4A.4.3 Concept of Financial Leverage

Financial Leverage results from the use of fixed financing costs by the firm. Financial Leverage is acquired by choice. It is used as a means of increasing the return to common shareholders.

Degree of Financial Leverage (DFL) is the percentage change in a firm's Earnings per Share (EPS) resulting from a 1% change in its Operating Profit.

Firms must first analyse their expected future Cash Flows. The greater and more stable expected future Cash Flows imply greater debt capacity. Fixed charges include debt principal and interest payments, lease payments and dividends from preference shares.

Measurement

Depending upon the availability of information the following formula may be used to compute DFL.

(i) $\text{DFL} = \dfrac{\text{EBIT}}{\text{EBT}}$

(ii) $\text{DFL} = \dfrac{\text{Percentage change in EPS}}{\text{Percentage change in EBIT}}$

Derivation of Formula

$$\text{DFL} = \frac{\text{Percentage change in EPS}}{\text{Percentage change in EBIT}} \tag{4A.1}$$

We know that $\text{EPS} = \dfrac{(E - I)(1 - t) - P_d}{N}$

where,

EPS = Earnings per share
I = Interest
t = Tax rate
P_d = Preference dividend
N = Number of equity shares

$$\text{Change in EPS} = \Delta\text{EPS} = \frac{\Delta\text{EBIT}\,(1 - t)}{N} \qquad [\text{since } I \text{ and } P_d \text{ are fixed}]$$

Now, from Equation (4A.1) we get,

$$\text{DFL} = \frac{\{(\text{Change in EPS}/\text{EPS}) \times 100\}}{\{(\text{Change in EBIT}/\text{EBIT}) \times 100\}}$$

$$= \frac{(\Delta\text{EPS}/\text{EPS})}{(\Delta\text{EBIT}/\text{EBIT})}$$

$$= \frac{[\{\Delta EBIT\,(1-t)/N\}/\{E-I)\,(1-t)-P_d\}/N]}{(\Delta EBIT/EBIT)}$$

$$= \frac{\Delta EBIT\,(1-t)}{(E-I)(1-t)-P_d} \times \frac{EBIT}{\Delta EBIT}$$

$$= \frac{\{EBIT\,(1-t)\}}{\{(E-I)\,(1-t)-P_d\}}$$

$$= \frac{EBIT}{\{(E-I)-P_d/(1-t)\}}$$

$$= \frac{EBIT}{\{EBT-P_d/(1-t)\}} \qquad [\text{since } E-I = EBT] \quad (4A.2)$$

Note: In the absence of P_d, the formula will be:

$$DFL = \frac{EBIT}{EBT}$$

Illustration 4A.5

Problem

Particulars	Firm X	Firm Y
Sales	1,00,000	1,00,000
Less: Variable cost	75,000	75,000
Contribution	25,000	25,000
Less: Fixed Operating Cost	10,000	15,000
EBIT	15,000	10,000
Less: Interest	1,000	2,000
EBT	14,000	8,000
DFL (EBIT/EBT)	1.07	1.25

As per the given data, give comments.

Solution

Increase in fixed financial charges (here, interest) results in higher DFL and vice versa. In this case, fixed financial charges are higher for Firm Y and accordingly DFL is also higher in Firm Y.

Illustration 4A.6

Problem

Particulars	Year 1	Year 2 (20% increase in EBIT)
EBIT	15,000	18,000
Less: Interest	3,000	3,000
EBT	12,000	15,000
Less: Tax @ 50%	6,000	9,000
EAT	6,000	9,000
Preference dividend	Nil	Nil
EATESH	6,000	9,000
Number of equity shares	1,000	1,000
EPS (EATESH/Number of equity shares)	6	9
Change in EBIT	—	3,000
Percentage change in EBIT	—	20%
Change in EPS	—	3
Percentage change in EPS	—	50%

As per the given data, give comments.

Solution

Due to the existence of fixed financial charges in the cost structure of a firm, the percentage change in EPS is more than percentage change in EBIT (Operating Profit). Here, 20% increase in EBIT results in 50% increase in EPS.

Illustration 4A.7

Problem

Particulars	Year 1	Year 2
EBIT	15,000	18,000
Less: Interest	NIL	NIL
EBT	15,000	18,000
Less: Tax @ 50%	7,500	9,000
EAT	7,500	9,000
Preference dividend	Nil	Nil
EATESH	7,500	9,000
Number of equity shares	1,000	1,000
EPS (EATESH/Number of equity shares)	7.5	9
Change in EBIT	—	3,000

(Contd.)

Percentage change in EBIT	—	20%
Change in EPS	—	1.5
Percentage change in EPS	—	20%
DFL (EBIT/EBT)	1	1

As per the given data, give comments.

Solution

Observation 1: When there are no fixed financial charges in the cost structure of a firm, the percentage change in EPS is same as the percentage change in EBIT (Operating Profit).

Observation 2: Non-existence of fixed financial charges in the cost structure of a firm means that DFL will be 1.

Difference between Operating Leverage and Financial Leverage

The differences between Operating Leverage and Financial Leverage are listed in Table 4A.1.

Table 4A.1 Difference between Operating Leverage and Financial Leverage

Points of Difference	Operating Leverage	Financial Leverage
Meaning	Operating Leverage arises from the cost structure of a firm.	Financial Leverage arises from the Capital Structure of a firm.
Relationship	It arises from the relationship between sales and EBIT	It arises from the relationship between EBIT and EPS.
Risk	Degree of Operating Leverage creates business risk.	Degree of Financial Leverage creates financial risk.
Formula	DOL = Contribution/EBIT	DFL = EBIT/EBT
Effect	It affects the sales and EBIT.	It affects the EBIT and EPS.
Focus	In operating Leverage the focus is on the fixed cost.	In financial Leverage the focus is on the fixed interest charges.
Tax effect	It is not affected by the rate of tax.	It is affected by the rate of tax.
Computation	It is not easy to compute for the outsiders because the published accounts do not convey information about fixed costs of the organisation.	It is easy to compute for the outsiders because the published accounts contain information about interest on debt and preference dividend.

Relationship between Fixed Cost, Risk and Leverage

The cost structure of a firm is composed of two costs: fixed cost and variable cost. Again, fixed cost may be of two types: (i) Operating fixed cost (such as rent, depreciation, etc.) and (ii) Financial fixed cost (such as interest on borrowed capital). Operating fixed cost, operating Leverage and operating risk are interrelated. Higher operating fixed cost in the cost structure

of a firm results in higher operating Leverage, and higher operating Leverage in turn implies higher amount of operating or business risk. On the other hand, existence of fixed charge capital in the capital structure of a firm enhances the earning potential of the equity shareholders. But at the same time, the financial Leverage of the firm also increases which leads to increase in financial risk. Further, high operating fixed cost in conjunction with high financial fixed cost leads to a highly risky situation because in this case the Combined Leverage is high due to high operating Leverage and high financial Leverage.

4A.4.4 Concept of Combined Leverage

Combined Leverage shows the total effect of the operating and financial Leverages. In other words, Combined Leverage shows the total risks associated with the firm. It is the product of the operating Leverage and financial Leverage.

Measurement

$$\begin{aligned} DCL &= DOL \times DFL \\ &= (C/EBIT) \times (EBIT/EBT) \\ &= \frac{C}{EBT} \end{aligned}$$

where,

DCL = Degree of Combined Leverage
DOL = Degree of Operating Leverage
DFL = Degree of Financial Leverage
C = Contribution
EBIT= Earning Before Interest and Tax
EBT = Earning Before Tax

Another way of measuring DCL is as follows:

$$\begin{aligned} DCL &= DOL \times DFL \\ &= \frac{\text{percentage change in EBIT}}{\text{percentage change in sales}} \times \frac{\text{percentage change in EPS}}{\text{percentage change in EBIT}} \\ &= \frac{\text{percentage change in EPS}}{\text{percentage change in sales}} \end{aligned}$$

Derivation of Formula

The formula can be derived with the help of the formula of DOL and DFL already derived.

Illustration 4A.8

Problem

Calculate the Degree of Operating Leverage, Degree of Financial Leverage and the degree of Combined Leverage for the following firms and interpret the result.

	A	B	C
Unit selling price (₹)	3	25	0.50
Unit variable cost (₹)	1	7.5	0.10
Fixed cost (₹)	3,50,000	7,00,000	75,000
Interest (₹)	25,000	40,000	Nil
Output (units)	3,00,000	75,000	5,00,000

Solution

	A	B	C
Sales	9,00,000	18,75,000	2,50,000
Less: Variable cost	3,00,000	5,62,500	50,000
Contribution	6,00,000	13,12,500	2,00,000
Less: Fixed cost	3,50,000	7,00,000	75,000
EBIT	2,50,000	6,12,500	1,25,000
Less: Interest	25,000	40,000	0
EBT	2,25,000	5,72,500	1,25,000
DOL (Contribution/EBIT)	2.4	2.14	1.6
DFL (EBIT/EBT)	1.11	1.07	1
DCL = DOL × DFL	2.66	2.29	1.6

Interpretation of Four Situations

DOL may be high or low. Similarly, DFL may be low or high. As a result, four possible scenarios may emerge and each scenario is unique. The outcomes of these four situations are stated as follows:

Situation	DOL	DFL	Remarks
Situation 1	High	High	It is a highly risky situation. It should be avoided.
Situation 2	Low	High	This is the optimum situation. Low operating Leverage indicates that company is making decent profits. High financial Leverage indicates that management has adopted a very good approach towards the Debt Capital.
Situation 3	High	Low	If financial Leverage is low then the funds are obtained mainly through equity shares. This makes the base solid. But since DOL is high, business risk is difficult to manage.
Situation 4	Low	Low	It is the situation of minimum risk. But it is the worst situation. It should be avoided.

4A.4.5 Selection of Financing Plans based on Leverage

The Capital Structure of a firm may have different combinations such as all equity, equity-preference share, equity-debt, equity-debt-preference share, etc. Before selecting a particular

plan, analysis of all the available plans should be made carefully to arrive at EPS, Cost of Capital and Market Price per Equity Share (MPPS). The plan with the highest EPS, the lowest Cost of Capital and the maximum MPPS should be selected. In the absence of other information, the financial plan has to be selected on the basis of the available information. For example, if it is not possible to compute Cost of Capital or MPPS but it is possible to find out the value of EPS, then the financial plan having the highest EPS should be selected.

4A.4.6 Concept of EBIT-EPS Analysis

It is an analysis of the effect of financing alternatives on EPS. The indifference point is the EBIT level where EPS is the same for two or more alternatives.

EBIT-EPS analysis may be defined as *a tool of financial planning that evaluates various options or alternatives of financing a project under varying levels of EBIT and suggests or recommends the best alternative having the highest EPS and determines the most profitable level of EBIT*. Simply put, EBIT-EPS analysis examines the effect of financial Leverage on the EPS with varying levels of EBIT under alternative financial plans.

Computation of EPS

The indifference point may be obtained by solving equations. Let's start with the computation of EPS.

Particulars	Symbol/Notation
EBIT	E
Less: Interest	I
EBT	$(E - I)$
Less: Tax @ t% on EBT	$(E - I)\, t$
EAT	$(E - I)\,(1 - t)$
Less: Preference dividend	(P_d)
Earnings available to equity shareholders	$(E - I)\,(1 - t) - P_d$
Number of equity shares	N
EPS	$\dfrac{(E - I)\,(1 - t) - P_d}{N}$

Three types of sources are available for financing: Equity, debt and preference shares. As such, there will be different possible combinations such as (i) equity, (ii) equity-debt, (iii) equity-preference shares and (iv) equity-debt-preference shares.

So, EPS under various alternatives will be as follows:

(i) Equity: $\dfrac{E(1-t)}{N}$

(ii) Equity-debt: $\frac{[(E-I)(1-t)]}{N}$

(iii) Equity-preference shares: $\frac{[E(1-t)-P_d]}{N}$

(iv) Equity-debt-preference shares: $\frac{[(E-I)(1-t)-P_d]}{N}$

Selection of Plans

The plan having the highest EPS should be selected.

Illustration 4A.9

Problem

Suppose, PQR Ltd. which is expecting the EBIT of ₹1,50,000 per annum on an investment of ₹5,00,000, is considering the finalisation of the Capital Structure or the financial plan. The company has access to raise funds of varying amounts by issuing equity share capital, 12% preference share and 10% debenture or any combination thereof. Suppose, it analyses the following four options to raise the required funds of ₹5,00,000:

(i) By issuing equity share capital at par.

(ii) A total of 50% funds by equity share capital and 50% funds by preference shares.

(iii) A total of 5% funds by equity share capital, 25% by preference shares and 25% by issue of 10% debentures.

(iv) A total of 25% funds by equity share capital, 25% as preference share and 50% by the issue of 10% debentures.

Assuming that PQR Ltd. belongs to 50% tax bracket, calculate the EPS under the above four options.

Solution

Assuming that PQR Ltd. belongs to 50% tax bracket, the EPS under the above four options can be calculated as follows:

	Option (i)	**Option (ii)**	**Option (iii)**	**Option (iv)**
Capital Structure				
Equity share capital	5,00,000	2,50,000	2,50,000	1,25,000
12% Preference Share Capital	—	2,50,000	1,25,000	1,25,000
10% debentures	—	—	1,25,000	2,50,000
Total	**5,00,000**	**5,00,000**	**5,00,000**	**5,00,000**
EBIT	1,50,000	1,50,000	1,50,000	1,50,000

(*Contd.*)

Less: Interest	0	0	12,500	25,000
EBT	1,50,000	1,50,000	1,37,500	1,25,000
Less: Tax @ 50 % on EBT	75,000	75,000	68,750	62,500
EAT	75,000	75,000	68,750	62,500
Less: Preference dividend	0	30,000	15,000	15,000
Earnings available to equity shareholders (EATESH)	75,000	45,000	53,750	47,500
Number of equity shares of ₹100 each (NOES)	5,000	2,500	2,500	1,250
EPS (EATESH/NOES)	15	18	21.5	38

In this case, the financial plan under option (iv) seems to be the best as it has given the highest EPS of ₹38. In this plan, the firm has applied maximum financial Leverage by employing the maximum amount of debt.

4A.4.7 Indifference Point

Indifference points refer to the EBIT level at which the EPS is same for two alternative financial plans. According to James. C. Van Horne, 'Indifference point refers to that EBIT level at which EPS remains the same irrespective of *debt-equity* mix'. The management is indifferent in choosing any of the alternative financial plans at this level because all the financial plans are equally attractive. The indifference point is the cut-off level of EBIT below which financial Leverage is damaging. Beyond the indifference point level of EBIT the advantage of financial Leverage with respect to EPS starts operating.

The indifference point between any two financial plans may be obtained by equalising the respective equations of EPS and solving them to find the value of EBIT.

Illustration 4A.10

Problem

A new project is under consideration by a company which involves a capital investment of ₹1,50,00,000. Fixed interest on Debt Capital is 12% and tax rate is 50%. If the debt–equity ratio insisted by the financing agencies is 2:1, calculate the point of indifference. The new equity shares can be issued for ₹100 par value. There are no preference shares.

Solution

The two alternatives available are as follows:

Alternative 1: Raising the entire amount by equity shares

Alternative 2: Raising ₹1,00,00,000 by equity and ₹50,00,000 by debt to maintain a debt–equity ratio of 2:1.

Alternative 1:

Interest = ₹0 (as no debt)

Number of equity shares = ₹1,50,00,000/₹100 par = 1,50,000 shares.

Alternative 2:

Interest = ₹50,00,000 × 12% = ₹6,00,000

Number of equity shares = ₹1,00,00,000/₹100 par = 1,00,000 shares.

Preference dividend in both alternatives is zero.

Calculation of Indifference point:

Intermediate difference

$$\frac{E(1-t)}{N} = \frac{[(E-I)(1-t)]}{N}$$

$$\frac{E(1-0.5)}{1,50,000} = \frac{(E-6,00,000)(1-0.5)}{1,00,000}$$

$$\frac{E(0.50)}{1,50,000} = \frac{(0.5E-300,000)}{1,00,000}$$

Solving for the above equation, we get E = ₹18,00,000.

X = Indifference EBIT level = ₹18,00,000.

If the EBIT crosses the above indifference level EBIT, the use of fixed-cost source of funds would be beneficial from the EPS viewpoint and the financial Leverage would be favourable.

4A.4.8 Financial Break-Even Point

Financial break-even point (FBEP) is that level of EBIT at which after paying interest, tax and preference dividend, nothing remains for the equity shareholders. In other words, FBEP refers to that level of EBIT at which the firm can satisfy all fixed financial charges. EBIT less than this level will result in negative EPS. As a result, EPS is zero at this level of EBIT. Thus FBEP refers to the level of EBIT at which financial profit is nil.

Financial break-even point is expressed as ratio with the following equation:

$$\text{FBEP} = \frac{[(E-I)(1-t) - P_d]}{N} = 0$$

$$[(E-I)(1-t) - P_d] = 0$$

$$(E-I)(1-t) = P_d$$

$$(E-I) = \frac{P_d}{(1-t)}$$

$$E = I + \frac{P_d}{(1-t)}$$

It is worthwhile to mention in this context that beyond the FBEP increase in EBIT will result in a proportional increase in EPS.

Illustration 4A.11

Problem

Compute financial break-even point (FBEP) from the following particulars:

	Plan A	Plan B	Plan C
Interest on borrowed capital	0	40,000	0
Preference dividend	0	0	50,000
Tax rate	50%	50%	50%

Solution

Particulars	Plan A	Plan B	Plan C
FBEP is that EBIT (E) level where $E = I + P_d/(1 - t)$	0 $[0 + 0/(1 - 0.5)]$	40,000 $[40,000 + 0/(1 - 0.5)]$	1,00,000 $[0 + 50,000/(1 - 0.5)]$

EBIT of the FBEP of Plan B is lower than the EBIT of the FBEP of Plan C. As such, plan B has dominance over Plan C.

4A.5 CONCEPT OF TRADING ON EQUITY

Trading on Equity means to raise fixed cost capital (borrowed capital and Preference Share Capital) on the basis of equity share capital so as to enhance the income of equity shareholders.

Trading on Equity occurs when a company incurs new debt to acquire assets on which it can earn a return greater than the interest cost of the debt.

If a company generates a profit through this financing technique, its shareholders earn a greater return on their investments. In this case, Trading on Equity is successful. If the company earns less from the acquired assets than the cost of the debt, its shareholders earn a reduced return because of this activity.

Note: Trading on Equity has been discussed in detail in the chapter 'Capital Structure Theories'.

4A.6 ADDITIONAL SOLVED PROBLEMS

1. A firm has sales of ₹5,00,000, variable cost of ₹3,50,000 and fixed cost of ₹1,00,000 and a debt of ₹2,50,000 at 10% rate of interest. What is Combined Leverage? If the firm wants to double its EBIT, how much of a rise in sales would be needed on a percentage basis?

[C.U. B.Com. (H), 2006]

Solution

Particulars	Amount (₹)
Sales	5,00,000
Less: Variable cost	3,50,000
Contribution	1,50,000
Less: Operating fixed cost	1,00,000
Operating Profit/EBIT	50,000
Less: Interest (10% of ₹2,50,000)	25,000
EBT	25,000
Combined Leverage (Contribution/EBT)	6
DOL (Contribution/EBIT) or percentage change in EBIT/percentage change in sales = 3 or 100/percentage change in sales = 3 or percentage change in sales = 100/3 = 33⅓%	3

2. From the following information of Trends Ltd., calculate the Degree of Operating Leverage, financial Leverage and Combined Leverage for each situation A and B under financial plans I, II and III. Also indicate which of the above plan is most risky and which one is least risky.

Production and sales	1,000 units		
Selling price per unit	₹20		
Variable cost per unit	₹15		
Fixed cost (operating)			
Situation A	₹3,000		
Situation B	₹4,000		
Capital Structure:	**Plan**		
	I (₹)	**II (₹)**	**III (₹)**
Equity	7,000	5,000	3,000
10% debt	3,000	5,000	7,000
	10,000	10,000	10,000

[C.U. B.Com. (H), 2006]

Solution

Particulars	Amount (₹)					
Sales (₹20 × 1,000)	20,000					
Less: Variable cost (15 × 1,000)	15,000					
Contribution	5,000					
	Situation A			**Situation B**		
Less: Operating fixed cost	3,000			4,000		
Operating Profit (EBIT)	2,000			1,000		
DOL (Contribution/EBIT)	2.5			5		
	Plan I	**Plan II**	**Plan III**	**Plan I**	**Plan II**	**Plan III**
Less: Interest	300	500	700	300	500	700
EBT	1,700	1,500	1,300	700	500	300
DFL (EBIT/EBT)	1.18	1.33	1.54	1.43	2.00	3.33
DCL (DOL × DFL)	2.94	3.33	3.85	7.14	10.00	16.67

It is evident from the above calculation that **Plan III under situation B is the most risky** plan since it has the highest DCL. On the other hand, **Plan I under situation A is the least risky** one because it has the lowest DCL

3. The value of DOL is 2, DFL is 3, Interest is ₹3,00,000, and contribution is 40% of sales. Calculate sales. *[C.U. B.Com. (H), 2007]*

Solution

DOL = 2

Contribution/EBIT = 2

EBIT = Contribution/2 (1)

DFL = 3

EBIT/EBT = 3

EBIT/(EBIT – Interest) = 3

(Contribution/2)/[(Contribution/2) – 3,00,000] = 3 (From 1)

Contribution/2 = 3 Contribution/2 – 9,00,000

9,00,000 = Contribution

9,00,000 = 40% of sales

Sales = 9,00,000/40% = 22,50,000

4. Relevant information about three companies are given as follows:

	BIL	PIL	MIL
Annual production capacity (units)	1,00,000	1,50,000	2,50,000
Capacity utilisation and sales	75%	75%	75%
Unit selling price (₹)	40	50	50
Unit variable cost (₹)	15	15	20
Fixed cost p.a. (₹)	2,00,000	3,00,000	5,00,000
Equity Capital (1,000 shares for each company) (₹)	5,00,000	7,00,000	10,00,000
10% Preference Share Capital (₹)	—	50,000	1,00,000
15% debentures (₹)	1,00,000	2,00,000	3,00,000

Calculate Operating Leverage, Financial Leverage, Combined Leverage and EPS of these three companies and comment. *[C.U. B.Com. (H), 2008]*

Solution

Particulars	BIL	PIL	MIL
Sales	30,00,000 (1,00,000 × 75% × 40)	56,25,000 (1,50,000 × 75% × 50)	93,75,000 (2,50,000 × 75% × 50)
Less: Variable cost	11,25,000	16,87,500	37,50,000
Contribution	18,75,000	39,37,500	56,25,000
Less: Fixed cost	2,00,000	3,00,000	5,00,000
EBIT	16,75,000	36,37,500	51,25,000
Less: Interest @ 15%	15,000	30,000	45,000
EBT	16,60,000	36,07,500	50,80,000
Less: Tax @ 50% (say)	8,30,000	18,03,750	25,40,000
EAT	8,30,000	18,03,750	25,40,000
Less: Preference dividend @ 10%	0	5,000	10,000
EATESH	8,30,000	17,98,750	25,30,000
Number of equity shares	1,000	1,000	1,000
DOL (Contribution/EBIT)	1.12	1.08	1.10
DFL (EBIT/EBT)	1.01	1.01	1.01
DCL (DOL × DFL)	1.13	1.09	1.11
EPS (EATESH/Number of equity shares)	830	1,798.75	2,530

It is evident from the above calculation that **BIL is the most risky** company since it has the highest DCL. On the other hand, **PIL is the least risky** one because it has the lowest DCL. In terms of EPS, MIL is the best performer and BIL is the worst performer.

5. The following information have been taken from the Income Statement of X Ltd:
Fixed Operating Expenses ₹1,200
Fixed financial charges ₹600
Earning Before Tax ₹400
Calculate percentage of change in EPS, if sales increase by 10 percent.

[C.U. B.Com. (H), 2010]

Solution

EBIT – Interest = EBT
EBIT – 600 = 400 (Interest = Fixed financial charges = ₹600)
EBIT = 1,000
Contribution – Fixed Operating Cost = 1,000
(EBIT = Contribution – Fixed Operating Cost)
Contribution – 1,200 = 1,000
Contribution = 2,200

We know that DOL = (Contribution/EBIT)
= 2,200/1,000
= 2.2

Similarly, DFL = EBIT/EBT
= 1,000/400
= 2.5

So, DCl = DOL × DFL
= 2.2 × 2.5
= 5.5

Again, DCL = percentage change in EPS/percentage change in sales
5.5 = percentage change in EPS/percentage change in sales

It means that 1% increase in sales is accompanied by 5.5% increase in EPS.
So, for 10% increase in sales EPS will be increased by 55% (5.5 × 10)

6. The Capital Structure of Moon Ltd. is given as follows:

	₹ (in Lakh)
Equity share capital (₹10 per share)	10.00
Retained earnings	6.00
10% Preference Share Capital (₹)	4.00
	20.00

The firm has planned to undertake an expansion scheme of ₹10,00,000 which can be financed (i) entirely by issue of equity shares of ₹10 each or (ii) by issue of 12% debentures of ₹100 each at par.

As a result of expansion, sales and operating fixed cost will increase by 60% and 75%, respectively. The other relevant information are given as follows:

Sales	₹50,00,000
Variable cost	60%
Operating fixed cost	₹5,00,000
Corporate tax	40%

Calculate Leverages and EPS before and after expansion and give your opinion for taking appropriate decision with respect to financing. *[C.U. B.Com. (H), 2010]*

Solution

Particulars	Present Situation (Before Expansion)	After Expansion	
		Option I	Option II
Capital Structure:			
Equity share capital	10,00,000	20,00,000	10,00,000
Retained earnings	6,00,000	6,00,000	6,00,000
10% Preference Share Capital	4,00,000	4,00,000	4,00,000
12% debentures	0	0	10,00,000
Total	20,00,000	30,00,000	30,00,000
Sales	₹50,00,000	80,00,000 (50,00,000 × 1.6)	80,00,000 (50,00,000 × 1.6)
Less: Variable cost @ 60% of sales	30,00,000	48,00,000	48,00,000
Contribution	20,00,000	32,00,000	32,00,000
Less: Operating fixed cost	5,00,000	8,75,000 (5,00,000 × 1.75)	8,75,000 (5,00,000 × 1.75)
EBIT	15,00,000	23,25,000	23,25,000
Less: Interest @ 12%	0	0	1,20,000 (10,00,000 × 12%)
EBT	15,00,000	23,25,000	22,05,000
Tax @ 40% of EBT	6,00,000	9,30,000	8,82,000
EAT	9,00,000	13,95,000	13,23,000
Less: Preference dividend @ 10%	40,000	40,000	40,000

(Contd.)

EATESH	8,60,000	13,55,000	12,83,000
Number of equity shares	1,00,000	2,00,000	1,00,000
DOL (Contribution/EBIT)	1.33	1.38	1.38
DFL (EBIT/[EBT – {P_d/(1–t)}]	1.05	1.03	1.09
DCL (DOL × DFL)	1.40	1.42	1.50
EPS (EATESH/Number of equity shares)	8.6	6.775	12.83

Expansion program through debt financing should be undertaken since it results in the highest EPS.

7. Which of the following financial plans would you recommend and why?

Particulars	Equity Plan	Equity-preference Plan	Equity–debt Plan
Earning per share	₹9.50	₹8	₹11.25
Price-earning ratio	20	17	16

[C.U. B.Com. (H), 2011]

Solution

We know that MPPS = EPS × P/E ratio

where, MPPS = Market price per equity share
EPS = Earning per share
P/E ratio = Price-earning ratio

Now, we are arranging the given information in tabular form:

Particulars	Equity Plan	Equity-preference Plan	Equity–debt Plan
EPS (₹)	9.50	8	11.25
P/E Ratio	20	17	16
MPPS (₹)	190	136	180

I should recommend the equity plan because under this plan market price per equity share (MPPS) is the maximum.

8. Given the following information:

Sales (10,000 units)	₹10,00,000
Variable cost per unit	₹60
Interest	₹1,00,000
EBT	₹2,00,000
DCL	2.5

Calculate operating Leverage and financial Leverage. *[C.U. B.Com. (H), 2012]*

Solution

We know that EBIT – Interest = EBT

EBIT – 1,00,000 = 2,00,000

EBIT = 3,00,000

Again, we know that Contribution = Sales – Variable cost

= 10,00,000 – (60 × 10,000)

= 10,00,000 – 6,00,000

= 4,00,000

Operating Leverage = Contribution/EBIT

(DOL) = 4,00,000/3,00,000

= 1.33

It is known that

DCL = DOL × DFL (*where,* DFL = Degree of Financial Leverage)

2.5 = 1.33 × DFL

DFL = 2.5/1.33

DFL = 1.88

9. Consider the following example for S Ltd.

	₹ (In lakhs)
EBIT	1,120
EBT	320
Fixed cost	700

Calculate the percentage of changes in EPS if sales increase by 5%.

[C.U. B.Com. (H), 2012]

Solution

We know that

DFL = EBIT/EBT

= 1,120 /320

= 3.5

Again, we know that

Contribution – Fixed Cost = EBIT

Contribution – 700 = 1,120

Contribution = 1,820

$$\text{DOL} = \text{Contribution}/\text{EBIT}$$
$$= 1{,}820/1{,}120$$
$$= 1.625$$
$$\text{DCL} = \text{DOL} \times \text{DFL}$$
$$= 1.625 \times 3.5$$
$$= 5.6875$$

Again, $\text{DCL} = \text{Percentage change in EPS}/\text{Percentage change in sales}$

$$5.6875 = \text{percentage change in EPS}/5$$

or percentage change in EPS $= 5.6875 \times 5$

$$= 28.4375$$

10. DOL = 1.25, DCL = 2.5, interest = ₹1,00,000, fixed cost = ₹50,000, sales = ₹10,00,000. Compute DFL and P/V ratio.

Solution

We know that $\text{DCL} = \text{DOL} \times \text{DFL}$

$$2.5 = 1.25 \times \text{DFL}$$
$$\text{DFL} = 2.5/1.25 = 2$$
$$\text{EBIT}/\text{EBT} = 2$$
$$\text{EBIT}/(\text{EBIT} - I) = 2$$
$$\text{EBIT}/(\text{EBIT} - 1{,}00{,}000) = 2$$
$$\text{EBIT} = 2\ \text{EBIT} - 2{,}00{,}000$$
$$\text{EBIT} = 2{,}00{,}000$$

Further, $\text{DOL} = \text{Contribution}/\text{EBIT}$

$$1.25 = \text{Contribution}/2{,}00{,}000$$
$$\text{Contribution} = 2{,}50{,}000$$
$$P/V \text{ ratio} = (\text{Contribution}/\text{Sales}) \times 100$$
$$= (2{,}50{,}000/10{,}00{,}000) \times 100$$
$$= 25\%$$

11. From the following particulars of X Ltd., prepare an income statement.
DOL = 3, DFL = 2, interest = ₹12,00,000, tax rate = 40%, variable cost = 60% of sales.

Solution

$$\text{DFL} = 2$$
$$\text{EBIT}/\text{EBT} = 2$$

EBIT/(EBIT – *I*) = 2

EBIT/(EBIT – 12,00,000) = 2

EBIT = 2 EBIT – 24,00,000

EBIT = 24,00,000

Further, DOL = Contribution/EBIT

3 = Contribution/24,00,000

Contribution = 72,00,000

(Sales – Variable cost) = 72,00,000

Sales – 60% of Sales = 72,00,000

40% of Sales = 72,00,000

Sales = 72,00,000/40% = 1,80,00,000

Variable cost = 60% of 1,80,00,000 = 1,08,00,000

Further, Contribution – Fixed cost = EBIT

72,00,000 – Fixed cost = 24,00,000

Fixed cost = 48,00,000

Income Statement of X Ltd.

Particulars	Amount (₹)
Sales	1,80,00,000
Less: Variable cost	1,08,00,000
Contribution	72,00,000
Less: Fixed cost	48,00,000
EBIT	24,00,000
Less: Interest	12,00,000
EBT	12,00,000
Less: Tax @ 40%	4,80,000
EAT	7,20,000

12. Anurup Ltd. has equity share capital of ₹5,00,000 divided into shares of ₹100 each. It wishes to raise ₹3,00,000 for expansion-cum-modernisation scheme. The company plans the following financing alternatives:

(i) By issuing equity shares of ₹100 each
(ii) ₹1,00,000 by issuing equity shares of ₹100 each and ₹2,00,000 through issue of 10% Debenture
(iii) By raising loan at 10% per annum
(iv) ₹1,00,000 by equity shares of ₹100 each and ₹2,00,000 by issuing 8% Preference Shares of ₹100 each.

You are required to suggest the best alternative giving your comment assuming that the estimated earnings before interest and taxes (EBIT) after expansion is ₹1,50,000 and corporate tax rate is 35%.

[C.U. B.Com. (H), 2013]

Solution

Particulars	Present Situation (Before Expansion)	After Expansion			
		Option I	Option II	Option III	Option IV
Capital Structure:					
Equity Share Capital of ₹100 each	5,00,000	8,00,000	6,00,000	5,00,000	6,00,000
10% Debentures			2,00,000		
10% Loan				3,00,000	
10% Preference Share Capital					2,00,000
Total	5,00,000	8,00,000	8,00,000	8,00,000	8,00,000
EBIT		1,50,000	1,50,000	1,50,000	1,50,000
Less: Interest @ 10%		NIL	20,000	30,000	NIL
EBT		1,50,000	1,30,000	1,20,000	1,50,000
Tax @ 35% of EBT		52500	45500	42000	52500
EAT		97,500	84,500	78,000	97,500
Less: Prefernce Dividend @ 8%		0	0	0	16,000
EATESH		97,500	84,500	78,000	81,500
Number of equity shares		8,000	6,000	5,000	6,000
EPS (EATESH / Number of equity shares)		12.1875	14.0833	15.6000	13.5833
Rank		4	2	1	3

It can be said that alternative III ranked 1 in terms of EPS. As such, it should be selected.

13. A company has the choice of issuing 10% debentures or ₹100 equity shares to raise ₹20 lakh to meet its long-term investment requirements. Its current capital structure

consists of 20000 ordinary shares of ₹100 each, 8% debentures of ₹10,00,000 and 12% preference shares of ₹10,00,000. Determine the level of EBIT at which EPS would be the same, whether the new funds are acquired by issuing ordinary shares or by issuing 10% debentures. Tax rate is assumed to be 50% (ignore dividend distribution tax).

Also, construct EBIT-EPS chart assuming various levels of EBIT.

[C.U. B.Com. (H), 2014]

Solution

Calculation of Indifference Point:

Intermediate Difference

$$[(E - I_1)(1 - t) - P_d] / N_1 = [(E - I_2)(1 - t) - P_d] / N_2$$

Here, E = EBIT

t = Tax rate = 50% = 0.5

P_d = Preference dividend = 12% of ₹10,00,000
= 1,20,000 (under both alternatives)

I_1 = Interest on debenture = 8% of ₹10,00,000 = 80,000

I_2 = Interest on debenture = (8% of ₹10,00,000) + (10% of ₹20,00,000)
= 80,000+ 2,00,000 = 2,80,000

N_1 = Number of equity shares under alternative 1
= 20,000 + 20,000 = 40,000

N_2= Number of equity shares under alternative 2 = 20,000

Hence,

$$[(E - 80,000)(1 - 0.5) - 1,20,000] / 40,000$$
$$= [(E - 2,80,000)(1 - 0.5) - 1,20,000] / 20,000$$
$$[(E - 80,000)(0.5) - 1,20,000] / [(E - 2,80,000)(0.5) - 1,20,000]$$
$$= 40,000 / 20,000$$
$$(0.5E - 40,000 - 1,20,000) / (0.5E - 1,40,000 - 1,20,000) = 2$$
$$0.5E - 1,60,000 / 0.5E - 2,60,000 = 2$$
$$0.5E - 1,60,000 = 2(0.5E - 2,60,000)$$
$$0.5E - 1,60,000 = E - 5,20,000$$
$$5,20,000 - 1,60,00 = E - 0.5E$$
$$3,60,000 = 0.5E$$
$$3,60,000 / 0.5 = E$$
$$7,20,000 = E$$

Now, in order to construct EBIT-EPS chart, it is assumed that the various levels of EBIT are ₹6,00,000 (below indifference point), ₹7,20,000 (indifference point) and ₹9,00,000 (above indifference point).

EBIT-EPS Chart at Various Levels of EBIT

	EBIT at Indifference Point		**EBIT Below Indifference Point**		**EBIT above Indifference Point**	
	Altenative 1 (Eq-Pref)	**Altenative 2 (Eq-Debt-Preference)**	**Altenative 1 (Eq-Pref)**	**Altenative 2 (Eq-Debt-Preference)**	**Altenative 1 (Eq-Pref)**	**Altenative 2 (Eq-Debt-Preference)**
EBIT	7,20,000	7,20,000	6,00,000	6,00,000	9,00,000	9,00,000
Less: Interest	80,000	2,80,000	80,000	2,80,000	80,000	2,80,000
EBT	6,40,000	4,40,000	5,20,000	3,20,000	8,20,000	6,20,000
Tax @ 50% of EBT	3,20,000	2,20,000	2,60,000	1,60,000	4,10,000	3,10,000
EAT	3,20,000	2,20,000	2,60,000	1,60,000	4,10,000	3,10,000
Less: Prefernce Dividend	1,20,000	1,20,000	1,20,000	1,20,000	1,20,000	1,20,000
EATESH	2,00,000	1,00,000	1,40,000	40,000	2,90,000	1,90,000
Number of equity shares	40,000	20,000	40,000	20,000	40,000	20,000
EPS (EATESH / Number of equity shares)	5	5	3.5	2	7.25	9.5
Rank	Equal		1	2	2	1
Comment	Both are equally preferable		Equity financing is preferable		Debt financing is preferable	

14. X Ltd. is considering two alternative plans. Following information relates to these plans:

	Plan-A	**Plan-B**
Equity Share (₹10 each) (₹)	2,00,000	1,00,000
12% Debenture (₹)	—	1,00,000
Profit after tax (₹)	28,000	19,600
Price-Earning ratio	11	7.5

Which of the plans is preferable considering the wealth maximisation objective?

[C.U. B.Com. (H), 2016]

Solution

Particulars	Plan-A	Plan-B
Profit after tax (₹)	28,000	19,600
Less: Preference dividend (₹)	0	0
EATESH	28,000	19,600
Number of equity shares	20,000	10,000
EPS (EATESH / Number of equity shares)	1.4	1.96
Rank	2	1
Price-Earning ratio	11	7.5
MPPS (EPS X Price-Earning ratio)	15.4	14.7
Rank	1	2

On the basis of EPS, Plan-B is better than Plan-A. But Plan-A is better than Plan-B in terms of MPPS. On the whole, the decision should be taken on the basis of MPPS. Accordingly, Plan-A should be chosen.

15. Malancha Plast Ltd. provides you the following information:
    (i) Capital Gearing Ratio: 3
    (ii) Fixed Cost: 1/3rd to total operating cost
    (iii) Dividend Yield: 6%
    (iv) Operating Ratio: 75%
    (v) Ratio of 18% Preference Shares to 15% Debentures: 12.5%
    (vi) Dividend Payout Ratio: 30%
    (vii) Accumulated Reserves: ₹4,00,000
    (viii) Capital Employed: ₹24,00,000
    (ix) Market Price of an Equity Share of ₹10: ₹135
    (x) Tax Rate: 40%

    Prepare an Income Statement and calculate the degree of operating leverage, financial leverage and combined leverage.

    [C.U. B.Com. (H), 2011]

Solution

Capital Gearing Ratio = 3

Fixed income bearing instruments / Equity shareholder's fund = 3

18% Preference Shares + 15% Debentures / Equity shareholder's fund = 3

18% Preference Shares + 15% Debentures = 3 Equity shareholder's fund ...(1)

Again, Capital Employed = ₹24,00,000

Equity shareholder's fund + 18% Preference Shares + 15% Debentures = ₹24,00,000

Equity shareholder's fund + 3 Equity shareholder's fund = ₹24,00,000 [From (1)]

4 Equity shareholder's fund = ₹24,00,000

Equity shareholder's fund = ₹24,00,000 / 4 = ₹6,00,000

Equity share capital + Reserves & Surplus = ₹6,00,000

Equity share capital + ₹4,00,000 = ₹6,00,000

Equity share capital = ₹2,00,000

Now, putting Equity shareholder's fund = ₹6,00,000 in equation (1) we get,

18% Preference Shares + 15% Debentures = 3 X ₹6,00,000 = ₹18,00,000 ...(2)

Further, 18% Preference Shares / 15% Debentures = 12.5%

18% Preference Shares / 15% Debentures = 1 / 8

15% Debentures = 8 X 18% Preference Shares ...(3)

Now, from equation (2) and equation (3) we get,

18% Preference Shares + 8 X 18% Preference Shares = ₹18,00,000

9 X 18% Preference Shares = ₹18,00,000

18% Preference Shares = ₹18,00,000 / 9 = ₹2,00,000

So, 15% Debentures = 8 X 18% Preference Shares

= 8 X ₹2,00,000

= ₹16,00,000

Dividend Yield = 6%

DPS / MPPS = 6% [DPS = Dividend per equity share, MPPS = Market Price per equity share]

DPS / 135 = 6%

DPS = 135 X 6% = 8.1

Dividend Payout Ratio = 30%

DPS / EPS = 30% [EPS = Earnings per equity share]

8.1 / EPS = 30%

EPS = 8.1 / 30% = 27

Number of equity shares = Equity share capital / Face value per equity share

= ₹2,00,000 / ₹10 = 20,000

Operating Ratio = 75%

So, Operating Profit Ratio = (100 – 75) % = 25%

Operating Profit / Sales = 25%

EBIT / Sales = 25% ...(4)

Computation of EBIT

Particulars	Amount (₹)
EATESH (EPS X Number of equity shares)	5,40,000 (₹27X 20,000)
Add: Preference dividend	36,000 (18% of ₹2,00,000)
EAT	5,76,000
Add: Tax	3,84,000 (5,76,000 X 0.4 / 0.6)
EBT	9,60,000
Add: Interest on debentures	2,40,000 (15% of ₹16,00,000)
EBIT	12,00,000

Putting EBIT = ₹12,00,000 in equation (4) we get,
₹12,00,000 / Sales = 25%
Sales = ₹12,00,000 / 25% = ₹48,00,000
Operating Ratio = 75%
Operating Expenses (or cost) / Sales = 75%
Operating Expenses (or cost) / ₹48,00,000 = 75%
Operating Expenses (or cost) = ₹48,00,000 X 75% = ₹36,00,000
Fixed Cost = $1/3^{rd}$ to total operating cost = $1/3^{rd}$ X ₹36,00,000 = ₹12,00,000
Variable Cost = $2/3^{rd}$ to total operating cost = $2/3^{rd}$ X ₹36,00,000 = ₹24,00,000

Income Statement of Mlancha Plast Ltd.

Particulars	Amount (₹)
Sales	48,00,000
Less: Variable Cost	24,00,000
Contribution	24,00,000
Less: Fixed Cost	12,00,000
EBIT	12,00,000
Less: Interest on debentures	2,40,000
EBT	9,60,000
Less Tax @ 40%	3,84,000
EAT	5,76,000
Preference dividend	36,000
EATESH	5,40,000
DOL (Contribution / EBIT)	2
DFL (EBIT / [EBT – (P_d / (1 – t)]	1.33
DCL (DOL X DFL)	2.67

4A.7 SUMMARY

- In finance, leverage is very closely associated with fixed expenses. Fixed expenses can be classified into two types: operating fixed expenses such as depreciation on fixed assets, salaries, etc., and financial fixed expenses such as interest and dividend on preference shares. One potential "effect" of operating leverage is that a change in the volume of sales results in a "more than proportional" change in operating profit. Low operating leverage results from lower amount of fixed costs.
- Leverage is a general term in financial management which entails the ability to magnify results at a relatively low cost. In broad terms, leverage means an association between two interrelated variables. The dependent variable is shown as a numerator whereas independent variable is shown as a denominator. Consequently, leverage may be defined as a percentage change in dependent variable divided by percentage change in independent variable.
- Likewise, leverages are also of two types: financial leverage and operating leverage.
- DOL magnifies the variability of operating profits and, hence, business risk. Business risk is independent of the capital structure. Financial risk arises from the financing decisions of a firm. The origin of this type of risk lies in the capital structure, i.e., the use of the debt capital.
- If there is no fixed operating cost, then there will be no operating leverage or DOL will be 1. A positive operating leverage means that a firm is operating at a higher level than Break-Even Point (BEP). EBIT of a firm having a higher DOL increases at a faster rate than increase in sales and vice versa. Financial leverage results from the use of fixed financing costs by the firm.
- Financial leverage is acquired by choice. It is used as a means of increasing the return to common shareholders. DFL is the percentage change in a firm's Earnings per Share (EPS) resulting from a 1% change in its operating profit. Increase in fixed financial charges (like interest) results in higher DFL and vice versa. Non-existence of fixed financial charges in the cost structure of a firm means that DFL will be 1.
- Combined leverage shows the total effect of the operating and financial leverages. In other words, combined leverage shows the total risks associated with the firm. It is the product of the operating leverage and financial leverage.
- The presence of debt in the capital structure of a firm necessitates fixed payments in the form of interest.
- The capital structure of a firm may have different combinations like all equity, equity-preference share, equity-debt, equity-debt-preference share, etc. Before selecting a particular plan, analysis of all the available plans has to be made carefully to arrive at EPS, cost of capital and MPPS. The plan which has the highest EPS, lowest cost of capital and the maximum MPPS should be selected. In the absence of other information, the financial plan has to be selected on the basis of the available information. For example,

if it is not possible to compute cost of capital or MPPS but it is possible to find out the value of EPS, then the financial plan having the highest EPS should be selected.

- EBIT-EPS analysis examines the effect of financial leverage on the EPS with varying levels of EBIT under alternative financial plans. Indifference points refer to the EBIT level at which the EPS is same for two alternative financial plans. Financial Breakeven Point (FBEP) is that level of EBIT at which after paying interest, tax and preference dividend, nothing remains for the equity shareholders. In other words, financial breakeven point refers to that level of EBIT at which the firm can satisfy all fixed financial charges. EBIT less than this level will result in negative EPS. As a result, EPS is zero at this level of EBIT. Trading on equity occurs when a company incurs new debt to acquire assets on which it can earn a return greater than the interest cost of the debt.

EXERCISES

A. Short-answer Type Questions (5 Marks)

1. What is 'Business Risk'?
2. What is 'Financial Risk'?
3. What is 'Operating Leverage'?
4. What is 'Financial Leverage'?
5. What is 'Combined Leverage'?
6. What do you mean by 'EBIT–EPS Analysis'?
7. What is 'indifference point'?
8. What do you mean by 'financial break-even point'?
9. What is 'Trading on Equity'?

B. Essay Type Questions (10 Marks)

1. Distinguish between 'Operating Leverage' and 'Financial Leverage'.
2. What do you understand by operating Leverage? How would you measure it?
   [C.U. B.Com. (H), 2007]
3. What is 'indifference point'? Explain it in relation to EBIT–EPS Analysis.
   [C.U. B.Com. (H), 2008]
4. Explain the relationship between Margin of Safety and Degree of Operating Leverage.
   [C.U. B.Com. (H), 2010]
5. Explain the relationship between fixed cost, risk and Leverage. *[C.U. B.Com. (H), 2006]*
6. Write note on EBIT–EPS Analysis. *[C.U. B.Com. (H), 2007, 2009, 2011]*
7. Explain indifference point in EBIT–EPS Analysis. How is it measured?
   [C.U. B.Com. (H), 2010]

C. Practical Problems

1. Find out operating Leverage from the following data:
   Sales = ₹50,000, variable costs = 60%, fixed costs = ₹12,000. **[Ans. 2.5]**
2. Find out operating Leverage from the following data:

Particulars	Y (₹)	Z (₹)
Sales	6,00,000	12,00,000
Variable costs	3,00,000	4,00,000
Fixed costs	2,00,000	4,00,000

[Ans. 3, 2]

3. Find out the amount of fixed cost from the following data:
   DOL = 4, EBT = ₹4,00,000, interest = ₹30,000 **[Ans. 12,90,000]**
4. Find out the amount of fixed cost and DFL from the following data of X Ltd:
   DOL = 2, EBIT = ₹7,80,000, tax rate = 40%, Capital Structure:
   Equity shares of ₹100 each: ₹20,00,000
   10% debentures: ₹25,00,000
   12% preference shares: ₹5,00,000 **[Ans. 7,80,000, 1.81]**
5. A firm has a sale of ₹90,00,000 variable cost of ₹20,00,000, fixed cost of ₹5,00,000. The Capital Structure of the firm includes 10% debenture of ₹20,00,000 and equity share capital of ₹40,00,000. Calculate operating, financial and Combined Leverage.
   [Ans. 1.07, 1.03, 1.10]
6. Calculate operating, financial and Combined Leverage from the following data (all figures are in rupees):
   Sales 9,60,000; fixed costs 2,40,000; variable costs 5,60,000; interest 60,000; tax rate 50%.
   [Ans. 2.5, 1.6, 4]
7. Following information is given:
   EBIT = ₹10,00,000, preference dividend = ₹40,000, operating fixed costs = ₹20,00,000, EBT = ₹200,000, tax rate = 50%. Calculate the degree of operating, financing and Combined Leverage. By what percentage the Operating Profits would increase if the sales increase by 10%? **[Ans. 3, 8.33, 25, 30%]**
8. Calculate DOL, DFL, DCL and EPS from the following data (all figures are in rupees):
   Sales = 8,00,000; fixed costs = 70,000; variable costs = 60% of sales; 12.5% debenture: 4,00,000; equity share capital (of ₹10 each) = 5,00,000, tax rate 37.5%.
   [Ans. 1.28, 1.25, 1.60, 2.50]
9. The following information is available for the firm ABC:
   EBIT 11,20,000; profit before tax 3,20,000; fixed costs 7,00,000. Calculate percentage change in EPS if the sales are expected to increase by 5%. **[Ans. 28.45%]**

10. The following information is available for the firm XYZ:
EBIT = ₹3,00,000, Contribution = ₹8,00,000, Interest = ₹2,00,000.
If the company's sales decline by 6%, the what will be the percentage change in EPS?
[Ans. 48%]

11. The following information is available for the firm XYZ:
Operating Profit = ₹3,00,000, excess of sales over variable costs = ₹6,00,000; interest = ₹1,00,00.
If the company's sales decline by 5%, what will be the percentage change in EPS?
[Ans. 15%]

12. The firm X has sales this year of ₹1,000 and variable costs account for 10% of revenues. It has fixed costs of ₹600, interests expense of ₹100 and a tax rate of 40%. The company currently has 100 shares outstanding. What is the EPS, DOL, DFL and DCL for alternative plans:
(i) The company is unlevered and does not pay interests, (ii) the company is levered.
[Ans. 1.8/1.2, 3/3, 1/1.5, 3/4.5]

13. Calculate (a) the Operating Leverage, (b) Financial Leverage and (c) Combined Leverage from the following data under situations I and II and financial plans A and B.

Installed capacity, 2,000 units
Actual production and sales, 50% of the capacity
Selling price, ₹20 per unit
Variable cost, ₹10 per unit

Fixed cost:

Under situation I, ₹4,000
Under situation II, 5,000

Capital Structure:

Particulars	**Financial Plan**	
	A	**B**
Equity	5,000	15,000
Debt (20% interest)	15,000	5,000
Total	20,000	20,000

[Ans.]

	Situation I		**Situation II**	
DOL	**1.67**		**2**	
	Financial Plan A	**Financial Plan B**	**Financial Plan A**	**Financial Plan B**
DFL	1.33	1.09	1.43	1.11
DCL	2.22	1.82	2.86	2.22

14. Calculate (a) Operating Leverage, (b) Financial Leverage and (c) Combined Leverage from the following data under situations I and II and financial plans A and B.

Installed capacity, 4,000 units
Actual production and sales, 75 percent of the capacity
Selling price, ₹30 per unit
Variable cost, ₹15 per unit

Fixed cost:

Under situation I, ₹15,000
Under situation II, 20,000

Capital Structure:

Particulars	Financial Plan	
	A	B
Equity	10,000	15,000
Debt (20% interest)	10,000	5,000
Total	20,000	20,000

[Ans.]

	Situation I		Situation II	
DOL	**1.5**		**1.8**	
	Financial Plan A	**Financial Plan B**	**Financial Plan A**	**Financial Plan B**
DFL	1.03	1.07	1.09	1.04
DCL	1.61	1.54	1.96	1.87

15. Calculate the Degree of Operating Leverage (DOL), Degree of Financial Leverage (DFL) and the degree of Combined Leverage (DCL) for the following firms and interpret the results.

	Firm A	Firm B	Firm C
Selling price per unit (₹)	0.60	5.00	0.10
Variable cost per unit (₹)	0.20	1.50	0.02
Fixed costs (₹)	7,000	14,000	1,500
Output (Units)	60,000	15,000	1,00,000
Interest on borrowed funds (₹)	4,000	8,000	—

[Ans.]

	Firm A	Firm B	Firm C
DOL	1.41	1.38	1.23
DFL	1.31	1.26	1.00
DCL	1.85	1.72	1.23

16. A firm has sales of ₹10,00,000; variable cost of ₹7,00,000; and fixed costs of ₹2,00,000 and debt of ₹5,00,000 at 10% rate of interest. What are the operating, financial and Combined Leverages? If the firm wants to double its earnings before interest and tax (EBIT), how much of a rise in sales would be needed on a percentage basis?

[Ans. DOL = 3, DFL = 2, DCL = 6, new sales = ₹13,33,333]

17. The following data is available for PQR Ltd:
    Sales = ₹2,00,000, variable cost = ₹60,000, fixed cost = ₹1,00,000, interest = 5,000,
    Find out:
    (a) Using the concept of operating Leverage, by what percentage will EBIT increase if there is 10% increase in sales?
    (b) Using the concept of financial Leverage, by what percentage will the taxable income increase if EBIT increase by 6%?
    (c) Using the concept of Leverage, by what percentage will the taxable income increase if the sales increase by 6%?. Also verify results in view of the above figures.

[Ans. 35%, 6.9%, 24%]

18. From the following particulars, calculate DOL, DFL, DCL and EPS:
    Fixed Assets 1,50,000, Current Assets 50,000, Equity share capital of ₹10 each 60,000, 10% long term debt ₹80,000. The company's total assets turnover ratio is 3, its Fixed Operating Costs are ₹1,00,000 and its variable operating cost ratio is 40%. The income tax rate is 50%. **[Ans. 1.38, 1.03, 1.42, 21]**

19. Calculate DOL, DFL, DCL and EPS from the following data.
    Installed capacity: 45,000 units
    Actual production and sales: 80% of the capacity
    Selling price per unit: ₹25
    Unit variable cost: ₹15
    Operating fixed cost: ₹1,60,000
    Tax rate: 50%
    Capital Structure:

	Financial Plan X	Financial Plan Y
Equity share capital of ₹10 each (₹)	5,00,000	2,50,000
10% Preference Share Capital of ₹100 each (₹)	Nil	2,00,000
Debt Capital (₹)	2,00,000	2,50,000

    Cost of Debt: Upto ₹1,00,000: 10%
    Above ₹1,00,000 to ₹2,00,000: 12%
    Above 2,00,000:16%
    What will be the EPS (i) if sales volume increases by 5% in Financial Plan X and (ii) if sales volume decreases by 5% in Financial Plan Y.

[Ans. DOL: 1.8, 1.8, DFL: 1.1236, 1.5385, DCL: 2.0225, 2.7692, EPS: 1.78, 2.6, (i) 10.112% increase, 1.96 (ii) 13.846% decrease, 2.24]

20. A company having equity share capital of ₹4,00,000 divided into shares of ₹100 each. The company wants to raise additional fund of ₹2,00,000 for its diversification programme. Company has the following alternatives for raising the fund:
    Plan A: Issue of 20,000 equity shares of 100 each
    Plan B: Issue of 20,000 preference shares of 100 each
    Plan C: Issue of 10% debentures of ₹100 each
    The expected current EBIT level of the company in the present scenario is ₹1,00,000. The EBIT will change according to general economic conditions given as follows:
    Good conditions: EBIT ₹1,20,000
    Bad conditions: EBIT ₹80,000
    Calculate EPS in all the cases and analyse the results. Assume tax rate of 50%.
    [Ans.]

	Existing plan	Plan A	Plan B	Plan C
EBIT of 1,00,000	12.5	8.33	6.5	10
EBIT of 1,20,000	12.5	10	9	12.5
EBIT of 80,000	12.5	6.67	4	7.5

21. Calculate the level of EBIT at which the indifference point between the following financing alternatives will occur:
    (i) Ordinary share capital ₹10 lakh or 15% debentures of ₹5 lakh and ordinary share capital of ₹5 lakh.
    (ii) Ordinary share capital of ₹10 lakh or 13% Preference Share Capital of ₹5 lakh and ordinary share capital of ₹5 lakh.
    (iii) Ordinary share capital of ₹10 lakh or ordinary share capital of ₹5 lakh, 13% Preference Share Capital of ₹2 lakh and 15% debenture of ₹3 lakh.
    (iv) Ordinary share capital of ₹6 lakh and 15 debentures of ₹4 lakh or ordinary share capital of ₹4 lakh, 13% unit Preference Share Capital of ₹2 lakh and 15% debentures of ₹4 lakh.
    (v) Ordinary share capital of ₹8 lakh and 13% Preference Share Capital of ₹2 lakh or ordinary share capital of ₹4 lakh, 13% Preference Share Capital of ₹2 lakh and 15% debentures of ₹4 lakh.
    Assume that the corporate tax rate is 50 percent and the price of the ordinary share is ₹10 in each case.
    [Ans. 1,50,000; 2,60,000; 1,94,000; 2,16,000; 1,72,000]
22. X Ltd. is planning an expansion programme. It requires ₹20 lakhs of external financing for which it is considering two alternatives. The first alternative calls for issuing 15,000 equity shares of ₹100 each and 5,000 10% preference shares of ₹100 each. On the other hand, the second alternative requires 10,000 equity shares of ₹100 each, 2,000 10% preference shares of ₹100 each and ₹8,00,000 debentures carrying 9% interest. The

company is in the tax bracket of 50%. You are required to calculate the indifference point for the plans and verify your answer by calculating the EPS.

[Ans: EBIT: 1,36,000]

23. A company has formulated the following financing plans to finance ₹15,00,000 which is required for financing a new project.

	Plan A	Plan B	Plan C
Equity share capital of ₹10 each	15,00,000	10,00,000	7,50,000
8% debentures	—	5,00,000	2,50,000
12% Preference Share Capital	—	—	5,00,000
Total	15,00,000	15,00,000	15,00,000

[Ans: 0; 40,000; 1,20,000]

24. A company is expecting EBIT of ₹5,00,000 per annum on investment of ₹10,00,000. Company is in need of ₹8,00,000 for its expansion activities. Company can raise this amount by either equity shares capital or 12% Preference Share Capital or 10% debentures. The company is considering the following financing patterns:
    (i) 10,00,000 through issue of equity shares at par;
    (ii) 5,00,000 by issue of equity share capital and remaining 5,00,000 by issue of debentures;
    (iii) 5,00,000 through equity shares and 2,50,000 through 12% Preference Share Capital and remaining 2,50,000 through 10% debentures.;
    (iv) 5,00,000 through debt and 2,50,000 through equity shares and remaining 2,50,000 through 12% Preference Share Capital.

    Find out the best financing mix assuming 50% tax rate.

[Ans: EPS: 25, 45, 41.5, 78 (best)]

25. X Ltd. is in need of ₹25,00,000 for its new plant. It is expected that the plant would yield an EBIT of ₹5,00,000. In selecting the financial plans, the management of the company decides on the basis of maximum EPS. The company has the following three options of financing:

    Option I: By raising debt of ₹2,50,000 and the balance by issuing equity shares.

    Option II: By raising debt of ₹10,00,000 and the balance by issuing equity shares.

    Option III: By raising debt of ₹15,00,000 and the balance by issuing equity shares.

    The company's share is currently selling at ₹150 but is expected to decline to ₹125 when the amount of borrowed capital exceeds ₹10,00,000. Cost of debt is as follows:

    Up to ₹2,50,000: 10%

    Above ₹2,50,000 and up to ₹10,00,000: 15%

    Above ₹10,00,000: 20%

    Applicable tax rate is 50%. Which form of financing should the company choose?

[Ans.]

	Option I	Option II	Option III
EAT	2,37,500	1,81,250	1,31,250
No. of equity shares	15,000	10,000	8,000
EPS	15.83	**18.13 (Best)**	16.41

26. X Ltd. is in need of ₹10,00,000 for its new plant. It is expected that the plant would yield an EBIT of ₹1,60,000. In selecting the financial plans, the management of the company decides on the basis of maximum EPS. The company has the following three options of financing:
Option I: By raising debt of ₹1,00,000 and the balance by issuing equity shares.
Option II: By raising debt of ₹4,00,000 and the balance by issuing equity shares.
Option III: By raising debt of ₹6,00,000 and the balance by issuing equity shares.
The company's share is currently selling at ₹25 but it is expected to decline to ₹20 when the amount of borrowed capital exceeds ₹5,00,000. Cost of debt is as follows:
Upto ₹1,00,000: 8%
Above ₹1,00,000 and up to ₹5,00,000: 12%
Above ₹5,00,000: 18%
Applicable tax rate is 50%. Which form of financing should the company choose?
[Ans.]

	Option I	Option II	Option III
EAT	76,000	58,000	43,000
No. of equity shares	36,000	24,000	20,000
EPS	2.11	**2.42 (Best)**	2.15

27. A company is considering a Capital Structure of ₹10,00,000 for which following options are available. Calculate indifference level of EBIT in each case;
    (a) Equity share capital of ₹10,00,000 or 10% debentures of ₹5,00,000 and the remaining amount from equity share capital.
    (b) Equity share capital of ₹8,00,000 plus 10% debentures of ₹200,000 or equity share capital of ₹7,00,000 plus 12% preference share of ₹3,00,000.
    (c) Equity share capital of ₹10,00,000 or equity share capital of ₹5,00,000 plus 10% debenture of ₹2,50,000 plus 12% preference share of ₹2,50,000.

[Ans. 1,00,000, 3,24,000, 1,70,000]

4B CHAPTER

Capital Structure Decisions

CHAPTER OUTLINE

4B.1 Introduction
4B.2 Concept of Capital Structure
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4B.4 Capitalisation and Capital Structure
4B.5 Financial Structure versus Capital Structure
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4B.7 Importance of Capital Structure
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4B.13 Implications of Corporate Tax on Capital Structure Theories
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4B.1 INTRODUCTION

Financing decision by a financial manager of a firm essentially involves three important dimensions: cost of fund procurement, risk-return trade-off, and impact on the value of the enterprise. While the first two dimensions are taken care of by areas like Cost of Capital, Leverage analysis and EBIT-EPS analysis, the third dimension comes under the purview of Capital Structure decisions. Capital Structure theories explain the relationship between the chosen debt-equity mix and the value of the firm.

4B.2 CONCEPT OF CAPITAL STRUCTURE

The phrase 'Capital Structure' comprises of two terms—capital and structure. The term 'capital' is interpreted differently in different subjects. In Economics, 'capital' is the 'produced means

of production'. In Accounting, 'capital' is the amount contributed by the owners. However, in Financial Management, 'capital' refers to the amount invested (irrespective of the source from which it is actually procured) in a business.

Thus, under fund concept, Total Capital = Own Fund + Loan Fund

Alternatively, under asset concept, Total Capital = Fixed Asset + Current Asset

The term 'structure' is often used in engineering science. It connotes the arrangements of the various parts of a construction.

Hence, 'Capital Structure' of a firm refers to the proportion of various long-term sources of capital (such as long-term loan, preference shares and equity shares, and reserve and surplus) in the total capital of the firm.

For example, if the total long-term capital of a firm comprises of ₹5,00,000 of equity share capital, ₹3,00,000 of Preference Share Capital and ₹2,00,000 of Debt Capital, then, the relative ratio 5:3:2 of all these three sources will denote the Capital Structure of the concerned firm.

4B.3 DEFINITION OF CAPITAL STRUCTURE

There is a good deal of debate on a unanimous definition of Capital Structure, though the basic line of thinking remains the same.

According to J. J. Hampton, Capital Structure is the composition of debt and equity securities that comprise a firm's financing of its assets.

According to Gerstenberg, Capital Structure of a company refers to the make-up of its capitalisation and it includes all long-term capital resources, viz. loans, reserves, shares and bonds.

According to James Mao, the term Capital Structure refers to the proportionate relationship between the market values of the company's outstanding debt and equity.

Therefore, the term 'Capital Structure' may be defined as the relative proportion of various long-term sources in the aggregate long-term capital of a firm.

4B.4 CAPITALISATION AND CAPITAL STRUCTURE

Though sometimes used interchangeably, the two terms, 'capitalisation' and 'Capital Structure' differ in their meanings. Capitalisation refers to the total amount of fund or capital procured by a firm from different sources (preferably long term). On the other hand, Capital Structure refers to the respective proportion of various long-term sources in the aggregate long-term capital of the firm. Therefore, if a firm procures ₹5,00,000 by issuing equity shares, ₹3,00,000 by issuing preference shares and ₹2,00,000 by issuing debentures, the capitalisation of the firm would be ₹(5,00,000 + 3,00,000 + 2,00,000) = ₹10,00,000, while the respective proportion of 5:3:2 for equity shares, preference shares and debentures would be the Capital Structure.

Therefore, we may sum up the issue as follows:

1. Capitalisation refers to the quantitative aspect of financial planning while Capital Structure refers to the qualitative aspect of financial planning.
2. Capitalisation is an absolute measure while Capital Structure is a relative measure.

3. Capitalisation is the total capital arranged by the firm from various long-term sources while Capital Structure is the relative proportion of various long-term sources in the aggregate long-term capital of any firm.

4B.5 FINANCIAL STRUCTURE VS. CAPITAL STRUCTURE

Financial structure refers to the respective proportion of all items on the liabilities side of the balance sheet. In other words, financial structure represents the relative proportion of different long-term as well as short-term capital. For example, if a firm procures ₹5,00,000 equity share capital, ₹4,00,000 Preference Share Capital, ₹3,00,000 Debt Capital and also has ₹2,00,000 Current Liabilities, then, the proportion of all these sources, i.e. 5:4:3:2 is the financial structure of the firm.

On the other hand, Capital Structure refers to the respective proportions of long-term capital sources only. Thus, in the above example, 5:4:3 represents the Capital Structure of the firm.

Tutorial Note:

Since financial structure considers all sources of capital including the short-term sources, it is a broader concept and includes Capital Structure as one of its subset. Hence, students should be careful while using these two terms. They must not be used interchangeably.

4B.6 CLASSIFICATION OF CAPITAL STRUCTURE

1. ***Nature-based classification*:** According to nature, a Capital Structure can be either (i) simple or (ii) complex.
   - ***Simple Capital Structure:*** When a firm procures capital only from one source (e.g. equity share capital and retained earnings), the resulting Capital Structure is said to be a simple Capital Structure. An example is given in Table 4B.1.

Table 4B.1 Balance Sheet of M Ltd.

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity share capital	5,00,000	Fixed assets	5,00,000
Retained earnings	2,00,000	Current Assets	5,00,000
Current Liabilities	3,00,000		
	10,00,000		10,00,000

The above Capital Structure is simple as capital is procured only from the equity shareholders (retained earnings represent the undistributed profit distributable to equity shareholders).

   - ***Complex Capital Structure:*** When a firm procures capital from more than one source, the resulting Capital Structure is called complex Capital Structure. An example is given in Table 4B.2.

Table 4B.2 Balance Sheet of N Ltd.

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity share capital	5,00,000	Fixed assets	8,00,000
Retained earnings	2,00,000	Current Assets	8,00,000
10% Preference Share Capital	2,00,000		
8% debentures	3,00,000		
Public deposit	2,00,000		
Bank loan	1,00,000		
Current Liabilities	1,00,000		
	16,00,000		16,00,000

In the above example, the firm has procured capital from different sources including shareholders, debenture holders and financial institutions, etc. Thus, the Capital Structure is considered complex.

Firm Ownership and Composition of Capital Structure

The composition of a firm's Capital Structure largely depends on the ownership structure of the firm. Because of the legal limitations, a sole proprietorship firm or a partnership firm cannot issue any structured debt instruments. As a result, institutional loans or loans from relatives are left as the sole option for them. On the other hand, corporate form of organisations enjoys a whole lot of options. This flexibility, in a great way, affects the Cost of Capital of those firms favourably.

Table 4B.3 depicts the comparison of Capital Structure under different forms of firm ownership.

Table 4B.3 Capital Structure under Different Forms of Firm Ownership—a Comparison

Sole Proprietorship Firm		**Partnership Firm**		**Joint Stock Company**	
Balance Sheet of M/S X (Liab. Side)		**Balance Sheet of XY & Co. (Liab. Side)**		**Balance Sheet of X Ltd. (Liab. Side)**	
Particulars	₹	**Particulars**	₹	**Particulars**	₹
Capital A/C	2,00,000	Partners' capital A/C:		Equity share capital	3,00,000
Loan from relatives	1,00,000	X	1,00,000	6% Preference Share Capital	1,00,000
Bank loan	1,00,000	Y	1,00,000	8% debentures	1,00,000
Current Liabilities	1,00,000	Partners' current A/C:		Public deposits	50,000
		X	30,000	Bank loan	1,50,000
		Y	20,000	Current Liabilities	1,00,000
		Loan from X	50,000		
		Bank Loan	2,00,000		
		Current Liabilities	1,00,000		
	5,00,000		6,00,000		8,00,000

2. ***Based on composition and resultant risk:*** Based on the composition, i.e. relative share of own capital and fixed charge capital[1] and resultant risk, Capital Structure (necessarily complex Capital Structure) can be divided into (i) Highly-geared, (ii) Low-geared and (iii) Evenly-geared Capital Structure.

   Here, Gearing ratio is defined as the ratio of fixed charge bearing securities, i.e. fixed interest bearing Debt Capital and Preference Share Capital to equity shareholders' fund. That is, Capital Gearing Ratio

$$= \frac{\text{Fixed charge bearing securities}}{\text{Equity shareholders' fund}}$$

$$= \frac{\text{Fixed interest bearing debt capital + Preference Share Capital}}{\text{Equity share capital + Retained Earnings net of fictititious assets}}$$

- ***Highly geared Capital Structure:*** A Capital Structure is called highly geared when the proportion of fixed charge bearing securities is higher than the equity shareholders' fund. In other words, a Capital Structure is said to be highly geared if,

$$\text{Gearing ratio} = \frac{\text{Fixed charge bearing securities}}{\text{Equity shareholders' fund}} > 1$$

  A highly geared Capital Structure is generally considered to be highly risky, however, at the same time, it offers the benefits of Trading on Equity which helps to maximise the return to shareholders.

- ***Low-geared Capital Structure:*** A Capital Structure is called low geared when the proportion of fixed charge bearing securities is lower than the equity shareholders' fund. In other words, a Capital Structure is said to be low geared if,

$$\text{Gearing ratio} = \frac{\text{Fixed charge bearing securities}}{\text{Equity shareholders' fund}} < 1$$

  A low geared Capital Structure is considered to be conservative rather than risky.

- ***Evenly geared Capital Structure:*** A Capital Structure is called evenly geared when the proportion of fixed charge bearing securities and equity shareholders' fund are same. In other words, a Capital Structure is said to be evenly geared if,

$$\text{Gearing ratio} = \frac{\text{Fixed charge bearing securities}}{\text{Equity shareholders' fund}} = 1$$

  An evenly geared Capital Structure shows that the firm is depended equally on equity shareholders' fund and fixed charge capital and hence represents a balanced financial risk profile.

[1] Fixed charge capital refers to Debt Capital and Preference Share Capital.

Illustration 4B.1

Problem

The financing mix of three public limited companies is given as follows:

Particulars	A Ltd. (₹)	B Ltd. (₹)	C Ltd. (₹)
Equity share capital	4,00,000	2,00,000	2,00,000
Retained earnings	3,00,000	3,00,000	1,00,000
10% Preference Share Capital	2,00,000	2,00,000	2,00,000
12% debentures	1,00,000	1,00,000	1,00,000
9.5% Bank loan	2,00,000	2,00,000	2,00,000

Comment on the nature of Capital Structure based on Capital Gearing Ratio.

Solution

Calculation for Capital Gearing Ratio

Particulars	A Ltd. (₹)	B Ltd. (₹)	C Ltd. (₹)
Fixed Charge Bearing Securities:			
10% Preference Share Capital	2,00,000	2,00,000	2,00,000
12% debentures	1,00,000	1,00,000	1,00,000
9.5% Bank loan	2,00,000	2,00,000	2,00,000
	5,00,000	5,00,000	5,00,000
Equity shareholders' fund:			
Equity share capital	4,00,000	2,00,000	2,00,000
Retained earnings	3,00,000	3,00,000	1,00,000
	7,00,000	5,00,000	3,00,000
Capital Gearing Ratio $= \frac{\text{Fixed charge bearing securities}}{\text{Equity shareholders' fund}}$	0.71	1.00	1.67
Type of Capital Structure	Low-geared	Evenly geared	High-geared

4B.7 IMPORTANCE OF CAPITAL STRUCTURE

Capital Structure decision of a firm has far reaching impact on different aspects of a firm's operation and long-term growth. Capital Structure significantly affects the return to shareholders, cost of financing and most importantly, the value of the firm. In addition, it casts great impact on the existing ownership structure and associated control. The importance of Capital Structure may be summarised as follows:

1. ***Maximisation of returns to owners:*** A properly designed Capital Structure offering a judicious use of fixed charge capital and owned capital can maximise the return on equity. This is because, a firm with Rate of Return on assets higher than the cost of debt

and cost of Preference Share Capital can significantly increase the return to shareholders by increasing the proportion of debt and Preference Share Capital in its total capital even in the absence of taxes. In the presence of tax, the increase is found to be even higher as interest on debt is a tax deductible item and as a result, the resultant tax savings goes to the equity shareholders.

2. ***Minimisation of Cost of Capital:*** Cost of debt is generally found to be cheaper than cost of equity. Moreover, it is also range bound, that is to say, it remains relatively constant within a given range. As a result, an increase in the proportion of Debt Capital keeping the total capital unaltered contributes significantly to reduce the overall Cost of Capital. Hence, an optimal debt equity mix in a Capital Structure can minimise the overall Cost of Capital.
3. ***Minimisation of risks:*** A business is subject to two types of risks: business risk and financial risk. Business risk arises from factors like sudden fall in demand, falling prices of goods, non-availability of raw materials, etc. On the other hand, financial risk arises due to inclusion of fixed charge capital in the Capital Structure. Since a proper balance must be maintained between these two risks to minimise their overall impact, Capital Structure can play an important role here. Thus, a firm with high business risk resulting into higher variability in operating income may use lesser debt to reduce the impact of financial risk and vice-versa to balance the overall risk profile of the firm.
4. ***Increasing value of the firm:*** Value of the firm or more precisely market value of the firm largely depends on its performance. Since properly designed Capital Structure can significantly reduce the overall Cost of Capital , return to shareholders increases. This, when recognised by the market, improves the market price of shares and accordingly the total value of the firm.
5. ***Ensuring liquidity:*** The Capital Structure of any firm has significant bearing on a firm's short-term and long-term liquidity in terms of buyback of equity shares, redemption of preference shares and debentures, repayment of loan and payment of dividend and interest. A properly designed Capital Structure, commensurate with earnings and cash availability, takes care of these factors and ensures liquidity.
6. ***Preservation of control:*** In many situations, large borrowings come with certain debt covenants (i.e. restrictions imposed by lenders). As a result, debt providers interfere in major company decisions and absolute control by equity shareholders is compromised. A well planned Capital Structure keeps a balance between equity and Debt Capital and thereby preserve the control of owners in the company.
7. ***Proper utilisation of funds:*** An ideal Capital Structure always takes into account the actual reason behind a fund procurement decision thereby establishes proper coordination between the quantum of capital and financial need of the business. As a result, both undercapitalisation and overcapitalisation can be avoided.
8. ***Financing long-term growth:*** Firm's existing Capital Structure plays an important role in attracting finance for long-term expansion and growth programmes. A firm with sound

Capital Structure gets finances (both in form of issue of shares or raising new debt) easily as compared to a firm with unplanned Capital Structure.

4B.8 FACTORS DETERMINING CAPITAL STRUCTURE

Since Capital Structure of a firm has significant impact on aspects like return to shareholders, Cost of Capital and value of a firm, many factors are required to be taken into consideration while framing the Capital Structure of a firm. These are known as the determinants of Capital Structure. These can be classified into internal factors and external factors as follows:

4B.8.1 Internal Factors

The internal factors affecting Capital Structure include the following:

1. ***Nature of the business:*** Capital Structure of a firm largely depends on the nature of the business a firm undertakes. Firms that operate in monopoly or oligopoly markets generally have stable income and low business risk as compared to perfectly competitive firms. As a result, they may employ higher proportion of Debt Capital in their Capital Structure. On the other hand, perfectly competitive firms face high risk and hence relies more on Equity Capital.
2. ***Size of the business:*** Small scale firms generally have lower capital requirement and hence rely mostly on own capital. Moreover, many a times, financial institutions impose strict lending conditions on such firm, as a result of which they are forced to avoid Debt Capital. On the other hand, large firms get easy access to institutional credit and hence can depend on Debt Capital. Moreover, they also have higher capital requirement which can hardly be made by new issues always. For this reason, they also depend equally on Debt Capital.
3. ***Stability of income:*** The Capital Structure of a firm also depends on the stability of its income. Firms which can maintain stable income can easily bear the fixed charges like interest on debt and preference share dividend. Hence, they may depend more on Debt Capital or Preference Share Capital. However, firms with fluctuating income can hardly manage the burden of fixed charge capital and hence should try to avoid them.
4. ***Cost of Capital :*** Generally, Debt Capital is associated with lower cost as compared to Equity Capital. Hence, increase in Debt Capital can significantly reduce the overall or average Cost of Capital . Hence, a firm that intends to minimise their Cost of Capital has to increase the share of Debt Capital in the total capital of the firm.
5. ***Objective of financing:*** Capital Structure also depends on the objective of financing. In order to finance the normal operating activities, a firm may rely on Debt Capital or Preference Share Capital as the fixed charges can easily be funded from the regular income. On the other hand, expansion projects which will take time to materialise should preferably be financed by equity share capital or from retained earnings.
6. ***Duration of the project:*** This is another important factor determining the Capital Structure of a firm. A firm should finance the projects with fixed completion period

through sources like Debt Capital or Preference Share Capital (which are compulsorily redeemable) by properly aligning the maturity profile of the instruments with the period of the projects. On the other hand, projects, which do not have any fixed completion period, should preferably be financed by equity share capital which is not associated with compulsory redemption.

7. ***Control over the firm:*** Since preference shareholders and debt providers do not have any voting right, procurement of additional capital through these sources does not hamper the controlling interest of the existing shareholders. But if additional capital is financed by issuing new shares to investors other than the existing shareholders, it may dilute the proportionate shareholding and accordingly the controlling interest of existing shareholders, especially the promoter group. As a result, firms with high promoter shareholding may prefer Debt Capital to Equity Capital. However, at times, large borrowings come with strict debt covenants which may invite unnecessary interfere by the debt providers. Hence, this aspect also needs to be taken care of.
8. ***Flexibility:*** Capital Structure of a firm should be flexible. Flexibility means the ease of changing the components of Capital Structure as and when needed. In order to ensure flexibility, a firm may prefer structured debt instruments or preference shares to traditional equity shares, because convertibility, callability, etc. can be attached only with these structured instruments and not with equity shares.
9. ***Structure of assets:*** Capital Structure decisions are closely associated with the structure of assets of any firm. A firm should avoid financing Current Assets by long-term capital sources. Moreover, a part of the fixed assets may be financed by long-term Debt Capital with matching maturity.
10. ***Trading on Equity:*** Capital Structure of a firm also depends on the possibility and intention of undertaking Trading on Equity. When a firm has its Rate of Return higher than the cost of fixed charge capital, it can increase the return to shareholders by increasing the share of fixed charge capital in the total capital. Hence, in such cases, Capital Structure comprises more Debt Capital and less Equity Capital.
11. ***Attitude of the management:*** Capital Structure of a firm also depends on the attitude and outlook of management towards financial risk. Firms with aggressive management are found to rely more on debt than those with conservative management.
12. ***Age of the company:*** Newer companies with uncertain future generally face hardship in getting institutional finance. As a result, they rely more on unconventional funding like private equities, venture capital funds, etc. mostly in form of equity investments. Thus, their Capital Structure include higher share of owned capital than Debt Capital.

4B.8.2 External Factors

These are factors beyond the control of any firm. External factors include the following:

1. ***Capital market conditions:*** Capital market conditions do not remain uniform throughout the year. As a result, while in a buoyant capital market, new issues are often oversubscribed, at times of slump, companies hardly find buyers for the new shares.

Hence, in such a situation, there remain no other alternative than to resort to institutional financing in form of loan. Thus, it can be said that capital market conditions do have a significant impact on the Capital Structure a company plans.

2. ***Level of interest rates:*** The current level of interest rates is an important determinant of the Capital Structure of a firm. A firm with relatively low Rate of Return cannot afford to pay high interest and hence may avoid loan financing in periods of high interest rates.
3. ***Investors' attitude:*** Capital Structure of a firm also depends on the attitude of the investors in the capital market. In an economy where investors are mostly risk averse, companies will find it difficult to issue securities in the market and should depend on institutional loans to meet their requirement of funds. On the other hand, in economies with risk taker investors, new issue of shares, debentures and other innovative products will be the most favoured route.
4. ***Regulatory requirements:*** Market regulators of each country issue various regulations to be abided by the issuers of securities. For example, in India, companies cannot issue irredeemable preference shares or rights issue can be made only after a minimum gap from the initial public offering. Similarly, banking companies are not allowed to issue securities other than equity shares. Thus, a firm's Capital Structure must be planned taking into consideration all the regulatory requirements of the concerned country.
5. ***Tax policy:*** Tax policy often plays an important role in determining the Capital Structure of a firm. For example, in India, dividend payment by domestic companies attracts dividend distribution tax resulting into higher Cash Outflow for financing through equity shares. On the other hand, interest payments are tax deductible and hence offer tax savings. Therefore, other things being unchanged, a company with higher sensitivity towards tax rates may favour debt financing over equity financing.
6. ***Government policies:*** Many a times, monetary and fiscal policy measures undertaken by the government significantly affects the Capital Structure of a firm. When government follows a liberal policy and allows foreign institutional investors to participate in the capital market, companies find it easier to raise required funds by issuing new shares. Similarly, domestic companies, when allowed to raise finance from international capital markets, enjoy better options to form a sound Capital Structure.

4B.9 OPTIMUM CAPITAL STRUCTURE

Since Debt Capital offers relatively lower cost, a company significantly reduces its average Cost of Capital by increasingly employing higher proportion of Debt Capital. This leads to continuous increase in the return available for equity shareholders in the form of increased EPS and return on equity up to a certain level of debt. Beyond this level, however, cost of equity rises sharply to offset the benefit of cheaper debt and average Cost of Capital starts rising leading to fall in EPS and ROE. The level where Cost of Capital becomes the minimum and EPS or ROE becomes the maximum is considered to be the optimum Capital Structure. At this level, the market price per share also becomes maximum and thus firm value becomes the maximum.

Hence, an optimum Capital Structure may be defined as the best combination of debt and equity which maximises the value of the firm.

Achieving an optimum Capital Structure is considered to be very important for every firm. This is because an optimum Capital Structure helps a firm in maximising its long-term growth potential with a balanced risk profile.

4B.9.1 Features of Optimum Capital Structure

In order to be optimum, a Capital Structure should preferably have the following features: profitability, economy, solvency, flexibility, conservatism, control, and reasonable risk.

1. ***Profitability:*** The Capital Structure of the company should be most profitable. It must maximise earnings per equity share and return on equity at a given level of operating income.
2. ***Economy:*** The Capital Structure must minimise the overall cost of financing by using an appropriate mix of different sources of capital including debt and equity.
3. ***Solvency:*** The Capital Structure should be so designed as to ensure that the firm does not run the risk of becoming insolvent. Excessive use of Debt Capital limits the solvency of the company. Hence, the debt content of capital should never be allowed to go beyond manageable limits.
4. ***Flexibility:*** The Capital Structure should be flexible enough to meet the requirements of changing conditions, both internal and external. While internally it should also be possible for the company to raise additional funds whenever needed to finance its profitable activities, externally it should be possible for the firm to take advantage of situations like decrease in the interest rates through measures like debt restructuring.
5. ***Conservatism:*** The Capital Structure should be conservative in the sense that the proportion of Debt Capital in the total capital does not exceed the limit which the company can normally bear. In other words, debt servicing[2] requirements should be commensurate with the company's ability to generate future Cash Flows.
6. ***Control:*** The Capital Structure should be so devised that it involves minimum risk of loss of control of the company. Hence, additional loan financing should be avoided when debt covenants are likely to invite unnecessary interfere by the debt providers in the decision-making process.
7. ***Reasonable Risk:*** The Capital Structure should offer a balanced risk which is manageable within the capacity of the company. It should not create unnecessary burden on the operating income of the firm.

4B.10 CAPITAL STRUCTURE AND TRADING ON EQUITY

In financial literature, one of the most important concepts associated with Capital Structure is Trading on Equity. It is so important that some of the experts of this field consider it to be the basic or fundamental principle underlying the Capital Structure.

[2] Debt servicing refers to payment of interest along with the instalment of principal amount regularly.

Trading on Equity is defined as a process through which a firm can improve its return to shareholders (i.e. owners) through the use of fixed charge capital, i.e. Debt Capital and Preference Share Capital. In other words, through Trading on Equity, a firm can considerably increase its EPS and ROE by increasing the proportion of Debt Capital and Preference Share Capital in its total capital. However, this is possible only when the Rate of Return is higher than the cost of fixed charge capital. That is to say,

1. Rate of Return on assets > Cost of Debt Capital, and
2. Rate of Return on shareholders' fund > Cost of Preference Share Capital.

In case the above two conditions are not met, increasing fixed charge capital (i.e. Debt Capital and Preference Share Capital) will lead to a decline in EPS and ROE instead of an increase. This is why the above two conditions are also known as the limiting conditions to Trading on Equity.

Consider the following two illustration.

Case 1: Rate of Return on Assets > Cost of Debt Capital

Illustration 4B.2

Problem

X Ltd. expects an annual return on assets of 10%. Currently. it has total assets of ₹2,00,000 financed by equity share capital of ₹1,00,000 of face value of ₹10 and 8% Debt of ₹1,00,000. It is now contemplating to raise its Debt Capital to ₹1,20,000 keeping the total capital unchanged. Calculate EPS of the firm both under existing and proposed situation and comment on how far the firm is successful in Trading on Equity. Will the decision be beneficial if the Rate of Return on assets declines to 7%? Tax rate is 50%.

Solution

Calculation for EPS

Particulars	ROA > K_d		ROA < K_d	
	Existing Plan (₹)	Proposed Plan (₹)	Existing Plan (₹)	Proposed Plan (₹)
1. EBIT (Total Assets × ROA)	20,000	20,000	14,000	14,000
2. Interest on Debt Capital	8,000	9,600	8,000	9,600
3. EBT	12,000	10,400	6,000	4,400
4. Tax @ 50%	6,000	5,200	3,000	2,200
5. EAT	6,000	5,200	3,000	2,200
6. No. of Shares	10,000	8,000	10,000	8,000
7. EPS	0.60	0.65	0.30	0.275

From the above statement, it can be seen that X Ltd. has been successful in increasing its EPS by employing additional Debt Capital when the return on assets is higher than the cost of debt. This has been possible because of Trading on Equity. However, when the return on assets is lower than the cost of debt, the firm has ended up with a decline in EPS while employing additional debt.

This proves the assertion that Trading on Equity is possible when Rate of Return on assets is higher than cost of Debt Capital.

Case 2: Rate of Return on Shareholders' Fund > Cost of Preference Share Capital

Illustration 4B.3

Problem

Y Ltd. has total assets of ₹5,00,000 financed by ₹2,50,000 equity share capital (₹10) and ₹2,50,000, 10% Preference Share Capital. The firm expects an annual return on assets of 22%. It is now contemplating to raise its Preference Share Capital to ₹3,00,000 keeping the total capital unchanged. Calculate EPS of the firm both under existing and proposed situation and comment on how far the firm is successful in Trading on Equity. Will the decision be beneficial if the Rate of Return on assets declines to 18%? Tax rate is 50%.

Solution

Calculation for EPS

Particulars	RSHF > K_d		RSHF < K_d	
	Existing Plan (₹)	Proposed Plan (₹)	Existing Plan (₹)	Proposed Plan (₹)
1. EBIT (Total Assets · ROA)	1,10,000	1,10,000	90,000	90,000
2. Interest on Debt Capital	Nil	Nil	Nil	Nil
3. EBT	1,10,000	1,10,000	90,000	90,000
4. Tax @ 50%	55,000	55,000	45,000	45,000
5. EAT	55,000	55,000	45,000	45,000
6. Preference dividend	25,000	30,000	25,000	30,000
7. Earnings available for equity shareholders	30,000	25,000	20,000	15,000
8. No. of shares	25,000	20,000	25,000	20,000
9. EPS	1.20	1.25	0.80	0.75

From the above statement, it can be seen that X Ltd. has been successful in increasing its EPS by employing additional Preference Share Capital when the return on shareholders' fund (i.e. EAT /Shareholders' Fund = 55,000/5,00,000 = 11%) is higher than the cost of Preference Share Capital. This has been possible because of Trading on Equity. However, in case 2, when the return on shareholders' fund (45,000/5,00,000 = 9%) is lower than the cost of debt, the firm has ended up with a decline in EPS while employing additional Preference Share Capital.

This proves the assertion that Trading on Equity is possible when Rate of Return on shareholders' fund is higher than cost of Preference Share Capital.

4B.10.1 Classification of Trading on Equity

Based on the relative dominance of equity shareholders' fund and fixed charge bearing capital, Trading on Equity can be of two types—trading on thin equity and trading on thick equity. A comparison between the two can be made as shown in Table 4B.4.

Table 4B.4 Difference Between Trading on Thick and Thin Equity

Trading on Thin Equity	Trading on Thick Equity
1. Fixed charge bearing capital is predominant. 2. Capital Gearing Ratio is more than one. 3. It involves high level of risk. 4. Rate of growth of EPS is more. 5. It is suitable for established firms.	1. Equity shareholders' fund is predominant. 2. Capital Gearing Ratio is less than one. 3. It involves low level of risk. 4. Rate of growth of EPS is less. 5. It is suitable for new firms.

4B.10.2 Advantages and Disadvantages of Trading on Equity

The advantages and disadvantages of Trading on Equity are listed in Table 4B.5.

Table 4B.5 Advantages and Disadvantages of Trading on Equity

Advantages	Disadvantages
1. It increases EPS and ROE of the firm. 2. It increases MPS by increasing EPS. 3. Preservation of control by promoters is possible as participation of retail outside shareholders is low. 4. Helps in building good image. 5. Injects more flexibility in the Capital Structure as Debt Capital can be redeemed easily.	1. It increases the financial risk substantially. 2. Its benefit is conditional, i.e. ROA > K_d and return on shareholders' fund > K_p. 3. Increasing fixed charge capital may not be easy always. Many a times, additional loan comes at the cost of independence in decision making. 4. Suitable only when operating risk is low.

4B.11 CAPITALIZATION; UNDERCAPITALIZATION AND OVERCAPITALIZATION

4B.11.1 Capitalisation

As mentioned earlier, capitalisation refers to the total capital employed in a business. More preferably, it refers to the total amount of long-term capital invested in the business.

According to Gerstenberg, for all practical purpose, capitalisation means the total accounting value of all the capital regularly employed in the business.

Thus, the term 'capitalisation' may be defined as the total fund invested in the business and includes owner's funds, borrowed funds, long-term loans, any other surplus earning, etc. Symbolically:

Capitalisation = Share capital + Debenture + Long-term borrowing + Reserve & Surplus.

Theories on Capitalisation

The problems of determining the amount of capitalisation is worth mentioning both for a newly started company and for an established concern. In case of the new enterprise, however, the problem is more severe in so far as it requires the reasonable provision for future as well

as for current needs and there arises the danger of either raising excessive or insufficient capital. Thus, in order to estimate the right amount of capitalisation, two theories have been pronounced, namely (a) Cost Theory and (b) Earnings Theory.

1. ***Cost Theory of Capitalisation:*** Under this theory, the capitalisation of a company is determined by adding the initial actual expenses to be incurred in setting up a business as a going concern. It is the aggregate of the cost of fixed assets (plant, machinery, building, furniture, goodwill, and the like), the amount of Working Capital (investments, cash, inventories, receivables) required to run the business, and the cost of promoting, organising and establishing the business. For example, if a company requires ₹1,00,000 for fixed assets, ₹30,000 for regular Working Capital, ₹40,000 for promotion and development expenses and ₹10,000 for raising funds, total capitalisation under cost theory will be = (₹1,00,000 + 30,000 + 40,000 + 10,000) = ₹1,80,000.

   Cost theory, no doubt, gives a concrete idea to determine the magnitude of capitalisation, but it fails to provide the basis for assessing the net worth of the business in real terms. The capitalisation determined under this theory does not change with earnings. Moreover, it does not take into account the future needs of the business. This theory is not applicable to the existing concerns because it does not suggest whether the capital invested justifies the earnings or not. Moreover, the cost estimates are made at a particular period of time. They do not take into account the price level changes. For example, if some of the assets may be purchased at inflated prices, earnings will be low and the company will not be able to pay a fair return on the capital invested.

2. ***Earnings Theory of Capitalisation:*** This theory assumes that an enterprise is expected to make profit. According to it, its true value of a company depends upon its earning capacity. Thus, the capitalisation of the company is equal to the capitalised value of its estimated earnings. To find out this value, a company, while estimating its initial capital needs, has to prepare a projected profit and loss account to complete the picture of earnings or to make a sales forecast. Having arrived at the estimated earnings figures, the financial manager will compare with the actual earnings of other companies of similar size and business with necessary adjustments. Finally, the above earnings are capitalised with the help of a fair return similar to the peers. The resultant value is the capitalisation. For example, if a company expects to earn ₹1,00,000 p.a. with an annual normal Rate of Return of 10%, then (1,00,000 ÷ 10%) = ₹10,00,000 will be the required capitalisation of the firm.

   Though earning theory is more appropriate for going concerns, it is difficult to calculate the amount of capitalisation under this theory. This is because it is based upon a 'normal Rate of Return' by which earnings are capitalised. This rate is difficult to estimate in so far as it is determined by a number of factors not capable of being calculated quantitatively.

   These factors include nature of industry/financial risks, competition prevailing in the industry and so on.

4B.11.2 Overcapitalisation

When the actual capitalisation of a company is more than the required capitalisation as per the earnings capacity of the company, the situation is called overcapitalisation. For example, if the estimated earnings of the company is ₹2,00,000 and normal Rate of Return is 10%, then capitalisation actually required is ₹(2,00,000 ÷ 10%) = ₹20,00,000. However, if actual capital employed is ₹23,00,000, then the company is said to be overcapitalised by ₹(23,00,000 – 20,00,000) = ₹3,00,000.

Causes of Overcapitalisation

Following are the major causes of overcapitalisation:

1. ***Over issue of capital:*** Defective financial planning may lead to excessive issue of shares or debentures. As a result, a significant amount of fund remains idle causing decline in returns and accordingly a state of overcapitalisation.
2. ***Acquiring assets at inflated prices:*** Assets may be acquired at inflated prices or at a time when the prices were at their peak. In both the cases, the real value of the assets is much below their book value causing low Return on Investment and a state of overcapitalisation.
3. ***Formation during the boom period:*** If the establishment of a new company or the expansion of an existing concern takes place during the boom period, it may be a victim of overcapitalisation. The assets are acquired at fabulous prices. But when boom conditions cease, prices of products decline, resulting in lower earnings. The original value of assets remains in books while earning capacity erodes due to depression. Such a state of affairs results in overcapitalisation.
4. ***Overestimation of earnings:*** The promoters or the directors of the company may overestimate the earnings of the company and raise capital accordingly. If the company is not in a position to invest these funds profitably, the company will have more capital than required and will become overcapitalised.
5. ***Inadequate depreciation:*** Absence of suitable depreciation policy may make the asset-values unrealistic. If the depreciation or replacement provision is not adequately made, the productive worth of the assets is diminished which depresses the earnings. Lowered earnings bring about fall in share values, which represents overcapitalisation.
6. ***Liberal dividend policy:*** The company may follow a liberal dividend policy and may not retain sufficient funds for self-financing. As a result, the company may need to raise additional funds at a high cost resulting into decline in returns and a state of overcapitalisation.
7. ***Lack of reserves:*** Certain companies do not believe in making adequate provision for various types of reserves and distribute the entire profit in the form of dividends. Such a policy reduces the real profit of the company and the book value of the shares lags much behind its real value. It represents overcapitalisation.
8. ***Heavy promotion and organisation expenses:*** "A certain degree of overcapitalisation," says Beacham, "may be caused by heavy issue expenses". If expenses incurred for

promotion, issue and underwriting of shares, promoters' remuneration, etc. prove to be higher compared to the benefits they provide, the enterprise will find itself overcapitalised.

9. ***Shortage of capital:*** If a company has small share capital, it will be forced to raise loans at heavy rate of interest. This would reduce the net earnings available for dividends to shareholders. Lower earnings bring down the value of shares leading to overcapitalisation.
10. ***Taxation policy:*** High rates of taxation may leave little in the hands of the company to provide for depreciation and replacement and dividends to shareholders. This may adversely affect its earning capacity and lead to overcapitalisation.
11. ***Taking high interest loans:*** When a company raises loan at a very high rate of interest and actual Rate of Return falls short of that, the company becomes overcapitalised.

Effect of Overcapitalisation

Effects of overcapitalisation are listed in Table 4B.6.

Table 4B.6 Effects of Overcapitalisation

On Shareholders	On Company	On Public
1. Profitability decreases, the rate of earning of shareholders also decreases. 2. The market price of shares goes down because of low profitability. 3. With profitability going down shareholders' earnings become uncertain. 4. Loss of reputation may cause shares to become illiquid.	1. Low profitability hampers reputation of company. 2. The company's shares cannot be easily marketed. 3. With degradation in credit rating fresh borrowings are difficult to be made. 4. To retain its image, the company may indulge in malpractices like manipulation of accounts to show high earnings. 5. The company cuts down it's expenditure on maintenance, replacement of assets, depreciation, etc.	1. In order to cover up their earning capacity, the management indulges in tactics like increase in prices or decrease in quality of products. 2. Return on capital employed is low. This gives an impression to the public that their financial resources are not utilised properly. 3. Low earnings of the company affect the credibility of the company and increases credit risks. 4. Working conditions may get affected and wages and salaries may come down.

Remedies for Overcapitalisation

The only effective remedy to cure overcapitalisation lies in implementing a scheme of capital reduction to reduce the excess capital. In specific, the following measures may be helpful.

1. The company may redeem its long-term debts like debentures and other institutional loans at the earliest to reduce the burden of high interest cost. As an alternative, however, the company may restructure its Debt Capital by substituting the existing high interest debts by debts of lower interest rates.
2. The company may redeem its preference shares carrying high rate of dividends out of the profits available in retained earnings.

3. The company may reduce the paid up value of its equity shares to reduce the over capitalisation and still maintain the same proportionate holding of the shareholders.

Though capital restructuring is likely to do the best as a remedy to overcapitalisation, a company may try the following means also.

1. Instead of distributing high dividends, the company may plough back profits to earn higher returns and thereby justify the high amount of capital.
2. The company may also put its best to manage the resources more efficiently to increase the returns and thereby justify the excess capital.

4B.11.3 Undercapitalisation

When the actual capitalisation of a company is found to be less than the required capitalisation as per the earnings capacity of the company, the situation is called over capitalisation. In other words, undercapitalisation arises when a company is found to be earning exceptionally higher profits as compared to other companies or the value of its assets is significantly higher than the capital raised. For example, if the estimated earnings of the company is ₹2,00,000 and normal Rate of Return is 10%, then capitalisation actually required is ₹(2,00,000 ÷ 10%) = ₹20,00,000. However, if actual capital employed is ₹19,00,000, then the company is said to be undercapitalised by ₹(20,00,000 – 19,00,000) = ₹1,00,000.

Causes of Undercapitalisation

Following are the major causes of undercapitalisation:

1. ***Low promotion costs:*** When a company incurs relatively low amount of promotional expenditure but the resultant Rate of Return is convincingly large, the company is undercapitalised.
2. ***Purchase of assets at deflated rates:*** When a company purchases assets at a deflated rate, the result is that the book value of assets is less than the real value. This situation gives rise to undercapitalisation of company.
3. ***Conservative dividend policy:*** The management may follow a conservative dividend policy leading to higher rate of ploughing back of profits. This would increase the earning capacity of the company significantly as a result of which the real value of assets will increase leading to undercapitalization.
4. ***Floatation of company in depression stage:*** If the establishment of a new company or the expansion of an existing concern takes place during the recession period, it may acquire at a very low price. Subsequently, when recession ceases, the real value of assets become much higher than their books value and the company becomes undercapitalised.
5. ***High efficiency of directors:*** The management of a company may be highly efficient. It may issue the minimum share capital and may meet the additional financial requirements through borrowings at lower rates of interest. Moreover, by using modern production technology, efficient job allocation, etc. it may generate above average returns. As a result, value of shares increases significantly and the company enters a state of undercapitalisation.

6. ***Adequate provision of depreciation:*** By undertaking a prudent depreciation and maintenance policy, a company may ensure best utilisation of its fixed assets. As a result, the company may generate higher than expected earnings and become undercapitalised.
7. ***Large secret reserves are maintained:*** A company may have large amount of secret reserves. Though illegal from regulatory viewpoint, this may result into high Rate of Returns with a significantly lower amount of published value of assets creating a situation of undercapitalisation.

Effect of Undercapitalisation

Effects of undercapitalisation are listed in Table 4B.7.

Table 4B.7 Effects of Undercapitalisation

On Shareholders	On Company	On Public
1. Company's profitability increases. As a result, rate of earnings go up. 2. Market value of share rises. 3. Financial reputation also increases. 4. Shareholders can expect a high dividend.	1. With greater earnings, reputation becomes strong. 2. Higher rate of earnings attract competition in market. 3. Demand of workers may rise because of high profits. 4. The high profitability situation affects consumer interest as they think that the company is overcharging on products. 5. The government may increase tax rates on companies earning exceptional profits.	1. With high earnings, high profitability, high market price of shares, there can be unhealthy speculation in stock market. 2. Restlessness in general public is developed as they link high profits with high prices of product. 3. Secret reserves are maintained by the company which can result in paying lower taxes to government. 4. The general public inculcates high expectations of these companies as these companies can import innovations, high technology and thereby best quality of product.

Remedies for Undercapitalisation

The following remedial steps may be taken to correct undercapitalisation of a company.

1. Undercapitalisation may be remedied by increasing the par value and/or number of equity shares by revising upward the value of assets. This will lead to decrease in the rate of earnings per share.
2. Management may capitalise the earnings by issuing bonus shares to the equity shareholders. This will also reduce the rate of earnings per share without reducing the total earnings of the company.
3. Where undercapitalisation is due to insufficiency of capital, more shares and debentures may be issued to the public.

4B.12 MAIN CONTENTIONS OF CAPITAL STRUCTURE THEORIES

In order to explain the interrelationship among Capital Structure, Cost of Capital and the value of the firm, different experts have suggested different theories. These are known as Capital Structure theories. These theories focus on two main contentions:

1. Whether the use of Debt Capital instead of Equity Capital, i.e. Leverage effect can reduce the overall Cost of Capital of the firm.
2. Whether the use of Debt Capital instead of Equity Capital, i.e. Leverage effect can enhance the value of the firm.

4B.12.1 General Assumptions of Capital Structure Theories

Capital Structure theories are based on some fundamental assumptions as follows:

1. The firm procures capital from two sources only, debt and equity. There is no existence of preferred stock.
2. There is no existence of corporate tax (this assumption is, however, withdrawn later).
3. The firm distributes all its earnings as dividend, i.e. retention is zero.
4. The total assets of the firm are fixed and not growing. Hence, its operating income or EBIT is constant.
5. The total capital (consisting of debt and equity) of the firm is fixed. However, the firm can change its Capital Structure or degree of Leverage, either by issuing new shares to redeem debt or by raising more debt to buyback existing shares.
6. The business risk of the firm is assumed to be constant over time and is independent of its Capital Structure and financial risk.
7. Investors have the same subjective probability distribution of the expected future operating income or EBIT. That is, all the investors have similar expectations regarding the future EBIT of the firm.
8. The firm is assumed to have a perpetual life.

With the help of these assumptions, we rule out the effect of dividend policy, taxation, risk preference, change in the level of earnings and change in debt and equity market.

4B.12.2 Different Capital Structure Theories

As mentioned earlier, different experts have proposed different theories to explain the interrelationship among Capital Structure, Cost of Capital and the value of the firm. These propositions can broadly be classified into two groups—relevance approach and irrelevance approach. While relevance approach admits that use of Leverage can reduce the Cost of Capital and increase the value of the firm, irrelevance approach exclusively denies any effect of Capital Structure on these two variables.

Over the time, four major Capital Structure theories have been proposed under the above two approaches. These are:

1. Net Income (NI) Approach
2. Net Operating Income (NOI) Approach

3. Traditional Approach
4. Modigliani-Miller (M-M) Approach

Of the above, NI Approach adheres to the relevance approach while NOI Approach advocates the irrelevance approach. The third one, i.e. Traditional Approach is basically a midway between the two. Finally, M-M Approach provides a more rational market oriented explanation while supporting the irrelevance of Capital Structure.

4B.12.3 Net Income Approach

According to NI Approach,[3] as proposed by David Durand, Capital Structure has significant bearing on the Cost of Capital and valuation of the firm. The firm is able to reduce its Cost of Capital (K_0) and increase its total valuation ($V = D + E$) as it increases the degree of Leverage, i.e. D/V. Hence, the optimum Capital Structure is one at which the Cost of Capital is the minimum and the value of the firm is maximum. At this Capital Structure, the market price per share is maximised.

Assumptions

In addition to the fundamental assumptions stated earlier, NI Approach is based on the following specific assumptions.

1. The cost of Debt Capital (K_d) and the cost of Equity Capital (K_e) will remain constant irrespective of the any change in proportion of debt and equity in the total capital.
2. The cost of Debt Capital (K_d) is always lower than the cost of Equity Capital (K_e), i.e. $K_d < K_e$.
3. The risk perception of the investors does not change with the change in Capital Structure, i.e. the firm does not become increasingly more risky in the minds of the investors and creditors if the degree of leverage is increased.

Student Note:

In this chapter, the term 'degree of leverage' is used to denote the proportion of Debt Capital to the Total Capital or Value of the firm. Students must not confuse the same with the term 'Degree of Financial Leverage' used in the context of the chapter Leverage Analysis.

Explanation

The rationale of this approach lies in its assumptions. As per the assumptions, Debt Capital is a cheaper source of financing as compared to Equity Capital (since, $K_d < K_e$). As a result, use of more Debt Capital in the Capital Structure will lead to reduction in the overall Cost of Capital (K_o). This will result into increase in returns to shareholders, which, when recognised by the market, will increase the market value of equity (E) and consequently the total value of the firm (V). Similarly, a reduction in the degree of leverage will increase the overall Cost of Capital and reduce the returns to shareholders. As a result, the market value of equity and total value of the firm will also reduce.

[3] Both NI approach and NOI approach were proposed by David Durand.

Behaviour of the Overall Cost of Capital—Graphical Presentation

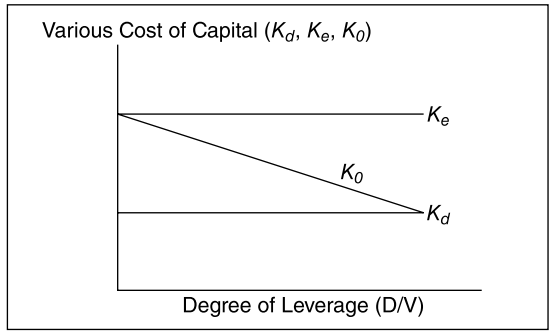


Figure 4B.1 Behaviour of K_d, K_e, K_0 under NI Approach

In the above diagram, K_d and K_e, being constant, are represented by two straight lines. Moreover, since $K_d < K_e$, K_e line lies above the K_d line. As the degree of Leverage increases, K_0 comes down and accordingly the K_0 line becomes downward slopping.

Formula

1. Market Value of Equity = $E = \dfrac{\text{EBT}}{K_e}$
2. Value of the Firm = $V = D + E$, *where*, $D = MV$ of Debt
3. Overall Cost of Capital = $K_0 = K_d \times D/V + K_e \times E/V$ (i.e. weighted average Cost of Capital, with market value as weights)

where,

E = Market Value of Equity, D = Market Value of Debt, K_d = Cost of Debt (Here before tax, as tax does not exist) and K_e = Cost of Equity.

Note: In case market value of debt is not available, assume Market Value of Debt = Book Value of Debt.

Illustration 4B.4

Problem

X Ltd. has an annual EBIT of ₹1,35,000. Currently, it has 70,000 equity shares of ₹10 per share and 3,000, 8% Debentures of ₹100 each. The Equity Capitalisation rate is 12%.

(a) Calculate the value of the firm and overall Cost of Capital under existing situation.

(b) In order to exploit the Trading on Equity advantage, the firm is contemplating to increase the proportion of Debt Capital to 50% of the total capital from the current level of 30%. For this, the firm is ready to issue new 8% debentures of ₹100 each to buyback ₹2,00,000 equity share capital at par. What will be the effect of such a financing decision on the value of the firm and its overall Cost of Capital ?

(c) What will be the consequences if Debt Capital is increased to 60% of total capital by issuing the same 8% debentures of ₹100 each and buying back the shares accordingly?

Assume taxes do not exist. Consider NI Approach.

Solution

Calculation for Value of the Firm (V) and Overall Cost of Capital (K_0) under NI Approach

Particulars	Existing	Proposed Plan 1	Proposed Plan 2
1. Level of Debt Capital	30%	50%	60%
2. Total Capital (₹)	10,00,000	10,00,000	10,00,000
3. Debt Capital (i.e. 8% Debentures) (D)(₹)	3,00,000	5,00,000	6,00,000
4. Cost of Debt (K_d)	8%	8%	8%
5. Cost of Equity Capital (K_e)	12%	12%	12%
6. EBIT (₹)	1,35,000	1,35,000	1,35,000
7. Interest (I) (₹) = $D \times K_d$	24,000	40,000	48,000
8. EBT (₹) = EBIT – I	1,11,000	95,000	87,000
9. Market Value of Equity (E)(₹) = $\frac{\text{EBT}}{K_e}$	9,25,000	7,91,667	7,25,000
10. Value of the Firm (V)(₹) = $E + D$	12,25,000	12,91,667	13,25,000
11. Overall Cost of Capital (K_0) $= K_d \times D/V + K_e \times E/V$	11.02%	10.45%	10.19%

1. Under existing situation, the value of the firm is ₹12,25,000 and its overall Cost of Capital is 11.02%
2. If level of debt is raised to 50% by issuing similar 8% debentures of ₹100, the value of the firm will increase to ₹12,91,667 and its overall Cost of Capital will decease to 10.45%.
3. If level of debt is raised to 60% by issuing similar 8% debentures of ₹100, the value of the firm will increase to ₹13,25,000 and its overall Cost of Capital will further decease to 10.19%.

Thus, by increasing the degree of Leverage, the firm can increase its value and reduce its overall Cost of Capital .

Criticism Against NI Approach

1. Under this approach, it is assumed that cost of Debt Capital will remain unchanged irrespective of the amount of Debt Capital raised. However, in practice, interest rates on debt are range bound and Debt Capital beyond a given range attract higher rate of interest.
2. The assumption of risk perception of investors remaining unchanged irrespective of change in the proportion of Debt Capital and consequently a constant cost of Equity Capital is also not tenable. As degree of Leverage increases, the firm becomes more risky in the minds of the equity investors. As a result, they will demand more cost of equity to compensate such additional risk.
3. If NI approach is to be true, a firm can, without any restriction, increase its value and reduce its overall Cost of Capital simply by increasing the degree of leverage, i.e.

proportion of Debt Capital. Hence, the Cost of Capital will be the minimum when it employs 100% Debt Capital. In such a case, overall Cost of Capital will equate the cost of Debt Capital. However, that is practically impossible because a firm with 100% debt and no owner is legally not viable.

4B.12.4 Net Operating Income Approach

As mentioned earlier, the main limitations of NI approach are the assumptions of constant cost of debt and Equity Capital and no change in the risk perception of the investors. In reality, however, the second assumption seems to be irrational. As a result, a totally opposite model is proposed. This is known as Net Operating Income (NOI) approach.

As per this approach, the value of a firm is not affected by any change in its Capital Structure. In other words, it is not possible to change the value of any firm by changing the debt-equity mix in the total capital. Thus, there is no single Capital Structure that can be called optimal rather all Capital Structures are optimal as they produce the same value. Capital Structure is a matter of irrelevance to the investors.

Assumptions

Net Operating Income approach is based on the following set of assumptions.

1. The overall Cost of Capital (K_0) does not vary with the degree of leverage but remains constant for a given industry risk class.
2. The investors determine the market value of the firm from the overall viewpoint. The value of the firm (V) is found by capitalising the net operating income (EBIT) at the overall Cost of Capital (K_0).

   So, $V = \dfrac{\text{EBIT}}{K_0}$. Since both EBIT and K_0 are constant, V will also remain constant.
3. The value of equity is a residual of V after subtracting the value of debt (D), i.e. the market value of equity (E) = $V - D$
4. The cost of debt (K_d) is a constant and hence cost of equity (K_e) = $\dfrac{\text{EBIT} - I}{E} = \dfrac{\text{EBT}}{E}$
5. Cost of equity can also be obtained by the formula, $K_e = K_0 + (K_0 - K_d) \times \dfrac{D}{E}$

Explanation

According to NOI approach, when a firm increases its degree of Leverage, it does save its overall Cost of Capital . However, such savings get exactly offset by the increase in cost of Equity Capital. This is because, increase in Leverage makes the firm riskier in the minds of the investors, as a result of which they demand for higher cost of equity. This ultimately keeps the overall Cost of Capital in the same level as earlier. Since both EBIT and K_0 remain constant, investors value the firm from the overall viewpoint and hence firm value, i.e. capitalised value

of EBIT also remains constant. Therefore, by changing the Capital Structure, it is not possible to change the Cost of Capital or the value of the firm.

Behaviour of the Overall Cost of Capital ; Graphical Presentation

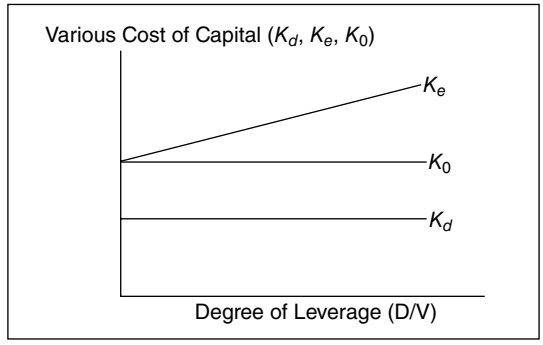


Figure 4B.2 Behaviour of K_d, K_e, K_0 under NOI Approach

In the above diagram, K_d is constant and thus represented by a straight line parallel to horizontal axis. As Leverage increases, use of additional debt generates savings in the overall cost. However, such savings get exactly offset by increase in the cost of equity (K_e) due to higher perceived risk of the investors. As a result, K_e moves upwards and K_0 becomes a straight line representing a constant K_0.

Formula to be Used

1. Market Value of the firm, $= V = \dfrac{\text{EBIT}}{K_0}$
2. Value of Equity = $E = V - D$, *where*, D = Market Value of Debt Capital
3. Cost of equity $(K_e) = \dfrac{\text{EBIT} - I}{E} = \dfrac{\text{EBT}}{E}$ or $K_e = K_0 + (K_0 - K_d) \times \dfrac{D}{E}$

Note: In case market value of debt is not available, assume Market Value of Debt = Book Value of Debt.

Illustration 4B.5

Problem

Y Ltd. has an expected Net Operating Profit of ₹2,40,000. It has ₹5,00,000, 9% Debt Capital. The overall capitalisation rate is 12%.

(a) Calculate the value of the firm and Equity Capitalisation rate under NOI approach.

(b) If the firm decides to raise its Debt Capital by an additional ₹3,00,000 and use such proceeds to buy-back the existing equity shares, then what will be the effect of such a policy on the value of the firm and Equity Capitalisation rate?

Solution

(a) Computation of the value of the firm and Equity Capitalisation rate. (Under existing condition)

Given, Cost of Debt Capital (K_d) = 9%

Overall capitalisation rate (K_0) = 12%

Net Operating Profit (EBIT) = ₹2,40,000

So, Value of the firm (V) = $\frac{\text{EBIT}}{K_0} = \frac{2,40,000}{0.12}$ = ₹20,00,000

Value of Debt (D) = ₹5,00,000

Value of equity (E) = $V - D$ = ₹20,00,000 – ₹5,00,000 = ₹15,00,000

Earnings before tax = EBT = EBIT – I = ₹2,40,000 – ₹(5,00,000 × 0.09) = ₹1,95,000

Equity Capitalisation rate or Cost of Equity (K_e) = $\frac{\text{EBT}}{E} = \frac{1,95,000}{15,00,000}$ = 13%

Alternatively, $K_e = K_0 + (K_0 - K_d) \times \frac{D}{E}$ = 12 + (12 – 9) × $\frac{5,00,000}{15,00,000}$ = 13%

(b) Computation of the value of the firm and Equity Capitalisation rate. (Under proposed condition)

Given, Cost of Debt Capital (K_d) = 9%

Overall capitalisation rate (K_0) = 12%

Net Operating Profit (EBIT) = ₹2,40,000

So, Value of the firm (V) = $\frac{\text{EBIT}}{K_0} = \frac{2,40,000}{0.12}$ = ₹20,00,000

Value of Debt (D) = ₹8,00,000

Value of equity (E) = $V - D$ = ₹20,00,000 – ₹8,00,000 = ₹12,00,000

Earnings before tax = EBT = EBIT – I = ₹2,40,000 – ₹(8,00,000 × 0.09) = ₹1,68,000

Equity Capitalisation rate or Cost of Equity (K_e) = $\frac{\text{EBT}}{E} = \frac{1,68,000}{12,00,000}$ = 14%

Alternatively, $K_e = K_0 + (K_0 - K_d) \times \frac{D}{E}$ = 12 + (12 – 9) × $\frac{8,00,000}{12,00,000}$ = 14%

Thus, with increase in Debt Capital value remains the same and Equity Capitalisation rate increases to cover the additional risk.

Illustration 4B.6

Problem

Two firms, *A* and *K* are identical in all respect (and belong to the same risk class) except their Leverage. While firm *A* is an all equity firm, the other one is a levered firm ₹3,00,000, 8% Debt Capital. Both the firms have identical expected EBIT of ₹1,50,000. Equity Capitalisation rate of firm *A* is 15%. Calculate the value of the firms and Equity Capitalisation rate of firm *K*.

Solution

Since, firm *A* is an all equity firm, its overall Cost of Capital = Cost of Equity Capital.

Moreover, since both the firms belong to the same risk class, they will have similar overall Cost of Capital .

Calculation of Value of the Firm (V) and Equity Capitalisation Rate (K_e)

Particulars	Firm A	Firm K
Value of Debt Capital (D)	Nil	₹3,00,000
Cost of Debt Capital (k_d)	8%	8%
Overall Cost of Capital (k_0)	15%	15%
EBIT	₹1,50,000	₹1,50,000
Value of the firm (V) = $\frac{\text{EBIT}}{K_0}$	₹10,00,000	₹10,00,000
Value of equity (E) = $V - D$	₹10,00,000	₹7,00,000
EBT = EBIT – I = EBIT – $D \times k_d$	₹1,50,000	₹1,26,000
Cost of equity (k_e) = $\frac{\text{EBT}}{E}$	15%	18%

Derivation of the Alternative Formula of Cost of Equity

Under NOI approach, since both the cost of debt and the overall Cost of Capital are constant, the cost of equity is defined as the NI (the residual income after payment to Debt Capital providers) as divided by the value of equity (the residual value after deducting the value of Debt Capital from the overall firm value). However, it can alternatively be calculated as:

$$K_e = K_0 + (K_0 - K_d) \times \frac{D}{E}, \text{ i.e.}$$

Cost of equity = overall Cost of Capital + (overall Cost of Capital – cost of debt) × Debt-Equity Ratio.

The derivation of the formula can be shown as follows:

We know that,

$$K_0 = K_d \times \frac{D}{V} + K_e \times \frac{E}{V}$$

$$K_0 = K_d \times \frac{D}{D+E} + K_e \times \frac{E}{D+E}$$

$$K_e \times \frac{E}{D+E} = K_0 - K_d \times \frac{D}{D+E}$$

Multiplying both sides by $\frac{D+E}{E}$, we get,

$$K_e = K_0 \times \frac{D+E}{E} - K_d \times \frac{D}{D+E}\frac{D+E}{E}$$

$$K_e = K_0 \times \frac{D}{E} + K_0 - K_d \times \frac{D}{E}$$

$$K_e = K_0 + K_0 \times \frac{D}{E} - K_d \times \frac{D}{E}$$

$$K_e = K_0 + (K_0 - K_d) \times \frac{D}{E}$$

The significance of this formula lies in the fact that it mathematically explains the relationship between the cost of equity of any firm with the leverage it has applied. For an all equity firm (i.e. *where,* $\frac{D}{E} = 0$), cost of equity (K_e) = Cost of Capital (K_0). Now, as the leverage increases, cost of equity (K_e) also increases, since both K_0 and K_d are constant. This is because, with increase in the debt-equity ratio, the perceived risk of investors increases which results into higher cost of Equity Capital. Thus, there exists a direct relationship between the degree of leverage applied and the cost of Equity Capital.

4B.12.5 Traditional Approach

The Traditional approach to Capital Structure is not an independent one. It is rather a reconciliation between the NI approach and the NOI approach.

Among the supporters of Traditional approach, there are two groups of proponents with slight differences in their opinion. However, the overall theme remains the same in each case which says that by judicious use of debt and Equity Capital, it is possible to reduce the overall Cost of Capital and increase the value of the firm. Hence, the Capital Structure that leads to the highest value of the firm with minimum Cost of Capital is the optimum.

Explanation

As mentioned earlier, there are two versions of Traditional Approach.

According to the first variant, the use of relatively higher amount of Debt Capital increases the firm value and reduces the Cost of Capital up to a certain level of Leverage. Beyond that level, any increase in Leverage more than offsets the use of cheaper Debt Capital and the average Cost of Capital starts rising. This is because both cost of debt and cost of equity remain relatively constant initially. As a result, increase in Leverage reduces the overall Cost of Capital and increases the value up to a certain point. Beyond this, both the costs start increasing leading to an increase in the overall cost and reduction in the value of the firm. Hence, the optimum Capital Structure is the level where Cost of Capital is the minimum and value is the maximum.

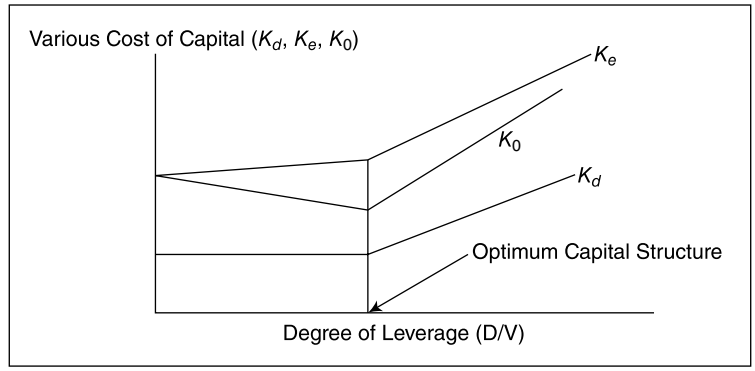


Figure 4B.3 Behaviour of K_d, K_e, K_0 and Optimum Capital Structure under Traditional Approach (First Variant)

The second variant, as mentioned earlier, has a slight different explanation as to how the Cost of Capital and value changes with change in Capital Structure. According to this, the change in the Cost of Capital and value takes place in three different stages as follows:

1. ***First Stage:*** During the first stage:
   - K_d remains constant or rises negligibly.
   - K_e remains constant or rises as leverage is increased but does not rise fast enough to eliminate the advantage of cheaper Debt Capital.

   As a result, overall Cost of Capital (K_0) decreases and value of the firm (V) increases.
2. ***Second Stage:*** At this stage, the advantage of using cheaper Debt Capital (in terms of savings in overall cost) gets exactly offset by the increase in cost of equity due to higher perceived risk of the investors for firm's use of higher leverage. As a consequent, both overall Cost of Capital (K_0) and value of the firm (V) remain relatively constant within a range.
3. ***Third Stage:*** During this stage, both cost of debt (K_d) and cost of equity (K_e) increase at an abnormal rate due to high financial risk. As a result, overall Cost of Capital increases and value of the firm decreases.

Thus, optimum Capital Structure is obtained at any point of the second stage.

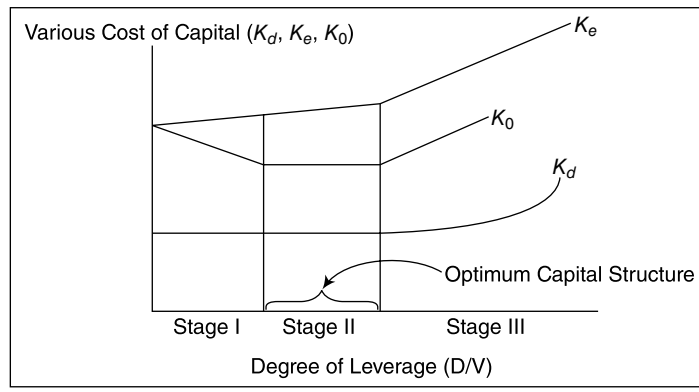


Figure 4B.4 Behaviour of K_d, K_e, K_0 and Optimum Capital Structure under Traditional Approach

Illustration 4B.7

Problem

Z Ltd. provides you the following information:

Total Capital Employed = ₹10,00,000, Expected Annual Net Operating Income (EBIT) = ₹1,00,000.

Applicable cost of debt (K_d) and cost of equity (K_e) at alternative levels are given as follows:

Debt Capital		Equity Capital	
Level (₹)	**Cost of Debt (k_d)**	**Level (₹)**	**Cost of Equity (k_e)**
Up to ₹4,00,000	10%	Up to ₹3,00,000	20%
₹4,00,001–5,00,000	9%	₹3,00,001–5,00,000	14%
₹5,00,001–6,00,000	8%	₹5,00,001–10,00,000	13%
Above ₹6,00,000	7%		

Calculate value of the firm and overall Cost of Capital if the proportion of Debt Capital to total capital is (i) 40%, (ii) 50%, (iii) 60% and (iv) 70%. Also comment on the optimal Capital Structure.

Solution

Calculation of Value of the Firm (V) and Overall Cost of Capital (K_0)

	Particulars	Plan 1	Plan 2	Plan 3	Plan 4
1	Total capital	10,00,000	10,00,000	10,00,000	10,00,000
2	Proportion of Debt Capital	0.40	0.50	0.60	0.70
3	Proportion of Equity Capital	0.60	0.50	0.40	0.30
4	Value of Debt Capital (D)	4,00,000	5,00,000	6,00,000	7,00,000
5	Equity Capital	6,00,000	5,00,000	4,00,000	3,00,000
6	Cost of debt (K_d)	10%	9%	8%	7%
7	Cost of equity (K_e)	13%	14%	14%	20%
8	EBIT	1,00,000	1,00,000	1,00,000	1,00,000
9	Interest (I) = $D \times K_d$	40,000	45,000	48,000	49,000
10	EBT = EBIT – I	60,000	55,000	52,000	51,000
11	Value of equity (E) = EBT/K_e	4,61,538	3,92,857	3,71,429	2,55,000
12	Value of firm (V) = $D + E$	8,61,538	8,92,857	9,71,429	9,55,000
13	Cost of Capital (K_0) = $K_d \times D/V + K_e \times E/V$	11.80%	11.50%	10.40%	10.90%

Since value of the firm is maximum and Cost of Capital is minimum when proportion of Debt Capital is 60% of the total capital, the optimum Capital Structure is Debt: Equity = 60%:40%.

4B.12.6 Modigliani and Miller Hypothesis

The NOI approach is more definitional or conceptual and lacks behavioural significance; it does not provide operational justification for irrelevance of Capital Structure. The theoretical argument developed by Modigliani and Miller (1958) provides the behavioural justification for the assertions made under the NOI approach. Thus, as per M-M hypothesis, when taxes do not exist, the Cost of Capital and market value of the firm remain indifferent to the any change in the Capital Structure or the Degree of Leverage.

Assumptions

M-M hypothesis is based on a number of assumptions, some of which are fundamental to any Capital Structure theory while the others are specific to the hypothesis developed. These are:

1. Capital markets are perfect. It means:
   (i) There are a large number of buyers and sellers of securities.
   (ii) No individual participant can influence or manipulate the price.
   (iii) There is no transaction cost.
   (iv) Individual investors can borrow at the same rate of interest as the corporates.
   (v) Investors are rational, well informed and choose a combination of risk and return that is most advantageous to them.
2. Investors have homogeneous expectation regarding the future operating income (EBIT) of the firm.
3. All firms can be classified into homogeneous risk classes on the basis of the business risk. Hence, firms belonging to same risk class will have similar required Rate of Return.
4. Dividend pay-out ratio is 100% and there is no retention.
5. There is no corporate tax. However, this assumption is removed later on.
6. The firm has an infinite life.

Explanation

On the basis of above assumptions, M-M explain their hypothesis in terms of the following three propositions.

Proposition I

The value of the firm is derived by capitalising its operating income with the required Rate of Return appropriate to the risk class to which it belongs. So $V_j = \frac{O_j}{R_j}$, *where,* O_j = operating income of the firm and R_j = Required Rate of Return of the firm appropriate to the risk class to which it belongs.

To simplify, $V_j = \frac{\text{EBIT}}{K_o}$, *where,* EBIT = Operating Income and K_0 = Overall Cost of Capital .

Since two firms, identical in all respect (i.e. total capital, asset structure and industry classification), will have similar EBIT as well as the same required Rate of Return or Cost of Capital,

their values are bound to be equal. Thus, Capital Structure, i.e. debt-equity mix will have no effect on the market value of those two firms. M-M also argue that even if their market value differ at a given point of time, such difference will wipe out very quickly due to the ***arbitrage process***.

Though market value of the firms will be equal, the value of their equity will certainly differ as it is calculated as a residual after deducting the market value of debt from the value of the firm.

In other words, since $V_j = D_j + E_j$, then $E_j = V_j - D_j$. Thus, if D_j differs, E_j will also differ accordingly.

Proposition II

According to the second proposition, cost of Equity Capital is the aggregate of overall Cost of Capital and risk premium for leverage.

In other words, $K_e = K_0 + \text{Risk Premium} = K_0 + (K_0 - K_d) \times D/E$. Here, the latter term stands for the risk premium for leverage. Thus, K_e is a linear function of D/E with a constant gradient $(K_0 - K_d)$.

As a result, if the firm employs more Debt Capital with supposedly cheaper K_d, the benefit will get offset by higher K_e. Hence, both V and K_0 will remain independent of financial Leverage.

Proposition III

Overall Cost of Capital is only affected by business risk. It is never affected by Capital Structure or financial leverage.

Arbitrage Process

The operational justification of M-M hypothesis is explained through the functioning of arbitrage process. The generic meaning of the term 'arbitrage' is 'simultaneous buying and selling of similar assets from two different markets to make riskless profit by exploiting price mismatch'. As a result of this arbitrage, equilibrium value is achieved in different markets. However, the arbitrage process that M-M have advocated in their theory is a bit different. Here, instead of achieving equilibrium value of the same asset across markets, the process aims to equalise the value of two firms identical in all respect except their Capital Structure. Thus, investors of the firm whose value is higher sell their shares and buy shares of the firm whose value is lower; thereby they will be able to earn the same return at lower outlay with the same perceived risk or lower risk. They would, therefore, be better off. As a result, even if at any given point of time any difference in their value arises, it will get wiped out very soon.

Illustration 4B.8

Problem

There are two firms U and L which are identical in all respect except Leverage. Firm U is an unlevered firm (i.e. all equity firm) and L is a levered firm (i.e. firm employing Debt Capital).

The other details of the companies are as follows:

Particulars	U	L
EBIT(₹)	1,00,000	1,00,000
Debt Capital (D)	Nil	5,00,000
Cost of debt (k_d)	10%	10%
Cost of equity (k_e)	12.5%	16%

Show how arbitrage process will equalise the value of the two firms.

Solution

Let us suppose that initially the value of the firms may differ as suggested in NI approach. Then the value of the two firms can be calculated in the following manner.

Particulars	U	L
EBIT(₹)	1,00,000	1,00,000
Interest (₹) = $D \times k_d$	Nil	50,000
EBT (₹)	1,00,000	50,000
Cost of equity (k_e)	12.5%	16%
Value of equity (E) = $\frac{\text{EBT}}{k_e}$ (₹)	8,00,000	3,12,500
Debt Capital (D) (₹)	Nil	5,00,000
Value of the firm (V) = $D + E$ (₹)	8,00,000	8,12,500

Now, suppose there is one investor, Mr. A, holding 10% shares in firm L. As 10% owner of L, he is eligible to get (50,000 × 10%) = ₹5,000 of NI and his investment stands for ₹(3,12,500 × 10%) = ₹31,250. Moreover, as 10% owner of firm L, he has a corporate Leverage of ₹(5,00,000 × 10%) = ₹50,000. (Here, corporate Leverage refers to the financial risk of Debt Capital. Since he is 10% owner of the firm, he is to bear 10% of the risk arising due to Debt Capital financing.) Suppose Mr. A wants to liquidate his investment in L and buy similar 10% ownership in firm U. So he sells his present 10% holding in L in the market at ₹31,250. However, 10% investment in U costs him ₹80,000. To finance the shortfall, let us assume that he borrows ₹50,000 at the same rate of interest as applicable for firm L and thereby substitutes his corporate Leverage by personal Leverage (risk of personal loan). Out of the total investible funds of ₹(31,250 + 50,000) = ₹81,250, he invests ₹80,000 to buy 10% holding in U. At the end of the year, Mr. A receives ₹(1,00,000 × 10%) = ₹10,000 as earnings out of which he has to pay ₹(50,000 × 10%) = ₹5,000 as interest on loan. Thus, his net earnings from firm U is ₹5,000 which is exactly equal to his earnings from his previous investment in L. Hence, from the viewpoint of earnings, he is not worse off. However, in this process, he manages to book a gain of ₹(81,250 – 80,000) = ₹1,250.

Being attracted by this opportunity to gain out of transfer, most of the shareholders of firm L will start selling their share in firm L and buy shares of firm U. As a result, there will be a selling pressure on the shares of L which will bring the price down and a buying pressure on the shares of U which will drive the price up. This process will continue till the market value of both the firms become equal.

In this way, arbitrage will ultimately equalise the value of the levered and the unlevered firms.

Criticism of M-M Hypothesis

1. Although it is assumed that there is no transaction cost, yet such costs do exist and that may hamper the arbitrage process.
2. Firms and individuals are assumed to borrow at the same rate of interest. This does not hold good in reality. Firms will be generally in a better position to borrow than individual.
3. It is implied that in M-M hypothesis, personal and corporate leverages are perfectly substitute. But firms have limited liability against unlimited liability of individuals. This eventually places the firms and individuals in different footings in the capital market because personal Leverage is more risky than corporate leverage.
4. In the present scenario, institutional investors dominate the capital market and sometimes institutional restrictions may also hamper the arbitrage process because most institutional investors are not allowed to engage in personal leverage.

Therefore, critics of M-M hypothesis have argued that the underlying assumptions of M-M approach are not valid and that in the real world, value of the firm and Cost of Capital are functions of leverage to a great extent.

4B.13 IMPLICATIONS OF CORPORATE TAX ON CAPITAL STRUCTURE THEORIES

One of the fundamental assumptions of Capital Structure Theories is the absence of any taxation in the economy. However, existence of tax (corporate as well as personal) is a reality in almost every economy across the globe. As a result, critics raise serious doubts over the validity of these theories. This is why supporters or proponents (in case of M-M hypothesis) have suggested suitable revisions to make these theories equally useful even in the existence of taxation. The following discussion highlights those revisions.

4B.13.1 Modigliani-Miller Hypothesis and Corporate Taxation

Though NOI approach does not recognise any change in its basic proposition even after introduction of corporate taxation, Modigliani and Miller do revise their fundamental proposition to incorporate effect of corporate taxation. They argue that, in the presence of corporate taxation, value of a levered and an unlevered firm will not be equal, rather value of the levered firm will be higher than that of the unlevered firm. However, they also concluded that the difference will be exactly equal to 'corporate tax rate times the value of debt'.

In other words, $V_L = V_U + D \times t$, *where,* V_L = Value of levered firm, V_U = Value of unlevered firm, D = Value of Debt and t = corporate tax rate.

This can be proved as follows:

We know that, value of any firm = Present Value of earnings available for the investors when discounted at the appropriate rate of discount.

Now, earnings available to investors of an unlevered and a levered firm can be calculated as follows:

Particulars	Unlevered Firm	Levered Firm
Earnings before interest and tax	EBIT	EBIT
Less Interest on debt	Nil	I
Earnings before tax	EBIT	EBIT – I
Less Corporate tax @ t	EBIT × t	(EBIT – I) × t
Earnings after tax, i.e. earnings available for equity shareholders	EBIT(1 – t)	(EBIT – I)(1 – t)
Add Earnings for debt providers	Nil	I
Total earnings for investors	EBIT(1 – t)	(EBIT – I)(1 – t) + I
		= EBIT(1 – t) – I + I × t + I
		= EBIT(1 – t) + I × t

Therefore, value of the unlevered firm $(V_U) = \frac{\text{EBIT}(1-t)}{k_e}$.

Similarly, value of the levered firm $(V_L) = \frac{\text{EBIT}(1-t)}{K_e} + \frac{I \times t}{K_d}$

$$= \frac{\text{EBIT}(1-t)}{K_e} + \frac{D \times K_d \times t}{K_d}$$

$$= V_U + D \times t$$

Thus, value of the levered firm = value of the unlevered firm + value of debt × corporate tax rate and hence, value of the levered firm (V_L) > value of the unlevered firm (V_U).

4B.13.2 Net Income Approach and Corporate Taxation

Introduction of taxation brings the following changes in NI approach:

1. The definition of NI changes from Earnings before Tax (EBT) to Earnings after Tax (EAT).
2. The formula for calculating value of equity (E) changes as, $E = \frac{\text{EAT}}{k_e}$.
3. Value of the firm, however, remains same as $V = D + E$.
4. The formula for overall Cost of Capital is revised as, $k_0 = k_d \times (1-t) \times \frac{D}{V} + k_e \times \frac{E}{V}$, *where*, t = tax rate.

With introduction of taxes, though the methodology of calculating value or Cost of Capital changes, there is no change in the basic proposition. In other words, even in the presence of tax also, value of the firm increases and Cost of Capital decreases with increase in Leverage.

Illustration 4B.9

Problem

A firm expects an annual income of ₹240,000. It has ₹1,000,000, 8% debentures. The Equity Capitalisation rate is 10%. Calculate the value of the firm and overall Cost of Capital isation according to NI approach.

What will be the value of the firm and the overall capitalisation rate, if the firm is assumed to have employed a debt of ₹14,00,000 instead of ₹10,00,000? The rate of interest on debt would be the same as before. Assume a tax rate of 40% in both the situations.

Solution

Calculation for Value of the Firm (V) and Overall Cost of Capital under NI Approach (with taxation)

	Particulars	Existing Plan	Proposed Plan
1	Debt Capital (D) (₹)	10,00,000	14,00,000
2	Cost of debt (K_d)	8%	8%
3	EBIT (₹)	2,40,000	2,40,000
4	Interest ($I = D \times K_d$)	80,000	1,12,000
5	EBT	1,60,000	1,28,000
6	Tax @ 40%	64,000	51,200
7	EAT	96,000	76,800
8	Cost of equity (K_e)	10%	10%
9	Value of equity (E) = $\frac{EAT}{K_e}$	9,60,000	7,68,000
10	Value of the firm (V) = $D + E$	19,60,000	21,68,000
11	Overall Cost of Capital (K_0) = $K_d(1-t)\frac{D}{V} + K_e\frac{E}{V}$	7.347%	6.642%

Under existing situation, the value of the firm is ₹19,60,000 and the Cost of Capital is 7.347%. If Debt Capital is increased to ₹14,00,000, the value of the firm will be ₹21,68,000 and Cost of Capital will be 6.642%. Thus, with increase in the proportion of Debt Capital, value of the firm increases and Cost of Capital decreases even in the presence of taxation.

4B.13.3 Net Operating Income Approach and Corporate Taxation

Similar to NI approach, in case of NOI approach also, introduction of taxation brings about a number of revisions. These are as follows:

1. Value of the unlevered firm (V_U) is now calculated by the formula, $V_U = \frac{EBIT(1-t)}{k_e}$, where, k_e = after tax Cost of Capital of an unlevered firm. Similarly, value of a levered firm (V_L) is calculated by the formula, $V_L = \frac{EBIT(1-t)}{k_e} + D \cdot t$
2. Similar to no taxation situation, value of equity is calculated as, $E = V - D$.
3. Cost of equity of levered firm is now calculated by the formula, $k_e = \frac{EAT}{E}$

Thus, here the basic proposition of NOI approach does not remain the same as now value of a levered firm is higher than the value of an unlevered firm by the amount (Value of Debt × Tax rate), i.e. $D \times t$. Similarly, K_e will also not be the same.

Illustration 4B.10

Problem

Companies *L* and *U* are in the same risk class and identical in all respects except that company *L* uses debts while company *U* does not. Levered company has ₹9,00,000 debentures carrying 10% rate of interest. Both companies earn 20% before interest on their total assets of ₹15,00,000. Assume perfect capital markets and capitalisation rate of 15% for all equity company and a tax rate of 50% for both.

(i) Compute the value of both the companies using NOI approach, and

(ii) Also calculate overall Cost of Capital for both the companies using NOI approach.

Solution

Calculation for Value of the Firm (V) and Overall Cost of Capital (K_0) under NOI Approach

	Particulars	Firm L	Firm U
1.	Debt Capital (i.e. 10% Debentures) (D)(₹)	9,00,000	Nil
2.	Cost of debt (K_d)	10%	N.A.
3.	Overall Cost of Capital (K_0)	15%	15% ($K_0 = k_e$)
4.	Tax Rate	50%	50%
5.	EBIT (₹)(@ 20% on ₹15,00,000)	3,00,000	3,00,000
6.	Market value of the unlevered firm (V_U) (₹) $= \frac{\text{EBIT}(1-t)}{k_e}$	—	10,00,000
	Market value of the levered firm (V_L) $= \frac{\text{EBIT}(1-t)}{k_e} + D \times t$	14,50,000	—
7.	Market value of equity (E)(₹) $= V - D$	5,50,000	10,00,000
8.	Interest (I)(₹) $= D \times K_d$	90,000	Nil
9.	EBT (₹) = EBIT – I	2,10,000	3,00,000
10.	Tax @ 50% on EBT(₹)	1,05,000	1,50,000
11.	EAT = EBT – Tax(₹)	1,05,000	1,50,000
12.	Cost of equity (K_e) $= \frac{\text{EAT}}{E}$	19.09%	15%
13.	Overall Cost of Capital (K_0)(For verification) $= K_d(1-t) \times D/V + K_e \times E/V$	15%	15%

4B.14 ADDITIONAL SOLVED PROBLEMS

1. From the following balance sheet of X Ltd., calculate the total capitalisation. Also comment on the financial structure and Capital Structure of the firm.

Balance Sheet of X Ltd.

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity share capital	50,000	Fixed Assets	80,000
Retained earnings	20,000	Current Assets	80,000
10% Preference Share Capital	20,000		
8% debentures	30,000		
9% Bank loan	30,000		
Current Liabilities	10,000		
	1,60,000		1,60,000

Solution

Here, Capitalisation = Total capital procured from long-term sources

= 50,000 + 20,000 + 20,000 + 30,000 + 30,000 = 1,50,000

Financial structure = relative proportion of all sources both short and long term = 5:2:2:3:3:1

Capital Structure = relative proportion of all long-term sources = 5:2:2:3:3

2. X Ltd. expects an annual return on assets of 10%. Currently, it has total assets of ₹3,00,000 financed by equity share capital of ₹1,50,000 of face value of ₹10 and 8% debt of ₹1,50,000. It is now contemplating to raise its Debt Capital to ₹2,00,000 keeping the total capital unchanged. Calculate EPS of the firm both under existing and proposed situation and comment on how far the firm is successful in Trading on Equity. Will the decision be beneficial if the Rate of Return on assets declines to 7%? Tax rate is 50%.

Solution

Calculation for EPS

Particulars	ROA > K_d		ROA < K_d	
	Existing Plan (₹)	Proposed Plan (₹)	Existing Plan (₹)	Proposed Plan (₹)
1. EBIT (Total Assets × ROA)	30,000	30,000	21,000	21,000
2. Interest on Debt Capital	12,000	16,000	12,000	16,000
3. EBT	18,000	14,000	9,000	5,000
4. Tax @ 50%	9,000	7,000	4,500	2,500
5. EAT	9,000	7,000	4,500	2,500
6. No. of shares	15,000	10,000	15,000	10,000
7. EPS	0.60	0.70	0.30	0.25

From the above statement, it can be seen that X Ltd. has been successful in increasing its EPS by employing additional Debt Capital when the return on assets is higher than the cost of debt. This has been possible because of Trading on Equity. However, when the return on assets is lower than the cost of debt, the firm has ended up with a decline in EPS while employing additional debt.

This proves the assertion that Trading on Equity is possible when Rate of Return on assets is higher than cost of Debt Capital.

3. A firm expects an annual income of ₹12,00,000. It has ₹50,00,000, 8% debentures. The Equity Capitalisation rate is 10%. Calculate the value of the firm and overall Cost of Capital isation according to NI approach.

   What will be the value of the firm and the overall capitalisation rate, if the firm is assumed to have employed a debt of ₹70,00,000 instead of ₹50,00,000? The rate of interest on debt would be the same as before. *[C.U. M.Com., 2013]*

Solution

Calculation for Value of the Firm (V) and Overall Cost of Capital (K_0) under NI Approach

Particulars	Existing Plan	Proposed Plan
1. Debt Capital (i.e. 8% Debentures) (D)(₹)	50,00,000	70,00,000
2. Cost of debt (K_d)	8%	8%
3. Cost of Equity Capital (K_e)	10%	10%
4. EBIT (₹)	12,00,000	12,00,000
5. Interest (I)(₹) = $D \times K_d$	4,00,000	5,60,000
6. EBT (₹) = EBIT – I	8,00,000	6,40,000
7. Market value of equity (E)(₹) = $\frac{\text{EBT}}{K_e}$	80,00,000	64,00,000
8. Value of the Firm (V)(₹) = $E + D$	1,30,00,000	1,34,00,000
9. Overall Cost of Capital (K_0) = $K_d \times D/V + K_e \times E/V$	9.23%	8.96%

Thus, under existing situation, the value of the firm is ₹1,30,00,000 and its overall Cost of Capital is 9.23%

If level of debt is raised to ₹70,00,000, the value of the firm will increase to ₹1,34,00,000 and its overall Cost of Capital will decease to 8.96%.

4. A company expects an annual income of ₹12,00,000. It has ₹5,00,000, 9% debentures. The Equity Capitalisation rate is 10%. Calculate the value of the firm and overall Cost of capitalisation according to NI approach. What will be the value of the company and the overall capitalisation rate if the company is assumed to have employed a debt of ₹7,00,000 instead of ₹5,00,000? *[C.U. M.Com., 2004]*

Solution

Calculation for Value of the Firm (V) and Overall Capitalisation Rate (K_0) under NI Approach

Particulars	Existing Plan	Proposed Plan
1. Debt Capital (i.e. 9% Debentures) (D)(₹)	5,00,000	7,00,000
2. Cost of debt (K_d)	9%	9%
3. Cost of Equity Capital (K_e)	10%	10%
4. EBIT (₹)	12,00,000	12,00,000
5. Interest (I)(₹) = $D \times K_d$	45,000	63,000
6. EBT (₹) = EBIT – I	11,55,000	11,37,000
7. Market value of equity (E)(₹) = $\frac{\text{EBT}}{K_e}$	1,15,50,000	1,13,70,000
8. Value of the firm (V)(₹) = $E + D$	1,20,50,000	1,20,70,000
9. Overall Cost of Capital (K_0) = $K_d \times D/V + K_e \times E/V$	9.95%	9.94%

At ₹5,00,000 level of Debt Capital, the value of the firm is ₹1,20,50,000 and overall capitalisation rate is 9.95%. If, however, the level of debt is increased to ₹7,00,000, the value of the firm will be ₹1,20,70,000 and overall capitalisation rate will be 9.94%.

5. A company has annual NOI of ₹5,00,000. It has ₹30,00,000 8% debentures. The overall capitalisation rate is 10%. You are required to calculate the value of the firm and Equity Capitalisation rate according to the NOI approach. What will be the effect on the value of the firm and the Equity Capitalisation rate if the debenture debt is increased to 40,00,000.

[C.U. M.Com., 2003]

Solution

Calculation for Value of the Firm (V) and Equity Capitalisation Rate (K_e) under NOI Approach

Particulars	Existing Plan	Proposed Plan
1. Debt Capital (i.e. 8% debentures) (D)(₹)	30,00,000	40,00,000
2. Cost of debt (K_d)	8%	8%
3. Overall Cost of Capital (K_0)	10%	10%
4. EBIT (₹)	5,00,000	5,00,000
5. Market value of the firm (V) (₹) = $\frac{\text{EBIT}}{k_0}$	50,00,000	50,00,000
6. Market value of equity (E) (₹) = $V - D$	20,00,000	10,00,000
7. Interest (I)(₹) = $D \times K_d$	2,40,000	3,20,000
8. EBT (₹) = EBIT – I	2,60,000	1,80,000
9. Cost of equity (K_e) = $\frac{\text{EBT}}{E}$	13%	18%

So, the current market value of the firm is ₹50,00,000 and Equity Capitalisation rate is 13%. If the level of debt increases to ₹40,00,000, the market value of the firm will remain the same, however, Equity Capitalisation rate will increase to 18%.

6. Companies X and Y are in the same risk class and identical in all respects except that company X uses debts while company Y does not. Levered company has ₹9,00,000 debentures carrying 10% rate of interest. Both companies earn 20% before interest on their total assets of ₹15,00,000. Assume perfect capital markets and capitalisation rate of 15% for all equity company.
   (i) Compute the value of both the companies using NOI approach, and
   (ii) Also calculate overall Cost of Capital for both the companies using NOI approach.

[C.U. M.Com., 2007]

Solution

Calculation for Value of the Firm (V) and Overall Cost of Capital (K_0) under NOI Approach

Particulars	Firm X	Firm Y
1. Debt Capital (i.e. 10% Debentures) (D)(₹)	9,00,000	Nil
2. Cost of debt (K_d)	10%	N.A
3. Overall Cost of Capital (K_0)	15%	15%
4. EBIT (₹)(@ 20% on ₹1,500,000)	3,00,000	3,00,000
5. Market value of the firm (V) (₹) = $\frac{\text{EBIT}}{k_0}$	20,00,000	20,00,000
6. Market value of equity (E) (₹) = $V - D$	11,00,000	20,00,000
7. Interest (I)(₹) = $D \times K_d$	90,000	Nil
8. EBT (₹) = EBIT – I	2,10,000	3,00,000
9. Cost of equity (K_e) = $\frac{\text{EAT}}{E}$	19.09%	15%
10. Overall Cost of Capital (K_0)(For verification) $= K_d \times D/V + K_e \times E/V$	15%	15%

7. A company has annual NOI of ₹1,05,000. It has 9% debentures of ₹5,00,000. The overall capitalisation rate is 10%. You are required to calculate the value of the firm and the Equity Capitalisation rate according to the NOI approach?

   What will be the effect on the value of the firm and the Equity Capitalisation rate if the debenture is increased to ₹6,00,000? *[C.U. M.Com., 2009]*

Solution

Calculation for Value of the Firm (V) and Equity Capitalisation Rate (K_e) under NOI Approach

Particulars	Existing Plan	Proposed Plan
1. Debt Capital (i.e. 9% debentures) (D)(₹)	5,00,000	6,00,000
2. Cost of debt (K_d)	9%	9%
3. Overall Cost of Capital (K_0)	10%	10%
4. EBIT (₹)	1,05,000	1,05,000
5. Market value of the firm (V) (₹) = $\frac{\text{EBIT}}{k_0}$	10,50,000	10,50,000
6. Market value of equity (E) (₹) = $V - D$	5,50,000	4,50,000
7. Interest (I)(₹) = $D \times K_d$	45,000	54,000
8. EBT (₹) = EBIT – I	60,000	51,000
9. Cost of equity (K_e) = $\frac{\text{EBT}}{E}$	10.9%	11.33%

Thus, under existing situation, the value of the firm is ₹10,50,000 and Equity Capitalisation rate is 10.9%.

If debentures are increased to ₹6,00,000, the value of the firm will be ₹10,50,000 and Equity Capitalisation rate will be 11.33%.

8. The management of XYZ Company, subscribing to the NOI approach, believes that its cost of debt and overall Cost of Capital will remain at 7% and 14%, respectively. If the equity shareholders of the firm demand a return of 25%, what should be the proportion of debt and equity in the firm's Capital Structure? Assume that there are no taxes.

Solution

Given, $K_d = 7\%$, $K_e = 25\%$ and $K_0 = 14\%$

As per NOI approach, $K_e = K_0 + (K_0 - K_d) \times \frac{D}{E}$

$$25 = 14 + (14 - 7) \times \frac{D}{E}$$

$$7 \times \frac{D}{E} = 11$$

$$\frac{D}{E} = \frac{11}{7} = 1.57$$

So, the required proportion of debt and equity is 1.57.

9. Company H and company I are in the same risk class and identical in all respects except H uses debt while I does not. Levered company has ₹18,00,000 debentures, carrying 10% rate of interest. Both the companies earn 20% before interest and taxes on their total

assets of ₹30,00,000. Assume perfect capital market, tax rate of 50% and capitalisation rate of 15% for an all equity company.

(i) Compute the value of both the companies using NI approach.
(ii) Compute the value of both the companies using NOI approach.
(iii) Using NOI Approach, calculate the overall Cost of Capital of both the companies.

[C.U. M.Com., 2012, C.A Final Nov. 1994]

Solution

Calculation for Value of the Firm (V) and Overall Cost of Capital (K_0) under NI Approach

Particulars	Firm H	Firm I
1. Debt Capital (i.e. 10% debentures) (D)(₹)	18,00,000	Nil
2. Cost of debt (K_d)	10%	N.A
3. Cost of Equity Capital (K_e)	15%	15%
4. EBIT (₹)(@ 20% on ₹3,000,000)	6,00,000	6,00,000
5. Interest (I)(₹) = $D \times K_d$	1,80,000	Nil
6. EBT (₹) = EBIT – I	4,20,000	6,00,000
7. Tax @ 50% on EBT (₹)	2,10,000	3,00,000
8. EAT = EBT – Tax (₹)	2,10,000	3,00,000
9. Market value of equity (E)(₹) = $\frac{\text{EAT}}{K_e}$	14,00,000	20,00,000
10. Value of the firm (V)(₹) = $E + D$	32,00,000	20,00,000

Calculation for Value of the Firm (V) and Overall Cost of Capital (K_0) under NOI Approach

Particulars	Firm H	Firm I
1. Debt Capital (i.e. 10% debentures) (D)(₹)	18,00,000	Nil
2. Cost of debt (K_d)	10%	N.A
3. Overall Cost of Capital (K_0)	15%	15%
4. Tax Rate	50%	50%
5. EBIT (₹)(@ 20% on ₹3,000,000)	6,00,000	6,00,000
6. Market value of the firm (V) (₹) = $\frac{\text{EBIT}(1-t)}{k_0}$	20,00,000	20,00,000
7. Market value of equity (E) (₹) = $V - D$	2,00,000	20,00,000
8. Interest (I)(₹) = $D \times K_d$	1,80,000	Nil
9. EBT (₹) = EBIT – I	4,20,000	6,00,000
10. Tax @ 50% on EBT (₹)	2,10,000	3,00,000
11. EAT = EBT – Tax (₹)	2,10,000	3,00,000
12. Cost of equity (K_e) = $\frac{\text{EAT}}{E}$	105%	15%
13. Overall Cost of Capital (K_0)(For verification) = $K_d(1-t) \times D/V + K_e \times E/V$	15%	15%

Note: Since cost of Equity Capital of the non-levered firm is 15%, its overall capitalisation rate is also 15%. Moreover, since firm *H* is identical to firm *I*, it will also have overall Cost of Capital as 15%.

10. A Ltd. and B Ltd. are identical, except for Leverage. They earn same Operating Profit of ₹16,00,000 before tax. A Ltd. has ₹50,00,000 in 10% debt while company B is entirely financed by equity.

Assuming a tax rate of 40% and capitalisation rate of 16% for an all-equity company, compute the value of business by:

(i) NI approach and

(ii) NOI approach. *[C.U. M.Com., 2005]*

Solution

(i) Calculation for value of the firm (V) and overall Cost of Capital (K_0) under NI Approach

Particulars	A Ltd.	B Ltd.
1. Debt Capital (D)(₹)	50,00,000	Nil
2. Cost of debt (K_d)	10%	N.A
3. Cost of Equity Capital (K_e)	16%	16%
4. EBIT (₹)	16,00,000	16,00,000
5. Interest (I)(₹) = $D \times K_d$	5,00,000	Nil
6. EBT (₹) = EBIT – I	11,00,000	16,00,000
7. Tax @ 40% on EBT (₹)	4,40,000	6,40,000
8. EAT = EBT – Tax (₹)	6,60,000	9,60,000
9. Market value of equity (E)(₹) = $\frac{EAT}{K_e}$	41,25,000	60,00,000
10. Value of the firm (V)(₹) = $E + D$	91,25,000	60,00,000

(ii) Calculation for value of the firm (V) under NOI Approach

Particulars	A Ltd	B Ltd
1. Debt Capital (D)(₹)	50,00,000	Nil
2. Cost of debt (K_d)	10%	N.A
3. Overall Cost of Capital (K_0)	16%	16%
4. Tax rate	40%	40%
5. EBIT (₹)	16,00,000	16,00,000
6. Market value of the firm (V) (₹) = $\frac{EBIT(1-t)}{k_0}$	60,00,000	60,00,000

Note: Since cost of Equity Capital of the non-levered firm (B Ltd.) is 16%, its overall capitalisation rate is also 16%. Moreover, since A Ltd. is identical to B Ltd, it will also have overall Cost of Capital as 16%.

11. X Co. has NOI of ₹3,60,000 when its investment in assets is ₹20,00,000. It can raise debt at 12% rate of interest.
    (i) Using the NI approach and an Equity Capitalisation rate of 18%, compute the total value of the firm and the weighted average Cost of Capital if the firm has (a) no debt and (b) ₹6,00,000 debt.
    (ii) Using the NOI approach and an Equity Capitalisation rate of 15%, compute the total value of the firm value of shares and the cost of equity if the firm has (a) no debt and (b) ₹6,00,000 debt.

    Assume taxes do not exist. *[C.U. M.Com., 1995]*

Solution

Calculation for Value of the Firm (V) and Overall Cost of Capital (K_0) under NI Approach

Particulars	No debt	With debt
1. Debt Capital (i.e. 8% debentures) (D)(₹)	Nil	6,00,000
2. Cost of debt (K_d)	12%	12%
3. Cost of Equity Capital (K_e)	18%	18%
4. EBIT (₹)	3,60,000	3,60,000
5. Interest (I)(₹) = $D \times K_d$	Nil	72,000
6. EBT (₹) = EBIT – I	3,60,000	2,88,000
7. Market value of equity (E)(₹) = $\frac{\text{EBT}}{K_e}$	20,00,000	16,00,000
8. Value of the firm (V)(₹) = $E + D$	20,00,000	22,00,000
9. Overall Cost of Capital (K_0) = $K_d \times D/V + K_e \times E/V$	18%	16.36%

Calculation for Value of the Firm (V) and Overall Cost of Capital (K_0) under NI Approach

Particulars	No debt	With debt
1. Debt Capital (i.e. 9% debentures) (D)(₹)	Nil	6,00,000
2. Cost of debt (K_d)	12%	12%
3. Overall Cost of Capital (K_0)	15%	15%
4. EBIT (₹)	3,60,000	3,60,000
5. Market value of the firm (V) (₹) = $\frac{\text{EBIT}}{k_0}$	24,00,000	24,00,000
6. Market value of equity (E) (₹) = $V - D$	24,00,000	18,00,000
7. Interest (I)(₹) = $D \times K_d$	Nil	72,000
8. EBT (₹) = EBIT – I	3,60,000	2,88,000
9. Cost of equity (K_e) = $\frac{\text{EBT}}{E}$	15%	16%

12. Net operating income ₹75,000
Total investment ₹5,00,000
Cost of equity:
If the firm uses no debt 15%
If the firm uses ₹2,00,000 debentures 18%
If the firm uses ₹3,00,000 debentures 20%
Assume that ₹2,00,000 debentures can be raised at 10% rate of interest whereas ₹3,00,000 debentures can be raised at 12% rate of interest. You are required to calculate the market value of the firm and the overall Cost of Capital using Traditional Approach.
[C.U. M.Com., 2008]

Calculation for Value of the Firm (V) and Overall Cost of Capital (K_0) under Traditional Approach

Particulars	Plan 1	Plan 2
1. Total investment	5,00,000	5,00,000
2. Debt Capital (D)(₹)	2,00,000	3,00,000
3. Equity Capital (₹)	3,00,000	2,00,000
4. Cost of debt (K_d)	10%	12%
5. Cost of Equity Capital (K_e)	18%	20%
6. EBIT (₹)	75,000	75,000
7. Interest (I)(₹) = $D \times K_d$	20,000	36,000
8. EBT (₹) = EBIT – I	55,000	39,000
9. Market value of equity (E)(₹) = $\frac{\text{EBT}}{K_e}$	3,05,556	1,95,000
10. Value of the firm (V)(₹) = $E + D$	5,05,556	4,95,000
11. Overall Cost of Capital (K_0) = $K_d \times D/V + K_e \times E/V$	14.84%	15.15%

13. The following data are related to I Ltd. and W Ltd. belonging to the same risk class.

Particulars	I Ltd.	W Ltd.
No. of ordinary shares (₹10 each)	9,00,000	15,00,000
Market price per share (₹)	12	10
6% debentures (₹)	60,00,000	Nil
Profit before interest (₹)	18,00,000	18,00,000

All profits after interest are distributed as dividend. You are required to explain how under M-M approach an investor holding 1% shares in I Ltd. will be better off in switching to W Ltd. *[C.U. M.Com., 2011]*

Solution

Calculation for the Value of the Firms

Particulars	I Ltd.	W Ltd.
EBIT(₹)	18,00,000	18,00,000
Interest (₹) = $D \times k_d$	3,60,000	Nil
EBT (₹)	14,40,000	18,00,000
No. of shares	9,00,000	15,00,000
EPS (₹)	1.60	1.20
MPS (₹)	12	10
Cost of equity (k_e) = $\frac{\text{EPS}}{\text{MPS}}$	13.33%	12%
Value of equity (E) = $\frac{\text{EBT}}{k_e}$ (₹)	1,08,00,000	1,50,00,000
Debt Capital (D) (₹)	60,00,000	Nil
Value of the firm (V) = $D + E$ (₹)	1,68,00,000	1,50,00,000

Now, the investor holds 1% shares in firm I Ltd. As 1% owner of I Ltd, he is eligible to get (14,40,000 × 1%) = ₹14,400 of NI and his investment stands for ₹(1,08,00,000 × 1%) = ₹1,08,000. Moreover, as 1% owner of firm I, he has a corporate Leverage of ₹(60,00,000 × 1%) = ₹60,000. (Here, corporate Leverage refers to the financial risk of Debt Capital. Since he is 1% owner of the firm, he is to bear 1% of the risk arising due to Debt Capital financing.) The investor wants to liquidate his investment in I and buy similar 1% ownership in firm W. So he sells his present 1% holding in I Ltd. in the market at ₹1,08,000. However, 1% investment in W costs him ₹1,50,000. To finance the shortfall, let us assume that he borrows ₹60,000 at the same rate of interest as applicable for firm I Ltd. and thereby substitutes his corporate Leverage by personal Leverage (risk of personal loan). Out of the total investible funds of ₹(1,08,000 + 60,000) = ₹1,68,000, he invests ₹1,50,000 to buy 1% holding in W. At the end of the year, Mr. A receives ₹(18,00,000 × 1%) = ₹18,000 as earnings out of which he has to pay ₹(60,000 × 6%) = ₹3,600 as interest on loan. Thus, his net earnings from firm W is ₹14,400 which is exactly equal to his earnings from his previous investment in I Ltd. Hence, from the viewpoint of earnings, he is not worse off. However, in this process, he manages to book a gain of ₹(1,68,000 – 1,50,000) = ₹18,000.

Being attracted by this opportunity to gain out of transfer, most of the shareholders of firm I will start selling their share in firm I and buy shares of firm W. As a result, there will be a selling pressure on the shares of I which will bring the price down and a buying pressure on the shares of W which will drive the price up. This process will continue till the market value of both the firms become equal.

14. B Ltd. and C Ltd. belong to the same risk class. Two companies are identical in all respect except that C Ltd. has no Debt Capital in its Capital Structure, whereas B Ltd. employs debt in its Capital Structure. Relevant financial particulars of the two companies are given as follows:

Particulars	B Ltd.	C Ltd.
Net operating income	₹10,00,000	₹10,00,000
Debt interest	₹4,00,000	Nil
Equity Capitalisation rate	14%	12%
Debt Capitalisation rate	8%	—

(a) You own ₹10,000 worth of equity of B Ltd. Show what arbitrage you would resort to.
(b) When will this arbitrage cease according to Miller and Modigliani?

[C.U. M.Com., 2006]

Solution

Calculation for the Value of the Firms

Particulars	B Ltd.	C Ltd.
EBIT (₹)	10,00,000	10,00,000
Interest (₹) (Given)	4,00,000	Nil
EBT (₹)	6,00,000	10,00,000
Cost of equity (k_e)	14%	12%
Value of equity (E) = $\frac{\text{EBT}}{k_e}$ (₹)	42,85,714	83,33,333
Cost of debt (K_d)	8%	N.A
Debt Capital (D) (₹)(400,000/8%)	50,00,000	Nil
Value of the firm (V) = D + E (₹)	92,85,714	83,33,333

(a) Now, the investor holds ₹10,000 worth of shares in firm B Ltd. As (10,000/42,85,714) = 0.233% owner of B Ltd, he is eligible to get (6,00,000 × 0.233%) = ₹1,397 of NI and his investment stands for ₹10,000. Moreover, as 0.233% owner of firm B, he has a corporate Leverage of ₹(50,00,000 × 0.233%) = ₹11,667. (Here, corporate Leverage refers to the financial risk of Debt Capital. Since he is 0.233% owner of the firm, he is to bear 0.233% of the risk arising due to Debt Capital financing.) The investor wants to liquidate his investment in B and buy similar 0.233% ownership in firm W. So he sells his present 0.233% holding in I Ltd. in the market at ₹1,08,000. However, 0.233% investment in C costs him ₹(83,33,333 × 0.233%) = ₹19,417. To finance the shortfall, let us assume that he borrows ₹11,667 at the same rate of interest as applicable for firm B Ltd. and thereby substitutes his corporate Leverage by personal Leverage (risk of personal loan). Out of the total investible funds of ₹(10,000 + 11,667) = ₹21,667, he invests ₹19,417 to buy 0.233% holding in C. At the end of the year, Mr. A receives ₹(10,00,000 × 0.233%) = ₹2,330 as earnings out of which he has to pay ₹(11,667 × 8%) = ₹933 as interest on loan. Thus, his net earnings from firm C is ₹(2,330 – 933) = ₹1,397 which is exactly equal to his earnings from his previous investment in B Ltd. Hence, from the viewpoint of earnings, he is not worse off. However, in this process, he manages to book a gain of ₹(21,667 – 19,417) = ₹2,250.

(b) Being attracted by this opportunity to gain out of transfer, most of the shareholders of firm B will start selling their share in firm B and buy shares of firm C. As a

result, there will be a selling pressure on the shares of B which will bring the price down and a buying pressure on the shares of C which will drive the price up. This process will continue till the market value of both the firms become equal.

15. X Ltd. and Y Ltd. are two companies in the same industry. They have the same business risk and identical in all respects. The annual profit of both companies is ₹2,80,000. The only differences between the companies are in their financial structures and their market values. Details of those are given below:

Particulars	X Ltd.	Y Ltd.
Equity shares of ₹10 each	₹10,00,000	₹20,00,000
10% debentures	₹10,00,000	—
Cost of equity	15%	14%
Cost of debt	10%	—
Pay-out ratio	100%	100%

(i) You are required to calculate for each company the following:
(a) Market value of equity; (b) Market value of debt and (c) Market value of the company. Ignore taxes.

(ii) Suppose you are the owner of the 10% of the equity of X Ltd. If you agreed with the propositions of Modigliani and Miller, would you retain your shares in X Ltd. or could you improve your financial position? Justify your answer.

[C.U. M.Com., 1997]

Solution

(i) Calculation for the value of the firms.

Particulars	X Ltd.	Y Ltd.
EBIT(₹)	2,80,000	2,80,000
Debt Capital (D) (₹)	10,00,000	Nil
Cost of debt (K_d)	10%	N.A
Interest (₹) (Given)	1,00,000	Nil
EBT (₹)	1,80,000	2,80,000
Cost of equity (k_e)	15%	14%
Value of equity (E) = $\frac{\text{EBT}}{k_e}$ (₹)	12,00,000	20,00,000
Value of the firm (V) = $D + E$ (₹)	22,00,000	20,00,000

(ii) Now, the investor holds 10% shares in firm X Ltd. As 10% owner of X Ltd, he is eligible to get (1,80,000 × 10%) = ₹18,000 of NI and his investment stands for ₹(12,00,000 × 10%) = ₹1,20,000. Moreover, as 10% owner of firm X, he has a corporate Leverage of ₹(10,00,000 × 10%) = ₹1,00,000. (Here, corporate Leverage refers to the financial risk of Debt Capital. Since he is 10% owner of the firm, he is to bear 10% of the risk arising due to Debt Capital financing.) The investor wants to liquidate

his investment in X and buy similar 10% ownership in firm Y. So he sells his present 10% holding in X Ltd. in the market at ₹1,20,000. However, 10% investment in Y costs him ₹2,00,000. To finance the shortfall, let us assume that he borrows ₹1,00,000 at the same rate of interest as applicable for firm I Ltd. and thereby substitutes his corporate Leverage by personal Leverage (risk of personal loan). Out of the total investible funds of ₹(1,20,000 + 1,00,000) = ₹2,20,000, he invests ₹2,00,000 to buy 10% holding in Y. At the end of the year, the investor receives ₹(2,80,000 × 10%) = ₹28,000 as earnings out of which he has to pay ₹(1,00,000 × 10%) = ₹10,000 as interest on loan. Thus, his net earnings from firm Y is ₹18,000 which is exactly equal to his earnings from his previous investment in X Ltd. Hence, from the viewpoint of earnings, he is not worse off. However, in this process, he manages to book a gain of ₹(2,20,000 – 2,00,000) = ₹20,000.

Being attracted by this opportunity to gain out of transfer, most of the shareholders of firm X will start selling their share in firm X and buy shares of firm Y. As a result, there will be a selling pressure on the shares of X which will bring the price down and a buying pressure on the shares of Y which will drive the price up. This process will continue till the market value of both the firms become equal.

4B.15 SUMMARY

Method	Particulars	Formulae
1. NI Approach	1. Market value of equity	$E = \frac{\text{EBT}}{K_e}$
	2. Value of the firm	$V = D + E$
	3. Overall Cost of Capital = weighted average Cost of Capital , with market value as weights *where,* E = Market value of equity, D = Market value of debt, K_d = Cost of debt (here before tax, as tax does not exist) and K_e = Cost of equity.	$K_0 = K_d \times D/V + K_e \times E/V$
2. NOI Approach	1. Market value of the firm,	$V = \frac{\text{EBIT}}{K_0}$
	2. Value of equity	$E = V - D$
	3. Cost of equity	$K_e = \frac{\text{EBIT} - I}{E} = \frac{\text{EBT}}{E}$ or $K_e = K_0 + (K_0 - K_d) \times \frac{D}{E}$

3. M-M Approach with Tax	1. Value of the unlevered firm 2. Value of the levered firm 3. Overall Cost of Capital for unlevered firm 4. Overall Cost of Capital for unlevered firm	$V_U = \frac{\text{EBIT}(1-t)}{k_e}$. $V_L = \frac{\text{EBIT}(1-t)}{K_e} + \frac{I \times t}{K_d}$ $= V_U + D \times t$ $K_0 = K_e$ $K_0 = K_d \times (1 - t) \times \frac{D}{V} + K_e \times \frac{E}{V}$ *where,* $K_e = \frac{\text{EAT}}{E}$
4. NI Approach with Taxation	1. Market value of equity 2. Value of the firm 3. Overall Cost of Capital = weighted average Cost of Capital, with market value as weights	$E = \frac{\text{EAT}}{K_e}$ $V = D + E$ $K_0 = K_d (1 - t) \times D/V + K_e \times E/V$ *where,* t = tax rate
5. NOI Approach with Taxation	1. Value of the unlevered firm 2. Value of the levered firm 3. Overall Cost of Capital for unlevered firm 4. Overall Cost of Capital for unlevered firm	$V_U = \frac{\text{EBIT}(1-t)}{k_e}$ $V_L = \frac{\text{EBIT}(1-t)}{K_e} + \frac{I \times t}{K_d}$ $= V_U + D \times t$ $K_0 = K_e$ $K_0 = K_d \times (1 - t) \times \frac{D}{V} + K_e \times \frac{E}{V}$ *where,* $K_e = \frac{\text{EAT}}{E}$

EXERCISES

A. Short-answer Type Questions (5 Marks)

1. Explain Trading on Equity with illustration. *[C.U. B.Com. (H), 2006]*
2. What do you mean by Capital Structure? Mention any three factors that are to be considered in determining the Capital Structure. *[C.U. B.Com. (H), 2007]*
3. Write short note on 'Trading on Equity'. *[C.U. B.Com. (H), 2007]*
4. Mention the factors that determine the Capital Structure. *[C.U. B.Com. (H), 2009]*
5. Define High-geared, Low-geared and Evenly-geared Capital Structure. *[C.U. B.Com. (H), 2009]*
6. Define 'Trading on Equity' with example. *[C.U. B.Com. (H), 2010]*
7. 'Neither Overcapitalisation nor Undercapitalisation is desirable' Elucidate the statement. *[C.U. B.Com. (H), 2011]*
8. What is Trading on Equity? Illustrate the statement with example. *[C.U. B.Com. (H), 2012]*
9. Mention the cause of overcapitalisation in a company. *[C.U. B.Com. (H), 2012]*

B. Essay Type Questions (10 Marks)

1. What do you mean by optimum Capital Structure? Discuss the features of optimum Capital Structure. *[C.U. B.Com. (H), 2012]*
2. Discuss the factors determining Capital Structure decision of a firm.
3. Define Trading on Equity. State with example the conditions limiting the benefits of Trading on Equity.

C. Practical Problems

1. From the following balance sheet of Y Ltd., calculate the total capitalisation. Also comment on the financial structure and Capital Structure of the firm.

Balance Sheet of Y Ltd.

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity share capital	2,00,000	Fixed assets	3,20,000
Retained earnings	80,000	Current Assets	3,20,000
10% Preference Share Capital	80,000		
8% debentures	1,20,000		
9% bank loan	1,20,000		
Current Liabilities	40,000		
	6,40,000		1,60,000

[Ans. ₹6,00,000, 5:2:2:3:3:1, 5:2:2:3:3]

2. M Ltd. expects an annual return on assets of 10%. Currently, it has total assets of ₹6,00,000 financed by equity share capital of ₹3,00,000 of face value of ₹10 and 8% debt of ₹3,00,000. It is now contemplating to raise its Debt Capital to ₹400,000 keeping the total capital unchanged. Calculate EPS of the firm both under existing and proposed situation and comment on how far the firm is successful in Trading on Equity. Will the decision be beneficial if the Rate of Return on assets declines to 7%? Tax rate is 50%.

[Ans. With 10% ROA – 0.60, 0.70; With 7% ROA – 0.30, 0.25]

3. X Ltd.'s EBIT is ₹5,00,000. The company has 10%, ₹20,00,000 debentures. The Equity Capitalisation rate is 16%. You are required to calculate:
   (i) Market value of equity and value of the firm.
   (ii) Overall Cost of Capital .

   Assume NI approach. **[Ans. (i) ₹18,75,000, ₹38,75,000 (ii) 12.9%]**

4. Y Ltd. has EBIT of ₹1,00,000. The company makes use of debt and Equity Capital. The firm has 10% debentures of ₹5,00,000 and the firm's Equity Capitalisation rate is 15%.

   You are required to compute:
   (i) Market value of equity and value of the firm.
   (ii) Overall Cost of Capital .

   Assume NI approach. **[Ans. (i) ₹3,33,333, ₹8,33,333 (ii) 12%]**

5. A company's expected annual net operating income (EBIT) is 50,000. The company has ₹2,00,000, 10% debentures. The Equity Capitalisation rate (K_e) of the company is 12.5%. Find the value of the firm and overall Cost of Capital under NI approach.

[Ans. ₹4,40,000, 11.36%]

6. Assuming no taxes and given the earnings before interest and taxes (EBIT), interest (I) at 10% and Equity Capitalisation rate (K_e) below, calculate the total market value of each firm under NI Approach:

Firms	EBIT	Interest	K_e
X	2,00,000	20,000	12%
Y	3,00,000	60,000	16%
Z	5,00,000	2,00,000	15%
W	6,00,000	2,40,000	18%

   Also determine the weight average Cost of Capital for each firm.

[Ans. ₹17,00,000, ₹21,00,000, ₹40,00,000, ₹44,00,000, 11.76%, 14.19%, 12.50%, 13.64%].

7. From the following information relating to a company, determine the optimum Capital Structure under NI approach.

Debt as a % of total capital	Before tax cost of debt (%)	Cost of equity (%)
0	10	15
10	10	15
20	10	16
30	11	17
40	12	18
50	14	19
60	15	21
70	18	24

Corporate tax may be taken at 50%.

[Ans. minimum K_0 = 12.9% at the debt level of 60%]

8. Z Ltd.'s operating income is ₹5,00,000. The firm's cost of debt is 10% and currently the firm employs ₹15,00,000 of debt. The overall Cost of Capital of the firm is 15%.
   You are required to calculate:
   (i) Total value of the firm (ii) Cost of equity.
   Assume NOI approach. **[Ans. ₹33,33,333, (ii) 19.09%]**
9. The management of MN Company, subscribing to the NOI approach, believes that its cost of debt and overall Cost of Capital will remain at 8% and 12%, respectively. If the equity shareholders of the firm demand a return of 20%, what should be the proportion of debt and equity in the firm's Capital Structure? Assume that there are no taxes.
   [Ans. D/E = 2:1]
10. A company has annual NOI of ₹2,50,000. It has ₹15,00,000 8% debentures. The overall capitalisation rate is 10%. You are required to calculate the value of the firm and Equity Capitalisation rate according to the NOI approach. What will be the effect on the value of the firm and the Equity Capitalisation rate if the debenture debt is increased to 20,00,000.
    [Ans. ₹25,00,000, 13%; ₹25,00,000, 18%]
11. A Company's current operating income is ₹4,00,000. The firm has ₹10,00,000 of 10% debt outstanding. Its cost of Equity Capital is estimated to be 15%.
    (i) Determine the current value of the firm using traditional valuation approach.
    (ii) Calculate the firm's overall capitalisation rate.
    [Ans. (i) ₹30,00,000, (ii) 13.33%]
12. Net operating income ₹1,50,000
    Total investment ₹10,00,000
    Cost of equity:
    If the firm uses no debt 15%
    If the firm uses ₹4,00,000 debentures 18%
    If the firm uses ₹6,00,000 debentures 20%

Assume that ₹4,00,000 debentures can be raised at 10% rate of interest whereas ₹6,00,000 debentures can be raised at 12% rate of interest. You are required to calculate the market value of the firm and the overall Cost of Capital using Traditional Approach.

[Ans. For ₹4,00,000 debt: ₹10,11,111, 14.84%; For ₹6,00,000: ₹9,90,000, 15.15%]

13. There are two firms P and Q which are identical in all respect except P does not use any debt in its Capital Structure while Q has ₹10,00,000, 12% debentures. Both the firms have EBIT ₹2,50,000 and the capitalisation rate of firm P is 20%. Assuming corporate tax of 30%, calculate the value of these two firms and weighted average Cost of Capital under M-M approach. **[Ans. ₹8,75,000, ₹11,75,000, 20%, 14.9%]**
14. There are two firms A and B which are identical in all respect except P does not use any debt in its Capital Structure while Q has ₹8,00,000, 9% debentures. Both the firms have EBIT ₹2,60,000 and the capitalisation rate is 10%. Assuming corporate tax of 30%, calculate the value of these two firms under M-M approach.

[Ans. Value (*P*) = ₹18,20,000, value (*Q*) = ₹20,60,000]

15. The following data are related to M Ltd. and N Ltd. belonging to the same risk class.

Particulars	M Ltd.	N Ltd.
No. of ordinary shares (₹10 each)	4,50,000	7,50,000
Market price per share (₹)	12	10
6% debentures (₹)	30,00,000	Nil
Profit before interest (₹)	9,00,000	9,00,000

All profits after interest are distributed as dividend. You are required to explain how under M-M approach an investor holding 1% shares in M Ltd. will be better off in switching to N Ltd.

16. P Ltd. and Q Ltd. are two companies in the same industry. They have the same business risk and identical in all respects. The annual profit of both companies is ₹5,60,000. The only differences between the companies are in their financial structures and their market values. Details of those are given as follows:

Particulars	X Ltd.	Y Ltd.
Equity shares of ₹10 each	₹20,00,000	₹40,00,000
10% debentures	₹20,00,000	—
Cost of equity	15%	14%
Cost of debt	10%	—
Pay-out ratio	100%	100%

Suppose you are the owner of the 10% of the equity of P Ltd. If you agreed with the propositions of Modigliani and Miller, would you retain your shares in P Ltd. or could you improve your financial position? Justify your answer.

5 CHAPTER

Working Capital Management (I)

CHAPTER OUTLINE

5.1 Introduction
5.2 Concept and Meaning of Working Capital
5.3 Constituents of Working Capital
5.4 Types of Working Capital
5.5 Nature and Objectives of Working Capital Management
5.6 Importance of Working Capital
5.7 Effects of Excessive Working Capital
5.8 Factors Determining Working Capital Requirement
5.9 Concept of Operating Cycle
5.10 Methods of Determining Operating or Working Capital Cycle
5.11 Causes behind Longer Working Capital or Operating Cycle
5.12 Strategies for Minimisation of Length of Working Capital Cycle or Operating Cycle
5.13 Summary

5.1 INTRODUCTION

Financial Management as per modern approach is not only concerned with procurement of funds but also with effective utilisation of funds. Effective utilisation of funds implies the long-term and short-term Investment Decisions such as Capital Budgeting Decisions, Working Capital management decisions, etc. Every firm aims at the effective utilisation of funds to achieve the desired objective. Investment Decision, financing decision and dividend decision constitutes the financing decision of a firm. Investment Decision can be categorised into two types—one long-term Investment Decision and another short-term Investment Decision (discussed in Chapter 1). Short-term Investment Decision deals with the Investment Decision in Current Assets. It is also known as Working Capital Management. The Working Capital decision is a vital area for any business because without Working Capital a business cannot continue its operation.

The concept, constituents, types, nature, importance of Working Capital and other relevant aspects relating to Working Capital Management have been discussed in the subsequent sections.

5.2 CONCEPT AND MEANING OF WORKING CAPITAL

In simple terms, "Working Capital" is the capital required for carrying out day-to-day business. It means that the fund required to carry out daily business activities is known as Working Capital. We all know that capital is the life and blood of a business, be it Fixed Capital or Working Capital. The capital of a firm can be categorised into two broad categories, namely, (a) Fixed Capital and (b) Working Capital. Fixed Capital is the capital required by a business for purchasing fixed assets such as machinery, building, furniture and fixture, etc. Fixed Capital is required for long-term investment, the return of which will be derived from the years to come. Whereas, Working Capital is the capital required for carrying out the day-to-day business operation, i.e. for meeting the day-to-day expenses. Working Capital is the capital required for financing the short-term or Current Assets. As per traditional approach, Working Capital is defined as the investment in current asset only.

Working Capital is the excess of Current Assets over Current Liabilities. The difference between Current Assets and Current Liabilities represents the Working Capital. Working Capital consists of two broad components—Current Assets and Current Liabilities. Shubin has defined Working Capital as the amount of funds necessary to cover the cost of operating the enterprise. Hampton has defined Working Capital as "Working Capital refers to the firm's Current Assets."

Working Capital = Current Assets – Current Liabilities

The management of Working Capital is known as Working Capital management. In other words, application of the management functions for managing Working Capital is known as Working Capital management. Working Capital represents the liquidity position of a business, i.e. its ability to meet up the day-to-day operations. Hence, Working Capital management is of utmost importance as it indicates the probability that the firm would be unable to meet up its financial commitments.

Working Capital is also known as 'circulating capital' or 'revolving capital' or 'fluctuating capital' or 'short-term capital' since it circulates within the organisation in a cyclical manner. This cycle has the following steps: (1) the funds are utilised for the purchase of raw materials, (2) raw materials are converted into work-in-progress, (3) work-in-progress is converted to finished goods, (4) finished goods are sold to debtors and (5) cash is collected from debtors and the next process begins with the purchase of raw materials and the process continues. Working Capital is a vital component of business and its management is important to ensure smooth functioning of the business.

5.3 CONSTITUENTS OF WORKING CAPITAL

There are two main components of Working Capital. These are—Current Assets, Current Liabilities.

1. ***Current Assets:*** Current Assets are those assets which are convertible into cash within a period of one year and are required to meet the day-to-day operations of the business. The value of Current Assets usually does not undergo any change in value during its life span. Current Assets comprise the following:

- Inventory or Stock
  - Raw Materials
  - Work-in Progress (WIP)
  - Consumable Stores or Spares
  - Finished Goods
- Sundry Debtors
- Bills Receivable
- Short-term Loans and Advances
- Marketable Securities (Short-term)
- Cash in Hand
- Cash at Bank
- Prepaid Expenses
- Accrued Income

2. ***Current Liabilities:*** Current Liabilities are those liabilities which are to be settled within a time span of one year in the normal course of business. Current Liabilities are the short-term obligations, which are paid off from the Current Assets or from the funds of the business. The following are some of the items of Current Liabilities:
   - Sundry Creditors
   - Bills Payable
   - Short-term Loans and Advances
   - Bank Overdraft
   - Proposed Dividend
   - Outstanding Expenses
   - Provision for Taxation
   - Unclaimed Dividend

The difference between the Current Assets and the Current Liabilities is called Net Working Capital. To arrive at the figure for Net Working Capital, if there are some adjustments then that should be duly made. For example, the amount of obsolete stock, if any, should be deducted from the inventory item to arrive at a net figure of inventory. Likewise, if any provision for debtor is there then that should be taken. Similarly, if some amount is set aside from the cash balance for the redemption of debentures, preference shares, etc. then that should also be accounted for.

5.4 TYPES OF WORKING CAPITAL

Working Capital represents the excess of Current Assets of a firm over and above its Current Liabilities. Working Capital can be classified into various types based on two broad categories.

These are explained as follows:

1. ***Based on time:*** Based on time, Working Capital can be categorised into two broad categories. These are: (i) Permanent or Fixed Working Capital, and (ii) Temporary or Variable Working Capital.

- **Permanent Working Capital** is that level of Working Capital which is required all the time or rather which should be maintained all the time in a firm to ensure smooth functioning of a firm without any fund crisis. Permanent Working Capital is also defined as the minimum amount of investment in Current Assets which is essential for effective functioning of a business. As Permanent Working Capital is fixed, it is financed by long-term funds such as the issue of shares, debentures, loans, etc. According to Tandon Committee, Permanent Working Capital is also known as 'hard core Current Assets' of a business. Since every business has to purchase a minimum amount of raw materials, some machinery, hire labour, bear some expenses and so on, it needs to maintain a fixed amount of Working Capital always.

  Permanent or Fixed Working Capital can be further classified into 'Regular Working Capital' and 'Reserve Working Capital'. *Regular Working Capital* refers to the minimum amount of liquid capital that must be maintained throughout to ensure smooth circulation of capital from cash to inventories, receivables and realisation of cash from receivables. Sufficient bank balance is a source of regular Working Capital. *Reserve Working Capital* is the Working Capital required over and above the Regular Working Capital. This type of Working Capital is required to ensure an uninterrupted flow of capital to meet the contingencies arising from natural disasters, strike, war, recession, etc.
- **Temporary or Variable Working Capital** is that Working Capital which is required over and above the Permanent Working Capital, i.e. in excess of Permanent Working Capital. It is variable in nature. It is not essential throughout the year all time. However, it is required in some seasons or for some special reasons.

  Temporary Working Capital can be further classified into 'Seasonal Working Capital' and 'Special Working Capital'. *Seasonal Working Capital* refers to the Working Capital required to meet the seasonal demand. Seasonal Working Capital demand arises owing to increase in demand during peak seasons. To meet the increase in demand, increase in production is essential. Hence more raw materials are required, more expenses are to be incurred and debtors increase. *Seasonal Working Capital demand is a short-term requirement which is usually financed by short-term funds. Special Working Capital* is required for some special purposes such as extensive marketing campaigns, new experiments with process or products, etc. This type of Working Capital is required for emergency situations and is not required in the ordinary course of business. *Special Working Capital is also usually financed by short-term funds.* Figure 5.1 shows Working Capital for normal and growing firm.

2. ***Based on concept:*** Based on the concept, there are two types of Working Capital. They are (i) Gross Working Capital and (ii) Net Working Capital. Net Working Capital can be further subdivided into two types. These are (i) Positive Working Capital and (ii) Negative Working Capital.

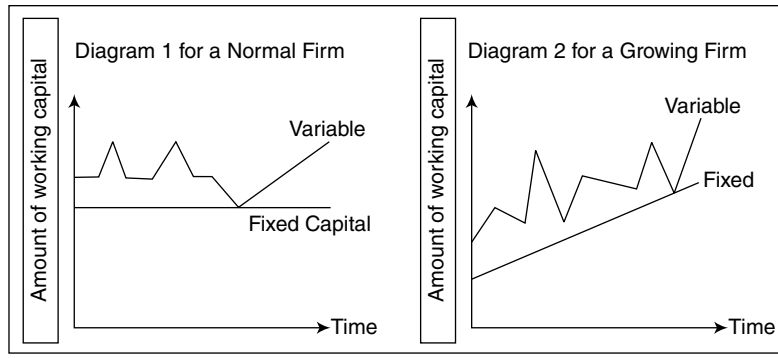


Figure 5.1 Working Capital for Normal Firm and Growing Firm

- **Gross Working Capital** is the sum total of Current Assets. Experts have defined gross Working Capital as the capital invested in Current Assets of a firm. The Balance Sheet approach to Gross Working Capital is defined as:

  Gross Working Capital = Total Current Assets

  Gross Working Capital is very important for a firm, it indicates the total amount of funds invested in Current Assets. Gross Working Capital is vital for any business since it is an indicator of the funds available for paying off Current Liabilities. Gross Working Capital is the *quantitative concept* of Working Capital. An optimum amount of gross Working Capital should be maintained to avoid fund crunches.

  Gross Working Capital offers the following advantages:

  1. It indicates the amount of funds required for Current Assets.
  2. It also indicates the funds available for meeting up the obligations.
  3. It takes into account the net figure of different items such as stock net of obsolete stock, debtors less provisions if any, etc.
  4. It is important for measuring the return on Working Capital.
  5. It implies an increase in Current Assets that would lead to an increase in Net Working Capital.

- **Net Working Capital** is the difference between Current Assets and Current Liabilities. It is the excess of Current Assets over Current Liabilities. It is a narrow concept. The Balance Sheet Approach to Net Working Capital states Net Working Capital as:

  Net Working Capital = Total Current Assets – Total Current Liabilities

  Net Working Capital is the *qualitative concept* of Working Capital. Net Working Capital indicates the liquidity position of a firm, i.e. its ability to repay short-term debt obligations or Current Liabilities. Current ratio to measure the liquidity position of a firm is determined by the following formula:

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

The current ratio is usually taken as 2:1 (It may be noted in this context that this figure varies from industry to industry). Current ratio indicates the current asset backing for every rupee of Current Liabilities.

Net Working Capital can be positive or negative. Net Working Capital is the excess of Current Assets over Current Liabilities. If we deduct the amount of total Current Liabilities from the total Current Assets we get the figure for Net Working Capital. Symbolically, it is represented as follows:

$$\text{Net Working Capital} = \Sigma\text{Current Assets} - \Sigma\text{Current Liabilities}$$

If total Current Assets are more than total Current Liabilities, then it is the positive Working Capital. It can be expressed as follows:

$$\text{Positive Working Capital: } \Sigma\text{Current Assets} > \Sigma\text{Current Liabilities}$$

When total Current Assets are less than total Current Liabilities or Current Liabilities are greater than Current Assets then it is known as negative Working Capital. It can be expressed as:

$$\text{Negative Working Capital: } \Sigma\text{Current Assets} < \Sigma\text{Current Liabilities}$$

Net Working Capital measure offers the following advantages:

1. It indicates the liquidity position of the firm.
2. It indicates the ability of a firm to meet its short-term debt obligations.
3. It is the assurance for the creditors regarding their dues.
4. It indicates the viability of a business financially.

Apart from these, there is another concept of **'Zero Working Capital'**. Zero Working Capital arises in situations where,

$$\Sigma\text{Current Assets} = \Sigma\text{Current Liabilities}$$

5.5 NATURE AND OBJECTIVES OF WORKING CAPITAL MANAGEMENT

5.5.1 Nature of Working Capital Management

Working Capital management is an important aspect of every business. It is essential for the survival of the business and ensures smooth and uninterrupted operations of a business without any sort of fund crisis.

The nature of Working Capital management has been stated as follows:

1. ***Management of current assets and liabilities:*** Working Capital management is concerned with the management of Current Assets and Current Liabilities. The excess of

Current Assets over Current Liabilities is the Net Working Capital. The Net Working Capital represents the fund of the business.

2. ***Circulating capital:*** Working Capital is also known as circulating or revolving capital since it circulates within the organisation in the normal course of business, i.e. say, cash converted into stock, stock to bills receivable and bills receivable into cash again.
3. ***Cyclic in nature:*** Working Capital rotates in the organisation in a cyclic manner, e.g. cash as the component of a current asset. Its outflow occurs with the purchase of raw materials, payment to labour, meeting expenses, etc. Again when goods produced are sold at credit to the debtors, Cash Inflow occurs when the cash is realised.
4. ***Cash inflow and outflow:*** The inflow of cash—one of the components of Current Assets—replaces the Cash Outflows, till that investment of cash is to be continued.
5. ***Increase and decrease of current assets:*** The increase in investment in Current Assets implies increase in Working Capital, whereas a decrease in investment in Current Assets implies a decrease in Working Capital.
6. ***Forecasting:*** Working Capital management is concerned with the estimation of Working Capital needs, management of each component of Current Assets—determining the amount to be invested in Current Assets, examining each component of Working Capital.
7. ***Liquidity management:*** The higher amount of Working Capital leads to a lower Return on Investment, whereas a lower amount of Working Capital indicates liquidity crisis or fund crunch to repay short-term debt obligations.
8. ***Source of finance:*** Working Capital can be financed from long-term and short-term sources. Permanent regular Working Capital can be financed by long-term sources, whereas temporary Working Capital can be financed by short-term sources.

5.5.2 Objectives of Working Capital Management

Working Capital management is concerned with the management of Current Assets and Current Liabilities. Working Capital management is essential to maintain a satisfactory level of Working Capital in order to avoid a financial crisis. Both excess and inadequate Working Capital exert an evil influence on the health of a company. So neither excess Working Capital nor inadequate Working Capital is desirable. Hence management of Working Capital is an important aspect. The objectives of Working Capital management are as follows:

1. ***Management of current assets and liabilities:*** The prime objective of Working Capital management is the management of Current Assets and Current Liabilities so that there is neither excess Working Capital nor inadequate Working Capital, i.e. there is a satisfactory level of Working Capital.
2. ***Assessing liquidity and profitability:*** There should be a proper balance between liquidity and profitability and hence Working Capital management targets at balancing profitability and liquidity by maintaining a satisfactory level of Working Capital.
3. ***Proper balance among different components:*** There should be a proper balance between different components of Working Capital. For example, if the amount of stock is high it

may be the fact that there exists a huge amount of obsolete stock. The ideal acid test ratio of the firm should be 1:1. Acid test ratio is measured as:

$$\frac{\text{Current Assets} - \text{Stock} - \text{Prepaid Expenses}}{\text{Current Liabilities} - \text{Bank Overdraft}}$$

4. ***Maintain optimum cash level:*** The optimum level of cash balance should be maintained so that there is neither excessive cash in hand or at bank nor insufficient cash in hand or at bank because excessive cash in hand or bank indicates the inability of the firm to utilise resources for the profitable and productive purpose, whereas insufficient cash indicates funds crisis. So management of Working Capital is essential.
5. ***Examine soundness of company:*** Working Capital management in an effective and efficient manner ensures higher profitability, balanced liquidity position and sound health of the company.

5.6 IMPORTANCE OF WORKING CAPITAL

The requirement for maintaining an adequate amount of Working Capital has been stated below:

1. ***Smooth supply of raw materials:*** Raw material is essential for production and adequate amount of Working Capital ensures sufficient amount of funds to carry day-to-day operations and hence raw materials supply can be ensured on a regular basis.
2. ***Benefit during purchase:*** Optimum amount of Working Capital ensures sufficient amount of cash to meet the daily expense. If raw materials can be purchased in bulk and most importantly in cash then facility of cash discount can be obtained.
3. ***Continuity in production:*** The optimum amount of Working Capital ensures continuity in production without any interruption due to fund crisis.
4. ***Regularity in wage payment:*** Sufficient amount of Working Capital ensures regularity in payment of wages to employees which also prevent any sort of discontent among employees.
5. ***Regularity in payment of other expenses:*** Overhead cost is also another important element of cost of production. Ample amount of Working Capital ensures regularity in payment of overhead expenses other than materials and labour.
6. ***Creating goodwill:*** Adequate Working Capital assures timely payment of debt and all expenses, which helps in creating goodwill in the market.
7. ***Solvency:*** Repaying short-term obligations at right time indicates a good solvency position of the business.
8. ***Easy availability of loan:*** Adequate Working Capital facilitates easy availability of loans from banks and other financial institutions since sufficient Working Capital indicates a solvent position of the business with a good debt-repaying capacity.
9. ***Helps to tide over the situation of crisis:*** Adequate or sufficient amount of Working Capital helps to tide over the situation of crisis if it arises during the recession period of an economy. Strong and healthy Working Capital base ensures availability of funds for meeting day-to-day expenses.

10. ***Ensuring assured Return on Investment:*** Adequate Working Capital ensures smooth availability of day-to-day funds. Sufficient Working Capital helps to procure raw materials easily and helps to make payments easily thereby making production process smooth. Fast rotation of Working Capital ensures higher profit and less inventory level, which thereby ensures higher payment of dividend to shareholders and interest to fund providers.
11. ***Gaining confidence of third parties and creditors:*** Smooth and strong Working Capital base assists in gaining the confidence of third parties and creditors by making their payments timely.
12. ***Optimum utilisation of fixed assets:*** Sufficient Working Capital ensures optimum utilisation of fixed assets. Fixed assets should be utilised optimally, i.e. to obtain higher return at a minimum cost. Strong Working Capital base ensures optimum utilisation of fixed assets thereby helping to absorb the other charges relating to the fixed assets.
13. ***Increase in efficiency:*** Adequate Working Capital helps to make payments at right time, facilitates the purchase of raw materials, meeting expenses at right time, thereby ensuring smooth production which in turn helps to increase the morale of employees and hence the overall efficiency of the business.

Working Capital indeed has a significant role in maintaining a smooth and uninterrupted flow of production. The importance of Working Capital cannot be ignored by a business; hence every business should try to ensure that a strong base of Working Capital is maintained.

5.7 EFFECTS OF EXCESSIVE WORKING CAPITAL

Optimum amount of Working Capital should be maintained within the firm, so that there is neither excessive Working Capital nor inadequate Working Capital. Excessive Working Capital or inadequate Working Capital both has an evil effect on the growth of a firm.

The evil effects of excessive Working Capital have been discussed below:

1. Excessive Working Capital leads to increase in inventory level due to high production and low sales leading to daring consequences such as theft, loss, damage and wastage.
2. Increase in idle funds thereby indicates inability in generation of profit by a firm.
3. Huge amount of idle funds indicates incapability of the firm in utilizing resources optimally, i.e. underutilization of resources of the firm.
4. Excessive Working Capital indicating underutilization of fund may motivate the management of the firm to involve in speculative activities.
5. Excessive Working Capital may induce a firm to provide credit to debtors liberally. Liberal credit to the debtors will result in an increase in size of accounts receivable and delay in collection from debtors.
6. Excessive Working Capital is an indication of the Overcapitalization, i.e. amount of capital more than the actual requirement.
7. The balance between profitability and liquidity may be distorted due to excessive Working Capital.

8. Excessive Working Capital may make the management inefficient in increasing production capacity and further expansion of the firm.

All these are the evil effects of excessive Working Capital. Similar to excessive Working Capital, inadequate Working Capital also have an evil effect on the business.

Effects of inadequate Working Capital have been stated below:

1. Failure to meet short-term obligations due to inadequate funds may lead to loss of reputation, credit worthiness of the firm.
2. A firm becomes insolvent, i.e. becomes incapable to repay Current Liabilities within stipulated time due to inadequate Working Capital.
3. Inadequate Working Capital makes a firm incapable to undertake profitable projects.
4. Inadequate Working Capital prevents a firm from earning profit since it cannot undertake its entire operation plan.
5. Inadequate Working Capital signifies weak liquidity position of the firm, i.e. incapability to meet day-to-day obligations.

Both excessive and inadequate Working Capital have negative impact on the firm. So neither excessive Working Capital nor inadequate Working Capital is desirable.

5.8 FACTORS DETERMINING WORKING CAPITAL REQUIREMENT

The factors determining Working Capital requirement are as follows:

1. ***Nature of business:*** Working Capital requirement depends on the nature of the business. For those organisations providing services, Working Capital requirement is less as compared to manufacturing organisations. Because requirement of Working Capital is more in case of manufacturing organisations since they have to maintain a huge stock of raw materials and finished goods.
2. ***Size of business:*** Working Capital requirement is comparatively higher for large firms, whereas it is lower for small-scale business.
3. ***Business cycle:*** Working Capital requirement depends on business cycle, i.e. in period of recession the demand for Working Capital is lower, whereas in boom period the demand for Working Capital is higher since the volume of production is higher in boom period.
4. ***Sales volume:*** For higher sales volume, higher amount of investment in Working Capital is required but for lower sales volume the amount of investment in Working Capital is lower.
5. ***Production cycle:*** If production cycle is longer in that case the amount of Working Capital requirement is higher as the funds remain blocked for a longer period of time. Production cycle starts from purchase of raw materials to production of finished goods. Longer the period, higher is the requirement of Working Capital.
6. ***Production policy:*** Depending on the production policy, the requirement of Working Capital varies. In case of steady production policy, the requirement of Working Capital

is higher since production is to be carried out throughout the year, but in case of seasonal production policy the amount of Working Capital requirement is low.

7. ***Credit policy:*** Credit policy is an important factor determining the requirement of Working Capital. If the credit policy is stringent, i.e. customers are allowed lower credit period, in that case Working Capital requirement is lower but in case of liberal credit policy where customers are allowed higher credit period in that case Working Capital requirement is higher.
8. ***Operational efficiency:*** Working Capital requirement depends on operational efficiency of a firm. Higher the operational efficiency, lower is the pressure on Working Capital.
9. ***Inventory policy:*** If amount of funds blocked in inventory is higher, higher will be the requirement of Working Capital. Whereas if the amount of funds blocked in inventory is lower, lower will be the requirement of Working Capital.
10. ***Level of competition in market:*** Working Capital requirement depends on level of competition in the market. If there is cut-throat competition in the market of the product manufactured by the company then the company needs to make his credit policy liberal, i.e. may have to allow higher credit period to debtors to retain customers. In addition, this company may also have to maintain high level of inventory to satisfy the customers' demand at right time to restrain them from moving to other competitors. For this reason they need to maintain high level of inventory and funds remain block in receivables for a longer period of time owing to liberal credit policy. Hence the Working Capital requirement is very high in case of high level of competition.
11. ***Operating or Working Capital cycle:*** Longer the Working Capital or Operating Cycle, higher will be the requirement of Working Capital. Working Capital cycle starts from procurement of raw materials and ends at cash realisation. The longer the time taken to complete one cycle, higher will be the Working Capital requirement.
12. ***Raw materials availability:*** If raw materials are available throughout the year smoothly then there is no requirement to maintain huge inventory. Hence the Working Capital requirement is less, since huge inventory level implies unnecessary blockage of Working Capital.
13. ***Growth and expansion of firm in future:*** If a firm wants to expand its business then additional Working Capital is required. If a firm plans for further expansion in future in that case the Working Capital requirement will be higher compared to a firm which does not want to expand its business in future.
14. ***Changes in price level:*** Price level is also another determinant of Working Capital requirement. If price increases then it will lead to an increase in Working Capital requirement to maintain the same level of operation.
15. ***Profit level:*** Profit earned by a firm is an important internal source of funds. Profit can be invested in the business provided it is adequate. Profit meets the Working Capital requirement to the extent it is earned in cash. Cash profit is the profit earned before depreciation and amortization.

16. ***Tax level:*** Working Capital requirement depends on level of tax imposed by the government. Higher the tax rate higher will be the requirement of Working Capital and vice versa.
17. ***Dividend policy:*** Dividend policy of a firm is also an important determinant of Working Capital requirement. Higher the amount of dividend paid in cash higher will be the requirement of Working Capital and lower the amount of dividend paid lower will be the Working Capital requirement.
18. ***Cash reserve for contingencies:*** Some amount of cash reserve should be maintained to handle the situation arising due to sudden unpredictable events. Higher the amount of cash reserve maintained higher will be the requirement of Working Capital.
19. ***Depreciation policy:*** If higher amount of depreciation is charged then it would lead to reduction in profit level, lower the profit lower will be the tax liability and large amount can be retained. Due to low profit firm will pay less dividend and large amount can be retained. Higher the amount of retained earning, stronger will be the position of Working Capital.
20. ***Stable political condition:*** If a state is politically stable in that case a firm can expands its business easily and can undertake new ventures easily, in that situation the requirement of Working Capital is high.

All these factors act as a determinant of Working Capital requirement of a business.

5.9 CONCEPT OF OPERATING CYCLE

Operating Cycle refers to the time period required for conversion of cash back into cash again. Operating Cycle is also known as Working Capital cycle. It is an important determinant of Working Capital requirement. Operating Cycle starts from purchase of raw material and ends in cash realization from sales. The first stage of Operating Cycle is procurement of raw materials by cash. Raw materials can be procured on credit also but cash is required for labour and overhead expenses to carry out production process. Raw materials procured in combination with labour and overhead are converted into finished goods; this process of conversion of raw materials into finished goods is known as production. Raw materials are converted into finished goods by adding some values to it. These finished goods are sold in the market either for cash or credit. For credit sales, cash is realized from debtors after the expiry of credit period allowed to debtors by the company. So the time taken to complete one cycle from procurement of raw materials in cash till realization of cash from sales is known as Operating Cycle or Working Capital cycle.

In other words Operating Cycle is the time gap between outflow of cash and inflow of cash of a firm. The Operating Cycle includes number of activities. They are procurement of raw materials then conversion of raw materials into work-in progress, work-in-progress into finished goods, finished goods to debtors and finally liquid cash realized from debtors. In case of a manufacturing concern, the Operating Cycle starts from procurement of raw materials

(procurement of saleable goods for trading concern) and ends at cash realization from debtors (in case of credit sales) but for cash sales the Operating Cycle ends at cash realization from sales.

5.9.1 Stages in Operating Cycle

Operating Cycle (Figure 5.2) constitutes the steps mentioned as follows:

1. Procurement of raw materials.
2. Conversion of raw materials in work-in-progress.
3. Conversion of work-in-progress into finished goods.
4. Sale of finished goods
   - For cash sales (Operating Cycle ends)
   - For credit sales
5. Conversion of receivables into cash or realization of debtors into cash.

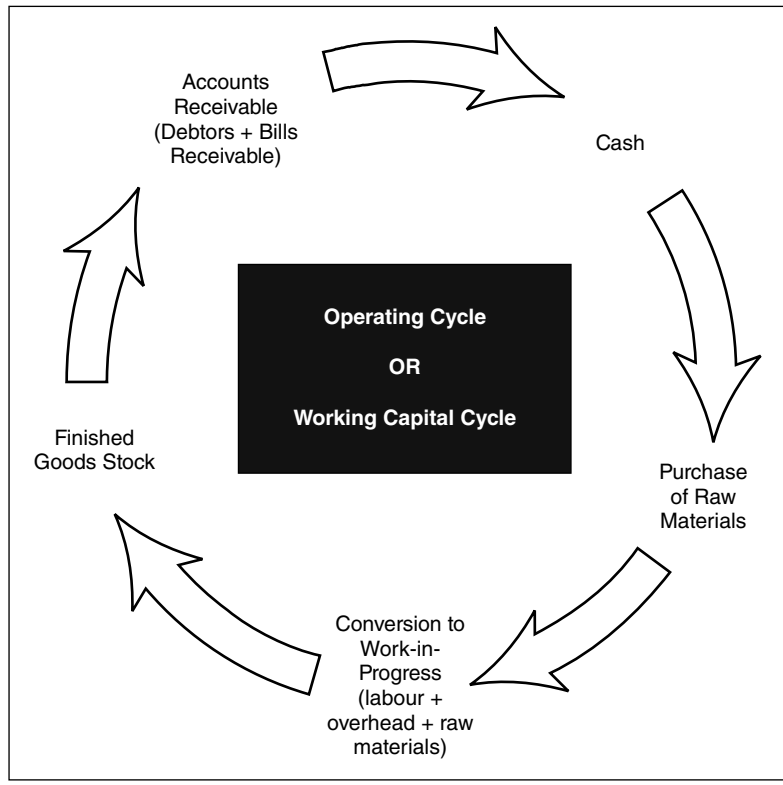


Figure 5.2 Diagrammatic Representation of Working Capital Cycle

Cash cycle refers to the time period between the payment of cash for purchase of raw materials and collection of cash from sales, i.e. the total Operating Cycle *minus* the lag in

accounts payable/payment made to suppliers of raw materials. Cash cycle is also known as Net Operating Cycle. Operating Cycle is also known as Gross Operating Cycle which refers to the total time length from purchase of raw materials till collection of cash through sales.

Accounting Research Bulletin No. 43 defines Operating Cycle as 'The average time intervening between the acquisition of materials or services entering this process and the final cash realisation constitutes an Operating Cycle.'

K. V. Smith defines Operating Cycle as 'the continuing flow from cash to suppliers, to inventory, to accounts receivable and back into cash is what is called Operating Cycle.'

So, the operating cycle is the length of time between the company's outlay on raw materials, wages and other expenses and inflow of cash from sale of goods.

5.10 METHODS OF DETERMINING OPERATING OR WORKING CAPITAL CYCLE

If the time gap between payment of cash and collection of cash is longer, higher will be the Working Capital requirement. Shorter the length of time of conversion of original cash back into cash again, lower will be the Working Capital requirement. Hence it is quite apparent that estimation or rather determination of Operating Cycle period is of utmost important to determine the Working Capital requirement.

Net Operating capital cycle period is the summation of storage or holding period/time lag of each of the stages of Operating Cycle. Net Operating Cycle Period is determined as follows:

Net Operating Cycle or Working Capital Cycle Period or Duration

= Raw Materials Storage Period (R) + Work-in-Progress Period (W)
+ Finished Goods Storage Period (F) + Debtors Collection Period(D)
– Creditors Payment Period (C).

Or,

$$\text{Net Operating Cycle Period or Duration} = R + W + F + D - C$$

Formulae for determining the holding period/lag period of different stages of Operating Cycle have been mentioned as follows:

1. ***Raw materials storage period:*** Raw material procurement is the first stage of Operating Cycle. In second stage, raw material with labour and overhead is converted into work-in-progress. The formula for determination of raw material storage period or conversion period is as follows:

$$\text{Raw materials storage or conversion period} = \frac{\text{Average stock of raw materials}}{\text{Average consumption of raw materials}}$$

$$\text{Now, Average Consumption of raw materials} = \frac{\text{Consumption of Raw materials}}{\text{365 days/12 months/52 weeks}}$$

Consumption of raw materials = Opening Stock of raw materials + Purchase of raw materials – Closing stock of raw materials.

If consumption amount is not available, average purchase of raw materials amount can be taken.

Average stock of raw materials

$$= \frac{\text{Opening stock of raw materials + Closing stock of raw materials}}{2}$$

$$\text{So, Raw materials storage or conversion period} = \frac{\text{Average stock of raw materials}}{\dfrac{\text{Consumption of Raw materials}}{\text{365 days/12 months/52 weeks}}}$$

2. ***Work-in-Progress period:*** Raw materials procured in the first stage of Operating Cycle in combination with labour and overhead is converted into work-in-progress in the second stage. Work-in-progress is converted into finished goods. The formula for determination of work-in-progress conversion period has been mentioned below:

$$\text{Work-in-Progress conversion period} = \frac{\text{Average work-in-progress}}{\text{Average cost of production/ cost of goods manufactured}}$$

Total Cost of production = Direct material + Direct labour + Direct expenses + Factory overheads (including depreciation) + Opening work-in-progress – Closing work-in-progress

$$\text{Average cost of production} = \frac{\text{Total cost of production}}{\text{365 days/12 months/52 weeks}}$$

$$\text{Average work-in-progress} = \frac{\text{Opening work-in-progress + Closing work-in-progress}}{2}$$

$$\text{So, Work-in-Progress conversion period} = \frac{\text{Average work-in-progress}}{\dfrac{\text{Total cost of production}}{\text{365 days/12 months/52 weeks}}}$$

3. ***Finished goods storage period or finished goods conversion period:*** Finally, work-in-progress is converted to finished goods. Finished goods storage or holding period refers to the length of time for which goods are being hold before they are sold to customers. The formula for determination of finished goods storage period or finished goods conversion period is mentioned below:

Finished Goods storage period

$$\text{Or Finished Goods Conversion Period} = \frac{\text{Average stock of finished goods}}{\text{Average cost of goods sold}}$$

where,

$$\text{Average Stock of Finished Goods} = \frac{\text{Opening stock of finished goods} + \text{Closing stock of finished goods}}{2}$$

Cost of goods sold = Direct material + Direct labour + Direct expenses + Factory overheads (including depreciation) + Office and Administrative overhead + Selling and distribution overhead + Opening stock of finished goods – Closing stock of finished goods.

$$\text{Average Cost of goods sold} = \frac{\text{Cost of goods sold}}{\text{365 days/12 months/52 weeks}}$$

So, Finished Goods storage period

$$\text{Or Finished Goods Conversion Period} = \frac{\text{Average stock of finished goods}}{\frac{\text{Cost of goods sold}}{\text{365 days/12 months/52 weeks}}}$$

4. ***Debtors collection period:*** It refers to the time gap between credit sales and cash realisation from debtors. Debtors collection period is calculated by the following formula:

$$\text{Debtors Collection period} = \frac{\text{Average Debtors}}{\text{Average Credit Sales}}$$

where,

$$\text{Average Debtors} = \frac{\text{Opening Debtors} + \text{Closing Debtors}}{2}$$

$$\text{Average Credit Sales} = \frac{\text{Total Credit Sales}}{\text{365 days/12 months/52 week}}$$

$$\text{So, Debtors Collection period} = \frac{\text{Average Debtors}}{\frac{\text{Total Credit Sales}}{\text{365 days/12 months/52 week}}}$$

5. ***Creditors payment period:*** Creditors payment period refers to the time gap between purchase on credit and cash payment to creditors. Creditors payment period is calculated as follows:

$$\text{Creditors Payment period} = \frac{\text{Average Creditors}}{\text{Average Credit Purchase}}$$

$$\text{Average Creditors} = \frac{\text{Opening Creditors} + \text{Closing Creditors}}{2}$$

$$\text{Average Credit Purchase} = \frac{\text{Total Credit Purchase}}{\text{365 days/12 months/52 week}}$$

$$\text{So, Creditors Payment period} = \frac{\text{Average Creditors}}{\dfrac{\text{Total Credit Purchase}}{\text{365 days/12 months/52 week}}}$$

So, the Net Operating Cycle Period is the summation of all the above components.

$$\text{Number of times Operating Cycle is rotated} = \frac{\text{365 days/12 months/52 week}}{\text{Net operating Cycle period in days/months/week}}$$

Working Capital Requirement in quantitative terms can be determined by the following formula:

$$\text{Working Capital Requirement} = \frac{\text{Total operating expenses during the year}}{\text{Number of times Operating Cycle is rotated}}$$

$$\text{Or, Working Capital Requirement} = \frac{\text{Total operating expenses during the year}}{\text{Net Operating Cycle period}} \times \frac{\text{365 days/}}{\text{12 months/ 52 week}}$$

Where, Operating Expenses = Materials + Wages + Factory overheads + Office and Administrative expenses + Selling and distribution expenses (excluding depreciation since it does not involve any outflow of cash)

Note: Depreciation since it is non-cash expenditure is usually excluded while estimating Working Capital requirement in monetary terms.

Operating Cycle discussed above is one of the methods of forecasting Working Capital. Apart from this method, there are other Working Capital forecasting methods such as Current Assets and Current Liabilities method, double-shift working method and cash cost method.

1. ***Current Assets and Current Liabilities method:*** Under this method Working Capital requirement is estimated by the following formula:

   Estimated Working Capital requirement = (Value of Current Assets – Value of Current Liabilities) + Cash and Bank Balance

   Formulae for determining the different components of Working Capital are as follows:

$$\text{Raw Materials} = \frac{\text{Estimated production in units} \times \text{Estimated raw materials per unit}}{\text{365 days/12 months/52 week}} \times \text{Average storage period of raw materials in days/months/week}$$

$$\text{Work-in-Progress} = \frac{\text{Estimated production in units} \times \text{Estimated cost of work-in-progress per unit}}{\text{365 days/12 months/52 week}} \times \text{Average storage period of work-in-progress in days/months/week}$$

$$\text{Finished Goods} = \frac{\text{Estimated production in units} \times \text{Estimated cost of production (excluding depreciation) per unit}}{\text{365 days/12 months/ 52 weeks}} \times \text{Average storage period of finished goods in days/ months/week}$$

$$\text{Debtors} = \frac{\text{Estimated sales in units} \times \text{Estimated cost of sales (excluding depreciation) per unit}}{\text{365 days/12 months/ 52 weeks}} \times \text{Average debtors collection period in days/months/ week}$$

$$\text{Creditors for raw materials} = \frac{\text{Estimated production in units} \times \text{Raw materials requirement per unit}}{\text{365 days/12 months/ 52 weeks}} \times \text{Credit period allowed by suppliers in days/ months/week}$$

$$\text{Direct wages} = \frac{\text{Estimated production in units} \times \text{Direct labour cost per unit}}{\text{365 days/12 months/52 weeks}} \times \text{Average time lag in payment of wage in days/months/week}$$

$$\text{Overheads} = \frac{\text{Estimated production in units} \times \text{Overhead cost per unit}}{\text{365 days/12 months/52 weeks}} \times \text{Average time lag in payment of overhead in days/months/week}$$

2. ***Double-shift working method:*** Under this method increase in stock is essential as production increases. It may be the cases that increase in stock may not be doubled even if production is doubled. Amount of materials used may not change due to double shift since the work started in first shift is completed in second shift, so materials involved is same and cost will not be higher unless the workers in work-in-progress stage are paid at higher rate.
3. ***Cash cost method:*** Under this method, it is assumed that some amount of funds are blocked in debtors and finished goods. Hence that amount should be excluded while estimating Working Capital requirement such as debtors to be taken not as percentage of sales but as percentage of cash cost.

   There is another method of determining Working Capital as percentage of fixed assets. It looks simple but is a difficult method because it is indeed difficult to attribute the exact changes in components of Working Capital to the changes in fixed assets.

5.11 CAUSES BEHIND LONGER WORKING CAPITAL CYCLE OR OPERATING CYCLE

Before discussing the strategies for minimisation of length of Working Capital Cycle or Operating Cycle, let us have a look into the factors responsible for a prolonged Operating

Cycle, i.e. an Operating Cycle of longer duration. Some of the factors have been mentioned next:

1. Purchasing raw materials in huge quantity more than the actual requirement leading to unnecessary blockage of funds.
2. Failure to design perfect inventory policy.
3. Failure to deliver finished goods to the right customer at right time and right place.
4. Faulty credit policy say, allowing longer credit period to customers resulting in delay in realising cash from them.
5. Decrease in sales volume.
6. Using outdated technology and old machineries, declining the pace of production.

All these factors jointly contribute to increasing length of Operating Cycle.

5.12 STRATEGIES FOR MINIMISATION OF LENGTH OF WORKING CAPITAL CYCLE OR OPERATING CYCLE

Working Capital management is an important aspect of Financial Management's second objective of optimum utilisation of funds as per the modern concept. Finance manager of a firm should aim at minimisation of length of Working Capital or Operating Cycle because a longer Operating Cycle period implies unnecessary blockage of funds, which is not at all desirable. So a finance manager should try to find out the optimum level of Working Capital and must design strategies for minimisation of length of Working Capital or Operating Cycle. The following are some of strategies aimed at minimisation of Working Capital or Operating Cycle length:

1. ***Inventory management:*** Inventory management aims at maintaining optimum level of inventory. In order to reduce the raw materials storage period, the purchase manager of a company should ensure availability of right quantity of raw material procured at right price, at right time and right place. Apart from this, a firm should try to maximise the length of creditors payment period since longer payment period implies liberal credit facility enjoyed by the firm and requirement of lower amount of Working Capital. So effective inventory management ensures reduction in length of Operating Cycle.
2. ***Production management:*** To minimise the time length of production period following measures such as perfect planning schedule, maintenance of machineries and other facilities related to operations, use of modern technology, evaluation of alternative production processes and selection of the shortest one, etc. can be adopted. Minimisation of length of production process is essential since longer production process implies higher requirement of Working Capital.
3. ***Marketing management:*** Adoption of effective and efficient marketing policy ensures higher sale of finished goods which in turn indicates lower level of finished goods stock which further implies less blockage of Working Capital.
4. ***Management of debtors:*** Debtors management is also another important strategy for minimisation of Working Capital cycle length. A firm should aim at minimizing the

debtors collection period since longer or higher debt collection period implies blockage of funds. Higher debt collection period indicates increasing length of Working Capital cycle. So a firm should adopt a rational credit policy considering the credit worthiness of customers.

5. ***Other factors:*** Some other factors that also helps in minimisation of Working Capital or Operating Cycle length involves certain external as well as internal factors such as sound recruitment, selection, performance appraisal policy, economic condition, government policies, demand and price fluctuations, etc.

All the above-mentioned strategies must be adopted by a firm to minimise the length of Operating Cycle so as to avoid unnecessary blockage of funds.

Illustration 5.1

Problem

From the following data compute the money block period of Working Capital:

	(₹ in 000)
Stock: Raw Materials	20
W.I.P	14
Finished Goods	21
Purchases	96
Cost of goods sold	140
Sales	160
Debtors	32
Creditors	16
1 year = 360 days	

[C.U. B.Com. (H), 2008]

Solution

Computation of the money block period of Working Capital:

$$\text{Raw materials storage or conversion period} = \frac{\text{Average stock of raw materials}}{\frac{\text{Consumption of Raw materials}}{\text{365 days/12 months/52 weeks}}}$$

$$\text{Average Consumption of raw materials} = \frac{\text{Consumption of Raw materials}}{\text{365 days/12 months/52 weeks}}$$

$$\text{Here, Average Consumption of raw materials} = \frac{\text{Op stock of raw material} + \text{Purchase} - \text{Closing stock}}{\text{360 days}}$$

$$\text{Average Consumption of raw materials} = \frac{20{,}000 + 96{,}000 - 20{,}000}{\text{360 days}}$$

$$= 266.6666$$

$$\text{Average stock of raw materials} = \frac{\text{Opening stock of raw materials} + \text{Closing stock of raw materials}}{2}$$

$$\text{Average stock of raw materials} = \frac{20{,}000 + 20{,}000}{2} = ₹20{,}000$$

$$\text{So, Raw materials storage or conversion period} = \frac{\text{Average stock of raw materials}}{\frac{\text{Consumption of Raw materials}}{\text{365 days/12 months/52 weeks}}}$$

$$= \text{Raw materials storage or conversion period} = \frac{₹20{,}000}{266.666667} = 74.99 = 75 \text{ days}$$

$$\text{Work-in-Progress conversion period} = \frac{\text{Average work-in-progress}}{\frac{\text{Total cost of production}}{\text{365 days/12 months/52 weeks}}}$$

$$= \frac{14{,}000}{\frac{1{,}40{,}000}{360 \text{ days}}}$$

$$= \frac{14{,}000}{388.888889} = 36 \text{ days}$$

$$\text{Finished Goods Conversion Period} = \frac{\text{Average stock of finished goods}}{\frac{\text{Cost of goods sold}}{\text{365 days/12 months/52 weeks}}}$$

$$= \frac{21{,}000}{\frac{140000}{360 \text{ days}}}$$

$$= \frac{21{,}000}{388.888889} = 54 \text{ days}$$

$$\text{Debtors Collection period} = \frac{\text{Average Debtors}}{\frac{\text{Total Credit Sales}}{\text{365 days/12 months/52 week}}}$$

$$= \frac{32{,}000}{\frac{1{,}60{,}000}{360 \text{ days}}} = \frac{32{,}000}{444.444444} = 72 \text{ days}$$

$$\text{Creditors Payment period} = \frac{\text{Average Creditors}}{\frac{\text{Total Credit Purchase}}{\text{365 days/12 months/52 week}}}$$

$$= \frac{16{,}000}{\frac{96{,}000}{360 \text{ days}}}$$

$$= \frac{16{,}000}{266.666667} = 60 \text{ days}$$

Operating Cycle = 75 + 36 + 54 + 72 – 60 = 177 days

Illustration 5.2

Problem

From the following information prepare a statement showing the Estimated Working Capital Requirements:

(i)	Projected annual sales	36,000 units
(ii)	Analysis of sales	₹
	Raw materials	6 per unit
	Labour	4 per unit
	Overhead	3 per unit
	Profit	2 per unit
	Selling Price	15 per unit
(iii)	Additional information:	
	(a) Raw materials in stock	1 month
	(b) Production process	2 months
	(c) Finished goods in store	3 months
	(d) Credit allowed to debtor	4 months
	(e) Credit allowed by suppliers	2 months
	(f) Monthly wages and expenses are paid twice on 1st and 16th of each month.	
	(g) Production is carried on evenly during the year and expenses and wages accrue similarly.	
(iv)	Cash is to be kept at 10% of the Net Working Capital.	*[C.U. B.Com. (H), 2006]*

Solution

Projected annual sales = 36,000

So, Sales per month = $\frac{36,000}{12}$ = 3000 units

Statement of Cost

	Total (₹)
Raw materials (3000 × 6)	18,000
Labour (3000 × 4)	12,000
Overhead (3000 × 3)	9000
Profit (3000 × 2)	6000
Selling price (3000 × 15)	45,000

Working Note 1: Since wages and expenses accrue similarly and they are paid at 1st and 16th of every month, so lag period in payment of wages and overheads in respect of WIP = 2/2 = 1 month

Statement showing Working Capital Requirement
(On the basis of Current Assets and Current Liabilities Method)

	Monthly Average Cost	Net Block (Months)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock:				
(i) Raw materials	18,000	1		18,000
(ii) Work-in-progress:				
Raw Materials	18,000	2	36,000	
Wages	12,000	1	12,000	
Overhead	9,000	1	9,000	
				57,000
(iii) Finished Goods:				
Raw Materials	18,000	3	54,000	
Wages	12,000	3	36,000	
Overhead	9,000	3	27,000	
				1,17,000
(iv) Debtors:				1,92,000
Raw Materials	18,000	4	72,000	
Wages	12,000	4	48,000	
Overhead	9,000	4	36,000	
Profit	6,000	4	24,000	
Total Current Assets				1,80,000
				3,72,000
B. Current Liabilities				
Creditors for materials	18,000	2	36,000	
Outstanding wages	12,000	1/2	6,000	
Outstanding expenses	9,000	1/2	4,500	46,500
Net Working Capital requirement (A – B)				3,25,500
Add: cash in hand (10% of Net WC)				32,550
Working Capital requirement				3,58,050

Or

Statement showing Working Capital Requirement (Columnar or Matrix Method)

	Monthly Average Cost (₹)	Net Block (Months)	Raw Materials (₹) (a)	Work-in-Progress(₹) (b)	Finished Goods (₹)(c)	Debtors (₹)(d)	Creditors (₹) (e)	Total (₹) [(a) + (b) + (c) + (d) – (e)]
1. Raw materials:								
(i) In store	18,000	1	18,000					
(ii) In WIP		2		36,000				
(iii) In Finished Goods		3			54,000			
(iv) In Debtors		4				72,000		
Gross Block		10						
Less: Credit from Creditors		2					36,000	
Net Block		8						1,44,000

(Contd.)

2. Labour:								
(i) In WIP	12,000	1		12,000				
(ii) In Finished Goods		3			36,000			
(iii) In Debtors		4				48,000		
Gross Block		8						
Less: Outstanding wages		0.5					6,000	
Net Block		7.5						90,000
3. Overhead	9,000							
(i) In WIP				9,000				
(ii) In Finished Goods		1			27,000			
(iii) In Debtors		3				36,000		
Gross/Net Block		4						
Less: Outstanding expenses		8					4,500	
		0.5						67,500
4. Profit		7.5						
(i) In Debtors (includes profit)	6,000	4	18,000	57,000	1,17,000	24,000 18,0000	46,500	24,000 32,5500
Add: cash in hand (10% in NWC)								32,550
Working Capital requirement								3,58,050

Illustration 5.3

Problem

A trading company's forecast sales and other particulars are given below:

Forecast annual sales	₹1,30,000
Net profit on cost of sales	25%
Average credit allowed to debtors	8 weeks
Average credit allowed by creditors	6 weeks
Average stock carrying (to meet sales)	4 weeks

Determine forecast Working Capital of the company. Estimated cash on hand and at Bank is ₹5,000.

[C.U. B.Com. (H), 2007]

Solution

Forecast annual sales = ₹1,30,000

Sales per week = $\frac{1,30,000}{52}$ = ₹2,500 units per week

Profit on cost = 25%, i.e. $\frac{1}{4}$ th on cost or $\frac{1}{5}$ th on sales.

So, Profit = $2500 \times \frac{1}{5}$ = ₹500

So, Cost = 2500 – 500 = ₹2,000

Statement showing Working Capital Requirement

	Weekly Average Cost	Net Block (Week)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock	2,000	4	8,000	
Debtors	2,500	8	20,000	
Cash on hand and at bank			5,000	
Total Current Assets				33,000
B. Current Liabilities	2,000			12,000
Creditors		6		21,000
Working Capital requirement (A – B)				

Illustration 5.4

Problem

P & G Ltd. furnishes its cost and other data as follows:

Unit Cost	₹
Raw Material	30
Direct Labour	20
Overhead	?
Profit (25% on selling price)	?
Unit selling price	100

Additional information is as follows:

Raw Material in Stock	–	1 month
Production Process	–	$\frac{1}{2}$ month
Credit allowed by suppliers	–	$1\frac{1}{2}$ month
Credit allowed to debtors	–	3 months

Time lag in payment of:		
Wages	–	$\frac{1}{2}$ month
Overhead	–	$\frac{1}{2}$ month

Cash balance is assumed to be ₹1,00,000 and 70% of Sales are credit sales.

Assuming that production is carried on evenly throughout the year, you are required to determine the Working Capital requirement of the P& G Ltd. to achieve an output level of 1,20,000 units p.a.

[C.U. B.Com. (H), 2008]

Solution

Projected annual sales = 1,20,000

So, Sales per month = $\frac{1,20,000}{12}$ = 10,000 units

Statement of Cost

	Total (₹)
Raw materials (10,000 × 30)	3,00,000
Labour (10,000 × 20)	2,00,000
Overhead (10,000 × 25)	2,50,000
Profit (10,000 × 25)	2,50,000
Selling price (10,000 × 100)	10,00,000

Working Note 1

Since production is carried out evenly, so lag period in payment of wages and overheads in respect of WIP = $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ month

Statement showing Working Capital Requirement

	Monthly Average Cost	**Net Block (Months)**	**Amount (₹)**	**Amount (₹)**
A. Current Assets				
Stock:				
(I) Raw materials	3,00,000	1		3,00,000
(II) Work-in-progress:				
Raw Materials	3,00,000	$\frac{1}{2}$	1,50,000	
Wages	2,00,000	$\frac{1}{4}$ (WN:1)	50,000	
Overhead	2,50,000	$\frac{1}{4}$	62,500	
				2,62,500
				5,62,500
Debtors:				
Raw Materials	3,00,000 × 70% = 2,10,000	3	6,30,000	
Wages	2,00,000 × 70% = 1,40,000	3	4,20,000	
Overhead	2,50,000 × 70% = 1,75,000	3	5,25,000	
Profit	2,50,000 × 70% = 1,75,000	3	5,25,000	21,00,000
Total Current Assets				26,62,500
B. Current Liabilities				
Creditors for materials	3,00,000	$1\frac{1}{2}$	4,50,000	
Outstanding wages	2,00,000	$\frac{1}{2}$	1,00,000	
Outstanding expenses	2,50,000	1	2,50,000	8,00,000
Net Working Capital (A – B)				18,62,500
Add: Cash balance				1,00,000
Working Capital requirement				19,62,500

Illustration 5.5

Problem

Determine the Working Capital requirement from the following particulars:

Annual budget figures for:

	₹ Lakhs
Raw Materials	480
Direct Wages	240
Overheads	180
	900
Sales	1000

Additional Information:

(i) Average stock level of raw materials is 18 days
(ii) Credit Sales: 20 days credit is normal
(iii) Finished goods are held in stock for a period of 10 days before they are released for sale.
(iv) Process period is for 12 days
(v) The company enjoys 30 days credit facilities for purchase.
(vi) Estimated Cash and Bank balance: 10% of total Working Capital.

Assumptions:

(a) 1 year = 360 days
(b) Raw materials are introduced at the beginning of manufacturing process and labour overhead accrues evenly. *[C.U. B.Com. (H), 2009]*

Solution

Statement of Cost

	Total (₹ lakhs)
Raw materials	480
Labour	240
Overhead	180
Profit (balancing figure)	100
Selling price	1,000

Statement of Daily Cost

	Total (₹ lakhs)	Total (₹ lakhs)
A. Current Assets Stock: I. Raw materials $\left(\frac{480}{360}\times 18\right)$		24

II. Work-in-progress		
Raw Materials $\left(\frac{480}{360}\times 12\right)$	16	
Labour $\left(\frac{240}{360}\times 6\right)$ (WN:1)	4	
Overhead $\left(\frac{180}{360}\times 6\right)$ (WN:1)	3	23
		47
III. Finished Goods:		
Raw Materials $\left(\frac{480}{360}\times 10\right)$	13.33	
Labour $\left(\frac{240}{360}\times 10\right)$	6.67	
Overhead $\left(\frac{180}{360}\times 10\right)$	5.00	25
IV. Debtors:		
Raw Materials $\left(\frac{480}{360}\times 20\right)$	26.67	
Labour $\left(\frac{240}{360}\times 20\right)$	13.33	
Overhead $\left(\frac{180}{360}\times 20\right)$		
Profit $\left(\frac{100}{360}\times 20\right)$ (WN:2)	10.00	
	5.55	55.55
Total Current Assets		127.55
B. Current Liabilities		
Creditors for materials $\left(\frac{480}{360}\times 30\right)$		
Net Working Capital (A – B)		40.00
		87.55
Add: 10% cash in hand $\left(\frac{87.55}{90}\times 10\right)$		9.727
Working Capital Requirement		97.28

Working Note 1
Since production is carried out evenly, so lag period in payment of wages and overheads in respect of WIP $\frac{12}{2}$ = 6 days

Working Note 2
If debtors are considered at cost price, i.e. excluding profit then the answer would be ₹95.56 lakhs

Illustration 5.6

Problem

Estimate the Working Capital requirement for the coming year from the following information of a manufacturing company.

Expected annual sales is 1,30,000 units of ₹10 per unit. The anticipated ratios of cost to selling price are as follows: Raw-materials 50% and Direct wages 15%. Budgeted overhead is ₹52,000 per annum including ₹10,000 for depreciation.

Planned stock will include raw-material for ₹50,000 and 7,500 units of finished goods. Credit allowed to debtors is 4 weeks. Credit expected to be received from suppliers is 3 weeks. Overhead and wages payment will be made 1 week after their incurrence. Material will stay in the process for 2 weeks.

Cash in hand to be maintained is 10% of total Working Capital. Assume that production is carried on evenly throughout the year. Raw materials are introduced at the beginning of the process and wages and overhead accrue evenly during processing. *[C.U. B.Com. (H), 2010]*

Solution

Projected annual sales = 1,30,000

So, Sales per week = $\frac{1,30,000}{52}$ = 2,500 units

Statement of Cost

	Per Unit (₹)	Total (₹)
Raw materials (10 × 50%)	5.00	12,500
Labour (10 × 15%)	1.50	3,750
Overhead $\frac{52,000 - 10,000}{1,30,000}$	0.32307692	808
Depreciation $\frac{10,000}{1,30,000}$	0.07692308	192
Profit (balancing figure)	3.100	7,750
Selling price	10.00	25,000

Statement showing Working Capital Requirement

	Weekly Average Cost	Net Block (Week)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock:				
(i) Raw materials	12,500	4		50,000
(ii) Work-in-progress:				
Raw Materials	12,500	2	25,000	
Direct Wages	3,750	1	3,750	
Overhead	808	1	808	29,558
(iii) Finished Goods:				
Raw Materials	12,500	3	37,500	
Direct Wages	3,750	3	11,250	
Overhead	808	3	2,424	51,174

(Contd.)

Debtors:				
Raw Materials	12,500	4	50,000	
Direct Wages	3,750	4	15,000	
Overhead	808	4	3,232	
Profit	7,750	4	31,000	
				99,232
Total Current Assets				2,29,964
B. Current Liabilities				
Creditors for materials	12,500	3	37,500	
Outstanding wages	3,750	1	3,750	
Outstanding overheads	808	1	808	42,058
Net Working Capital (A – B)				1,87,906
Add: 10% cash in hand				20,878
Working Capital requirement				2,08,784

Illustration 5.7

Problem

Mr. Roy wants to start a new trading business and gives the following information:

(i) The projected annual sales—₹60,00,000

(ii) He has estimated fixed expenses of ₹10,000 per month and variable expenses equal to 2% of turnover.

(iii) Percentage of gross profit on cost of purchase will be 25%.

(iv) Average expected credit period from suppliers—15 days.

(v) Average expected credit period allowed to debtors—1 month.

(vi) He expects to turnover his stock five times in a year.

(vii) Average cash holding—1 month's expenses.

You are required to forecast his Working Capital requirement. *[C.U. B.Com. (H), 2011]*

Solution

Projected annual sales = ₹60,00,000

Sales per month = $\frac{60,00,000}{12}$ = 5,00,000

Fixed expenses = ₹10,000 per month

Variable expenses = 60,00,000 × 2% = 1,20,000, so per month = $\frac{1,20,000}{12}$ = 10,000

Total expenses = 10,000 + 10,000 = 20,000 per month

Gross profit on cost of purchase = 25%, i.e. $\frac{1}{5}$ th on sales = $\frac{1}{5}$ × 60,00,000 = ₹12,00,000, so $\frac{12,00,000}{12}$ = 1,00,000 per month

Cost of goods sold (COGS) = Sales – gross Profit

Working Note 1: COGS = 60,00,000 – 12,00,000 = ₹48,00,000

Stock turnover = 5 times

So, $$\frac{\text{Cost of Goods Sold}}{\text{Average stock}} = 5$$

$$\frac{48,00,000}{\text{Average stock}} = 5$$

$$\textbf{Average stock} = \frac{48,00,000}{5} = \textbf{9, 60,000}$$

Assuming no opening stock, the stock figure represents closing stock.

Working Note 2: Credit period to debtors = 1 month

$$1 = \frac{12}{\text{Debtors turnover ratio}}$$

Debtors turnover ratio = 12

$$\frac{\text{Credit sales}}{\text{Debtors}} = 12$$

$$\frac{60,00,000}{\text{Debtors}} = 12$$

$$\textbf{Debtors} = \frac{60,00,000}{12} = \textbf{5,00,000}$$

Working Note 3: Credit period from supplier = 15 days = $\frac{1}{2}$ month

$$\frac{1}{2} = \frac{12}{\text{Creditors turnover ratio}}$$

Creditors turnover ratio = 24

$$\frac{\text{Credit purchase}}{\text{Creditors}} = 24$$

$$\frac{57,60,000}{\text{Creditors}} = 24$$

$$\textbf{Creditors} = \frac{57,60,000}{24} = \textbf{2,40,000}$$

Cost of Goods sold = Opening stock + Purchase – Closing stock

48,00,000 = Nil + Purchase – 9,60,000

48,00,000 + 9,60,000 = Purchase

Purchase = 57,60,000

Statement showing Working Capital Requirement

	Amount (₹)	**Amount (₹)**
A. Current Assets		
Stock:		
(i) Finished Goods (WN:1)	9,60,000	
(ii) Debtors (WN:2)	5,00,000	
Total Current Assets		14,60,000

(Contd.)

(iii) Current Liabilities		
Creditors for materials (WN:3)		2,40,000
Net Working Capital (A – B)		12,20,000
Add: Cash holding (1 month's expenses)		20,000
Working Capital requirement		12,40,000

Illustration 5.8

Problem

With the following information, prepare a statement showing the Working Capital required to finance a level of activity of 10,400 units per annum:

(i) Selling price at the rate of ₹5 per unit

(ii) The expected ratios of cost to selling prices are as follows:

(a) Raw material, 40%

(b) Direct wages, 10%

(c) Overheads, 30%

(d) Profit, 20%

(iii) Raw materials are expected to remain in store for an average period of 2 months before being used for production, and materials are in process on an average period of 6 weeks.

(iv) Finished goods will stay in store approximately for 6 weeks before dispatch to customers.

(v) Credit allowed to debtors is for a period of 2 months.

(vi) Credit allowed by creditors is for a period of 2 months.

(vii) Lag in payment of wages and overheads is for a period of 2 weeks.

(viii) Cash in hand and bank is expected to be ₹10,000. It may be noted that production is carried on evenly during the year and wages and overheads accrue similarly. Assume 4 weeks a month. *[C.U. B.Com. (H), 2012]*

Solution

Projected annual sales = 10,400

So, Sales per week = $\frac{10,400}{52}$ = 200 units

Statement of Cost

	Per Unit (₹)	**Total (₹)**
Raw materials (5 × 40%)	2.00	400
Labour (5 × 10%)	0.50	100
Overhead (5 × 30%)	1.50	300
Profit (5 × 20%)	1.00	200
Selling price	5.00	1000

Statement showing Working Capital Requirement

	Weekly Average Cost	Net Block (Week)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock:				
(i) Raw materials	400	8		3,200
(ii) Work-in-progress:				
Raw Materials	400	6	2,400	
Labour	100	3	300	
Overhead	300	3	900	3,600
(iii) Finished Goods:				
Raw Materials	400	6	2,400	
Wages	100	6	600	
Overhead	300	6	1,800	4,800
(iv) Debtors:				
Raw Materials	400	8	3,200	
Labour	100	8	800	
Overhead	300	8	2,400	
Profit	200	8	1,600	8,000
Total Current Assets				19,600
(v) Current Liabilities				
Creditors for materials	400	8	3,200	
Outstanding labour	100	2	200	
Outstanding overheads	300	2	600	4,000
Net Working Capital (A – B)				15,600
Add: cash in hand				10,000
Working Capital requirement				25,600

Illustration 5.9

Problem

From the following information extracted from the books of Private Ltd., prepare a statement showing the Working Capital requirement needed to finance a level of activity of 5,200 units of output per annum:

Amount Per Unit	(₹)
Raw materials	8
Direct labour	2
Overheads	6
Total Cost	16
Profit	4
Selling price	20

Raw materials are in stock on an average for 1 month

Materials are in process for $\frac{1}{2}$ month

Finished goods are in stock for 6 weeks

Credit allowed by creditors for 1 month

Credit allowed to debtors for 2 month

Lag in payment of wages for $1\frac{1}{2}$ month

Cash in hand and at bank for ₹7,300

The production is carried on evenly during the year and wages and overheads accrue similarly.

Solution

Projected annual sales = 5,200

So, Sales per week = $\frac{5,200}{52}$ = 100 units

Statement of Cost

	Per Unit (₹)	Total (₹)
Raw materials	8	800
Direct Labour	2	200
Overhead	6	600
Profit	4	400
Selling price	20	2,000

Statement showing Working Capital Requirement

	Weekly Average Cost	Net Block (Week)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock:				3,200
(i) Raw materials	800	4		
(ii) Work-in-progress:				
Raw Materials	800	2	1,600	
Labour	200	1	200	
Overhead	600	1	600	2,400
(iii) Finished Goods:				
Raw Materials	800	6	4,800	
Wages	200	6	1,200	
Overhead	600	6	3,600	9,600

(Contd.)

(iv) Debtors:				
Raw Materials	800	8	6,400	
Labour	200	8	1,600	
Overhead	600	8	4,800	
Profit	400	8	3,200	16,000
Total Current Assets				31,200
B. Current Liabilities				
Creditors for materials	800	4	3,200	
Outstanding labour	200	6	1,200	4,400
Net Working Capital (A – B)				26,800
Add: cash in hand and bank				7,300
Working Capital requirement				34,100

Illustration 5.10

Problem

Cosmos Ltd. sells its products on a Gross Profit of 20% on sales. The following information is extracted from its annual accounts for the current year ended 31 March 2014.

	₹
Sales at 3 months credit	40,00,000
Raw materials	12,00,000
Wages paid- average time lag 15 days	9,60,000
Manufacturing expenses paid-1 month in arrears	12,00,000
Administration expenses paid-1 month in arrears	4,80,000
Sales promotion expenses–payable half-yearly in advance	2,00,000

The company enjoys 1 month's credit from the suppliers of raw materials and maintains a 2 month's stock of raw materials and $1\frac{1}{2}$ month's stock of finished goods. The cash balance is maintained at ₹1,00,000 as precautionary measures. Assuming 10% margin, find out the Working Capital requirement of Cosmos Ltd. *[C.U. B.Com. (H), 2014]*

Solution

Projected annual sales = 40,00,000

So, Gross Profit = 20% of sales = 40,00,000 × 20% = 8,00,000

Net Profit = Gross Profit – Administration expenses – Selling and Distribution expenses

= 8,00,000 – 4,80,000 – 2,00,000 = ₹1,20,000

Statement of Daily Cost

	Total (₹ lakhs)	Total (₹ lakhs)
A. Current Assets		
Stock:		
(i) Raw materials $\left(\frac{12,00,000}{12}\times 2\right)$		2,00,000
(ii) Finished Goods:		
Raw Materials $\left(\frac{12,00,000}{12}\times 1.5\right)$	1,50,000	
Labour $\left(\frac{9,60,000}{12}\times 1.5\right)$	1,20,000	
Overhead $\left(\frac{12,00,000}{12}\times 1.5\right)$ (WN:1)	1,50,000	4,20,000
(iii) Debtors:		
Raw Materials $\left(\frac{12,00,000}{12}\times 3\right)$	3,00,000	
Labour $\left(\frac{9,60,000}{12}\times 3\right)$	2,40,000	
Overhead $\left(\frac{18,80,000}{12}\times 3\right)$	4,70,000	
Profit $\left(\frac{8,00,000}{12}\times 3\right)$	2,00,000	12,10,000
Sales promotion expenses in advance $\left(\frac{2,00,000}{12}\times 6\right)$		1,00,000
Cash Balance		
Total Current Assets		1,00,000
		20,30,000
B. Current Liabilities		
Creditors for materials $\left(\frac{12,00,000}{12}\times 1\right)$	1,00,000	
Creditor for wages $\left(\frac{9,60,000}{12}\times 0.5\right)$	40,000	
Creditor for manufacturing expenses $\left(\frac{12,00,000}{12}\times 1\right)$	1,00,000	
Creditor for administration expenses $\left(\frac{4,80,000}{12}\times 1\right)$	40,000	2,80,000
Net Working Capital (A – B)		17,50,000
Add: 10% cash in hand $\left(\frac{17,50,000}{90}\times 10\right)$		1,75,000
Working Capital Requirement		19,25,000

WN: 1 Overhead expense for finished goods taken at manufacturing cost only.
WN: 2 If debtors are taken at cost, then the Working Capital requirement is ₹17,27,000

Illustration 5.11

Problem

From the following information, ascertain the Working Capital requirement.

(i)	Annual Production	15,600 units
(ii)	Analysis of sales per unit:	₹
	Raw materials	5
	Wages	4
	Overheads	2
	Profit	1
		12
(iii)	Time Lag:	Weeks
	Raw materials	3
	Processing period	4
	Finished goods in store:	5
	Credit allowed by creditors	3
	Credit allowed to debtors	4
	Payment of wages & overheads	2

(iv) Production has been carried on evenly during the year and wages and overheads accrue similarly.

Solution

Projected annual sales = 15,600

So, Sales per week = $\frac{15,600}{52}$ = 300 units

Since production is carried out evenly, so lag period in payment of wages and overheads in respect of WIP = $\frac{4}{2}$ = 2 weeks

Statement of Cost

	Total (₹)
Raw materials (300 × 5)	1,500
Wages (300 × 4)	1,200
Overhead (300 × 2)	600
Profit (300 × 1)	300
Selling price	3,600

Statement showing Working Capital Requirement

	Weekly Average Cost	**Net Block (Week)**	**Amount (₹)**	**Amount (₹)**
A. Current Assets				
Stock:				
(i) Raw materials	1,500	3		4,500

(Contd.)

(ii) Work-in-progress:				
Raw Materials	1,500	4	6,000	
Wages	1,200	2	2,400	
Overhead	600	2	1,200	9,600
(iii) Finished Goods:				
Raw Materials	1,500	5	7,500	
Wages	1,200	5	6,000	
Overhead	600	5	3,000	16,500
Debtors:				
Raw Materials	1,500	4	6,000	
Labour	1,200	4	4,800	
Overhead	600	4	2,400	
Profit	300	4	1,200	14,400
Total Current Assets				45,000
B. Current Liabilities				
Creditors for materials	1,500	3	4,500	
Outstanding wages	1,200	2	2,400	
Outstanding overheads	600	2	1,200	8,100
Working Capital requirement (A – B)				36,900

Illustration 5.12

Problem

From the information given below, prepare a Working Capital requirement forecast:

(i) Annual Production	52,000 units
(ii) Analysis of selling price per unit:	₹
Raw materials	10
Wages	7
Overhead expenses	5
Profit	3
(iii) Time Lag:	Weeks
Raw materials in stores	3
Manufacturing process	4
Finished goods in Godown	5
Payment to Creditors	4
Collection from Debtors	8
Payment of Wages	2
Payment of overhead expenses	2

Solution

Projected Annual sales = 52,000

So, Sales per week = $\frac{52,500}{52}$ = 1,000 units

Statement of Cost

	Total (₹)
Raw materials (1,000 × 10)	10,000
Wages (1,000 × 7)	7,000
Overhead (1,000 × 5)	5,000
Profit (1,000 × 3)	3,000
Selling price	25,000

Statement showing Working Capital Requirement

	Weekly Average Cost	Net Block (Week)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock:				
(i) Raw materials	10,000	3		30,000
(ii) Work-in-progress:				
Raw Materials	10,000	4	40,000	
Wages	7,000	4	28,000	
Overhead	5,000	4	20,000	88,000
(iii) Finished Goods:				
Raw Materials	10,000	5	50,000	
Wages	7,000	5	35,000	
Overhead	5,000	5	25,000	1,10,000
Debtors:				
Raw Materials	10,000	8	80,000	
Labour	7,000	8	56,000	
Overhead	5,000	8	40,000	
Profit	3,000	8	24,000	2,00,000
Total Current Assets				4,28,000
B. Current Liabilities				
Creditors for materials	10,000	4	40,000	
Outstanding wages	7,000	2	14,000	
Outstanding overheads	5,000	2	10,000	64,000
Working Capital requirement (A – B)				3,64,000

If debtors are taken at cost, then the Working Capital requirement is ₹3,40,000
i.e., ₹3,64,000 – ₹24,000 (Profit included in debtors) = ₹3,40,000.

Illustration 5.13

Problem

The annual capacity of a company is 20,000 units. But owing to non-availability of a grade of materials it has been operating at 60% level and is expected to operate at the same level during the next year. The selling price of product in which the company deals, shows the following:

	₹ per unit
Direct Materials	10
Direct Wages	5
Overhead	100% of direct wages
Profit	25% on cost

Raw materials are in stock on average for 15 days. Materials are in process on average for 1 month. Finished goods are in stock on average for 2 months and debtors are allowed 2½ months credit. The company received 1 month's credit from its suppliers in respect of materials. Time lag in wage payment is 1 month.

Prepare a Working Capital requirements forecast from the above particulars.

Solution

Projected annual sales = 20,000 × 60% = 12,000

So, Sales per month = $\frac{12,000}{12}$ = 1,000 units

Statement of Cost

	Total (₹)
Raw materials (1,000 × 10)	10,000
Direct Wages (1,000 × 5)	5,000
Overhead (1,000 × 5 [100% on 5])	5,000
Profit (1,000 × 5 [25% on 20])	5,000
Selling price	25,000

Statement showing Working Capital Requirement

	Monthly Average Cost	Net Block (Months)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock:				
(i) Raw materials	10,000	$\frac{1}{2}$		5,000
(ii) Work-in-progress:				
Raw Materials	10,000	1	10,000	
Wages	5,000	1	5,000	
Overhead	5,000	1	5,000	20,000
(iii) Finished Goods:				
Raw Materials	10,000	2	20,000	
Wages	5,000	2	10,000	
Overhead	5,000	2	10,000	40,000

(Contd.)

Debtors:				
Raw Materials	10,000	$2\frac{1}{2}$	25,000	
Wages	5,000	$2\frac{1}{2}$	12,500	
Overhead	5,000	$2\frac{1}{2}$	12,500	
Profit	5,000	$2\frac{1}{2}$	12,500	62,500
Total Current Assets				1,27,500
B. Current Liabilities				
Creditors for materials	10,000	1	10,000	15,000
Outstanding wages	5,000	1	5,000	1,12,500
Working Capital requirement (A – B)				

Illustration 5.14

Problem

Following information are available in respect of a manufacturing concern:

(i) Production 1,20,000 units p.a.

(ii) Selling price ₹10 per unit.

(iii) Analysis of Sales: Materials 40%, labour 30%, Overhead 20%, Profit 10%.

(iv) Raw materials are in store for 1 month.

(v) Materials are in process for $\frac{1}{2}$ month.

(vi) Finished goods are in store for $1\frac{1}{2}$ months

(vii) Credit allowed to debtors 3 months.

(viii) Credit allowed by supplier of raw material 2 months.

(ix) Lag in payment of wages and overheads $\frac{1}{2}$ month.

(x) Expected cash balance ₹50,000

Calculate Working Capital requirement.

Solution

Projected annual sales = 1,20,000

So, Sales per month = $\frac{1,20,000}{12}$ = 10,000 units

Statement of Cost

	Per Unit	**Total (₹) (Per Unit Cost × 10,000)**
Raw materials (10 × 40%)	4.00	40,000
Labour (10 × 30%)	3.00	30,000
Overhead (10 × 20%)	2.00	20,000
Profit (10 × 10%)	1.00	10,000
Selling price	10.00	1,00,000

Statement showing Working Capital Requirement

	Monthly Average Cost	Net Block (Months)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock:				
(i) Raw materials	40,000	1		40,000
(ii) Work-in-progress:				
Raw Materials	40,000	$\frac{1}{2}$	20,000	
Wages	30,000	$\frac{1}{2}$	15,000	
Overhead	20,000	$\frac{1}{2}$	10,000	45,000
(iii) Finished Goods:				
Raw Materials	40,000	$1\frac{1}{2}$	60,000	
Wages	30,000	$1\frac{1}{2}$	45,000	
Overhead	20,000	$1\frac{1}{2}$	30,000	1,35,000
(iv) Debtors:				
Raw Materials	40,000	3	1,20,000	
Wages	30,000	3	90,000	
Overhead	20,000	3	60,000	
Profit	10,000	3	30,000	3,00,000
Total Current Assets				5,20,000
B. Current Liabilities				
Creditors for materials	40,000	2	80,000	
Outstanding wages	30,000	$\frac{1}{2}$	15,000	
Outstanding expenses	20,000	$\frac{1}{2}$	10,000	1,05,000
Net Working Capital (A – B)				4,15,000
Add: cash in hand				50,000
Working Capital requirement				4,65,000

Illustration 5.15

Problem

From the following information of Goodluck Ltd., you are required to determine Working Capital requirement:

(i) Annual Sales—₹1,20,000

(ii) Analysis of Sales:

Raw materials 60%, Expenses 15%, Profit 25%

(iii) Credit allowed to debtors—1 month

Credit allowed to creditors—$2\frac{1}{2}$ months

Raw materials in store—1 month

Processing period—2 months

Finished Goods in Store—3 months

Solution

Projected annual sales = ₹1,20,000

So, Sales per month = $\frac{1,20,000}{12}$ = ₹10,000

Statement of Cost

	Total (₹)
Raw materials (10,000 × 60%)	6,000
Expenses (10,000 × 15%)	1,500
Profit (10,000 × 25%)	2,500
Selling price	10,000

Statement showing Working Capital Requirement

	Monthly Average Cost	**Net Block (Months)**	**Amount (₹)**	**Amount (₹)**
A. Current Assets				
Stock:				
(i) Raw Materials	6,000	1		6,000
(ii) Work-in-progress:				
Raw Materials	6,000	2	12,000	
Expenses	1,500	2	3,000	15,000
(iii) Finished Goods:				
Raw Materials	6,000	3	18,000	
Expenses	1,500	3	4500	22,500
(iv) Debtors:				
Raw Materials	6,000	1	6,000	
Expenses	1,500	1	1,500	
Profit	2,500	1	2,500	10,000
Total Current Assets				53,500
B. Current Liabilities				15,000
Creditors for materials	6,000	$2\frac{1}{2}$		38,500
Working Capital requirement (A – B)				

Illustration 5.16

Problem

From the following information of Joy Durga Ltd., you are required to determine the Working Capital requirement:

(i) Annual (expected) Sales ₹3,60,000

(ii) Analysis of Selling price:

Raw materials: 50%

Expenses: 30%

Profit: 20%

(iii) Credit allowed to debtors— $2\frac{1}{2}$ months

Credit allowed by creditors— $2\frac{1}{2}$ months

Raw materials in store—1 month

Processing period—2 months

Finished goods in store—4 months

Production is carried out evenly during the year and expenses accrue similarly.

Solution

Projected annual sales = ₹3,60,000

So, Sales per month = $\frac{3,60,000}{12}$ = ₹30,000

Statement of Cost

	Total (₹)
Raw materials (30,000 × 50%)	15,000
Expenses (30,000 × 30%)	9,000
Profit (30,000 × 20%)	6,000
Selling price	30,000

Since production is carried out evenly, so lag period in payment of expenses in respect of WIP = $\frac{2}{2}$ = 1 month.

Statement showing Working Capital Requirement

	Monthly Average Cost	**Net Block (Months)**	**Amount (₹)**	**Amount (₹)**
A. Current Assets				
Stock:				
(i) Raw materials	15,000	1		15,000
(ii) Work-in-progress:				
Raw Materials	15,000	2	30,000	
Expenses	9,000	1	9,000	39,000
(iii) Finished Goods:				
Raw Materials	15,000	4	60,000	
Expenses	9,000	4	36,000	96,000
(iv) Debtors:				
Raw Materials	15,000	$2\frac{1}{2}$	37,500	
Expenses	9,000	$2\frac{1}{2}$	22,500	
Profit	6,000	$2\frac{1}{2}$	15,000	75,000
Total Current Assets				22,5000
B. Current Liabilities				22,500
Creditors for materials	15,000	$1\frac{1}{2}$		2,02,500
Working Capital requirement (A – B)				

Illustration 5.17

Problem

From the following particulars, you are required to calculate Working Capital requirement.

(i) Annual Sales ₹3,60,000

(ii) Analysis of Sales:

Materials—40%, Labour—20%, Overheads—15%, Profit—25%

(iii) Credit allowed to debtors—3 months

Credit allowed by creditors—2 months

Lag in payment of wages—1 month

Lag in payment of overhead—2 months

Raw materials in store—1 month

Processing period—2 months

Finished goods in store—3 months

Expected cash balance—₹30,000

Production is carried out evenly during the year and wages and expenses accrue similarly.

Solution

Projected annual sales = ₹3,60,000

So, Sales per month = $\frac{3,60,000}{12}$ = ₹30,000

Statement of Cost

	Total (₹)
Raw materials (30,000 × 40%)	12,000
Labour (30,000 × 20%)	6,000
Overhead (30,000 × 15%)	4,500
Profit (30,000 × 25%)	7,500
Selling price	30,000

Statement showing Working Capital Requirement

	Monthly Average Cost	**Net Block (Months)**	**Amount (₹)**	**Amount (₹)**
A. Current Assets				
Stock:				
(i) Raw materials	12,000	1		12,000
(ii) Work-in-progress:				
Raw Materials	12,000	2	24,000	
Labour	6,000	1	6,000	
Overhead	4,500	1	4,500	34,500

(Contd.)

(iii) Finished Goods:				
Raw Materials	12,000	3	36,000	
Labour	6,000	3	18,000	
Overhead	4,500	3	13,500	67,500
(iv) Debtors:				
Raw Materials	12,000	3	36,000	
Labour	6,000	3	18,000	
Overhead	4,500	3	13,500	
Profit	7,500	3	22,500	90,000
Total Current Assets				2,04,000
B. Current Liabilities				
Creditors for materials	12,000	2	24,000	
Creditors for wages	6,000	1	6,000	
Creditors for expenses	4,500	2	9,000	39,000
Net Working Capital (A – B)				1,65,000
Add: Expected cash balance				30,000
Working Capital requirement				1,95,000

Illustration 5.18

Problem

From the following information of Nanu Ltd., find the Working Capital requirement:

(i) Sales for the year ₹3,60,000

(ii) Analysis of Sales:

Raw materials—50%

Expenses—30%

Profit—20%

(iii) Period of credit repayment by the debtors—$2\frac{1}{2}$ months

Raw Material storing period—1 month

Period of Credit allowed by the creditors—$1\frac{1}{2}$ months

Product processing time—2 months

Finished goods storing period—4 months

Bank Overdraft—₹1,00,000

Cash requirement for other expenses payable ₹6,000. Production is carried on evenly throughout the year and expenses are paid accordingly.

Solution

Projected annual sales = 3,60,000

So, Sales per month = $\frac{3,60,000}{12}$ = ₹30,000

Statement of Cost (Monthly)

	Total (₹)
Raw materials (30,000 × 50%)	15,000
Expenses (30,000 × 30%)	9,000
Profit (30,000 × 20%)	6,000
Selling price	30,000

Statement showing Working Capital Requirement

	Monthly Average Cost	**Net Block (Months)**	**Amount (₹)**	**Amount (₹)**
A. Current Assets				
Stock:				
(i) Raw materials	15,000	1		15,000
(ii) Work-in-progress:				
Raw Materials	15,000	2	30,000	
Expenses	9,000	1	9,000	39,000
(iii) Finished Goods:				
Raw Materials	15,000	4	60,000	
Expenses	9,000	4	36,000	96,000
(iv) Debtors:				
Raw Materials	15,000	$2\frac{1}{2}$	37,500	
Expenses	9,000	$2\frac{1}{2}$	22,500	
Profit	6,000	$2\frac{1}{2}$	15,000	75,000
Total Current Assets				2,25,000
B. Current Liabilities				22,500
Creditors for materials	15,000	$1\frac{1}{2}$		2,02,500
Net Working Capital (A – B)				6,000
(+) Cash requirement				
Working Capital requirement				2,08,500

Out of the total Working Capital requirement of ₹2,08,500, Bank Overdraft of ₹1,00,000 has been arranged, so the remaining ₹(2,08,500 – 1,00,000) = ₹1,08,500 to be arranged from other sources.

Illustration 5.19

Problem

From the following information, prepare a statement showing estimated Working Capital requirement of Woodpecker Ltd.:

Projected Annual Sales	5,200 units
Selling price per unit	₹60

Analysis of selling price:	
Materials: 40%, Labour: 30%; Overhead: 20%; Profit: 10%	
Time Lag on an average:	
Raw materials in stock	3 weeks
Production Process	4 weeks
Credit to debtors	5 weeks
Credit from suppliers	3 weeks

Lag in payment of wages and overhead 2 weeks. Finished goods are in warehouse for 2 weeks; cash in hand is expected to be 10% of Net Working Capital.

Solution

Projected annual sales = 5,200

So, Sales per month = $\frac{5,200}{52}$ = 100 units

Statement of Cost

	Per Unit	Total (₹) (Per Unit Cost × 100)
Raw materials (60 × 40%)	24	2,400
Labour (60 × 30%)	18	1,800
Overhead (60 × 20%)	12	1,200
Profit (60 × 10%)	6	600
Selling price	60	6,000

Statement showing Working Capital Requirement

	Weekly Average Cost	Net Block (Weeks)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock:				
(i) Raw materials	2,400	3		7,200
(ii) Work-in-progress:				
Raw Materials	2,400	4	9,600	
Labour	1,800	2	3,600	
Overhead (WN:2)	1,200	2	2,400	15,600
(iii) Finished Goods:				
Raw Materials	2,400	2	4,800	
Labour	1,800	2	3,600	
Overhead	1,200	2	2,400	10,800
(iv) Debtors:				
Raw Materials	2,400	5	12,000	
Labour	1,800	5	9,000	
Overhead	1,200	5	6,000	
Profit	600	5	3,000	30,000
Total Current Assets				63,600

(Contd.)

B. Current Liabilities	2,400	3	7,200	
Creditors for materials	1,800	2	3,600	
Creditors for wages	1,200	2	2,400	13,200
Creditors for expenses				50,400
Net Working Capital (A – B)				5,600
Add: Expected cash balance $\left(50{,}400 \times \frac{90}{10}\right)$				56,000
Working Capital requirement				

WN: 1 Assuming production is carried out evenly, so lag period in payment of labour and overhead expenses in respect of WIP = $\frac{4}{2}$ = 2 months.

Illustration 5.20

Problem

A factory produces 12,000 units in a year and sells them at ₹100 per unit. Cost structure of the product is given below:

Materials—50%, Labour—20%; Overhead—20%; Profit—10%

The following additional information is available:

(i) Purchase, sell and production occur evenly throughout the year and labour and overhead accrue similarly.

(ii) Raw materials in store for 2 months.

(iii) The production process takes 2 months.

(iv) Finished goods in store for 4 months.

(v) Debtors are allowed 3 months credit

(vi) Creditors allow 2 months credit.

(vii) Cash balance to be maintained at 10% of the Working Capital.

(viii) 20% of sales are made at 10% above normal selling price.

(ix) 20% of purchases are for cash.

(x) The company usually maintains a liability for Bills Payable at ₹20,000

Forecast the Working Capital requirement.

Solution

Projected annual sales = 12,000

So, Sales per month = $\frac{12{,}000}{12}$ = 1,000 units

WN: 1 20% of sales above normal selling price i.e., 20% of 1,000 units = 200 units

Selling price = 100

10% above selling price i.e., excess profit per unit = 10 + 10 × 10% = 11

20% of 1,000 units × ₹11 = 2,200

Normal profit for rest (1000 – 200) = 800 units at a profit of ₹10 per unit i.e., 800 × 10 = ₹8000

So, total profit = ₹8,000 + ₹2,200 = ₹10,200

WN: 2 Credit purchase = 80% × 50,000 = ₹40,000
WN: 3 Bills payable amounting to ₹20,000 has not been considered since it is a part of creditors.

Statement of Cost

	Per Unit	Total (₹) (Per Unit Cost × 100)
Raw materials (100 × 50%)	50	50,000
Labour (100 × 20%)	20	20,000
Overhead (100 × 20%)	20	20,000
Profit (100 × 10%)	10	10,000
Selling price	100	1,00,000

Statement showing Working Capital Requirement

	Monthly Average Cost	Net Block (Months)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock:				
(i) Raw materials	50,000	2		1,00,000
(ii) Work-in-progress:				
Raw Materials	50,000	2	1,00,000	
Labour	20,000	1	20,000	
Overhead	20,000	1	20,000	1,40,000
(iii) Finished Goods:				
Raw Materials	50,000	4	2,00,000	
Labour	20,000	4	80,000	
Overhead	20,000	4	80,000	3,60,000
(iv) Debtors:				
Raw Materials	50,000	3	1,50,000	
Labour	20,000	3	60,000	
Overhead	20,000	3	60,000	
Profit: at normal selling price	8,000	3	24,000	
10% above normal selling price (WN:1)	2,200	3	6,600	3,00,600
Total Current Assets				9,00,600
B. Current Liabilities				
Creditors for materials (WN:2)	40,000	2		80,000
Net Working Capital (A – B)				8,20,600
(+) Cash balance $\left(\frac{8,20,600}{90} \times 10\right)$				91,178
Working Capital requirement				9,11,778

Illustration 5.21

Problem

(i) Annual Sales ₹2,40,000

(ii) Analysis of Sales:

Materials—60%, Labour—15%, Overheads—15%, Profit—10%

(iii) Credit allowed to debtors	2 months
Credit allowed by creditors	1 month
Lag in payment of wages	1 month
Lag in payment of overhead	1 month
Raw materials in store	4 months
Processing period	3 months
Finished goods in store	4 months
Expected cash balance	₹50,000

Production is carried out evenly during the year and wages and expenses accrue similarly.

What is the effect of double shift working on the requirement of Working Capital?

[C.A. (Final), 1985, Adapted]

Solution

Projected annual sales = 2,40,000

So, Sales per month = $\frac{2,40,000}{12}$ = 20,000

Statement of Cost

	Total (₹)
Raw materials (20,000 × 60%)	12,000
Labour (20,000 × 15%)	3,000
Overhead (20,000 × 15%)	3,000
Profit (20,000 × 10%)	2,000
Selling price	20,000

Statement showing Working Capital Requirement

	Monthly Average Cost	Net Block (Months)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock:				
(i) Raw materials	12,000	4		48,000
(ii) Work-in-progress:				
Raw Materials	12,000	3	36,000	
Labour	3,000	$1\frac{1}{2}$	4,500	
Overhead	3,000	$1\frac{1}{2}$	4,500	45,000

(Contd.)

(iii) Finished Goods:				
Raw Materials	12,000	4	48,000	
Labour	3,000	4	12,000	
Overhead	3,000	4	12,000	72,000
(iv) Debtors:				
Raw Materials	12,000	2	24,000	
Labour	3,000	2	6,000	
Overhead	3,000	2	6,000	
Profit	2,000	2	4,000	40,000
Total Current Assets				2,05,000
B. Current Liabilities				
Creditors for materials	12,000	1	12,000	
Creditors for wages	3,000	1	3,000	
Creditors for overhead	3,000	1	3,000	18,000
Net Working Capital (A – B)				1,87,000
Add: Expected cash balance				50,000
Working Capital requirement				2,37,000

Sales per month under single shift = ₹20,000
Sales per month under double shift = 20,000 × 2 = 40,000

Statement of Cost

	Total (₹)
Raw materials (40,000 × 60%)	24,000
Labour (40,000 × 15%)	6,000
Overhead (40,000 × 15%)	6,000
Profit (40,000 × 10%)	4,000
Selling price	40,000

Statement showing Working Capital Requirement (under double shift)

	Monthly Average Cost	**Net Block (Months)**	**Amount (₹)**	**Amount (₹)**
A. Current Assets				
Stock:				
(i) Raw materials	24,000	4		96,000
(ii) Work-in-progress:				
Raw Materials	12,000	3	36,000	
Labour	3,000	$1\frac{1}{2}$	4,500	
Overhead (WIP under single shift)	3,000	$1\frac{1}{2}$	4,500	45,000

(Contd.)

(iii) Finished Goods:				
Raw Materials	24,000	4	96,000	
Labour	6,000	4	24,000	
Overhead	6,000	4	24,000	1,44,000
(iv) Debtors:				
Raw Materials	24,000	2	48,000	
Labour	6,000	2	12,000	
Overhead	6,000	2	12,000	
Profit	4,000	2	8,000	80,000
Total Current Assets				3,65,000
B. Current Liabilities				
Creditors for materials	24,000	1	24,000	
Creditors for wages	6,000	1	6,000	
Creditors for overhead	6,000	1	6,000	36,000
Net Working Capital (A – B)				3,29,000
Add: Expected cash balance				50,000
Working Capital requirement				3,79,000

Working Capital requirement under double shift – Working Capital requirement under single shift
= ₹3,79,000 – ₹2,37,000 = ₹1,42,000

$$\% \text{ increase in Working Capital} = \frac{1,42,000}{2,37,000} \times 100$$

% increase in Working Capital = 59.91%

Illustration 5.22

Problem

Mr. B wants to start a new manufacturing concern. He wants to know the amount of Working Capital required for the first year. The following estimated figures are provided:

	₹
Sales: inland	8,40,000
Export	1,20,000
Average inventories: Materials	5,000
Finished Goods	10,000
Purchases	72,000
Wages	2,40,000
Royalties	12,000
Salaries	96,000
Sundry expenses	60,000
Rent	10,000

Average Credit period allowed to debtors 4 weeks for inland sales and 2 weeks for export
Average Credit period received 1 month
Lag in payment of wages 2 months

Lag in payment of royalties 5 months
Lag in payment of salaries 1 month
Lag in payment of sundry expenses is 1 month and rent is paid quarterly in advance. Profit not withdrawn throughout the year ₹50,000. 5% should be allowed for contingencies.
Determine the amount of Working Capital required.

Solution

Statement showing Working Capital Requirement

	Amount (₹)	Amount (₹)
A. Current Assets		
Stock:		
(i) Raw materials	5,000	15,000
Finished Goods:		
(ii) Debtors:		
Inland $\left(\frac{8,40,000}{12}\times 1\right)$	10,000	
Export $\left(\frac{1,20,000}{12}\times\frac{1}{2}\right)$	70,000	
Rent paid in advance $\left(\frac{10,000}{4}\right)$	5,000	75,000
Total Current Assets		2,500
B. Current Liabilities		
Creditors for materials $\left(\frac{72,000}{12}\times 1\right)$	6,000	92,500
Creditors for wages $\left(\frac{2,40,000}{12}\times 2\right)$	40,000	
Creditors for royalties $\left(\frac{12,000}{12}\times 5\right)$	5,000	
Creditors for salaries $\left(\frac{96,000}{12}\times 1\right)$	8,000	
Creditors for sundry expenses $\left(\frac{60,000}{12}\times 1\right)$	5,000	64,000
Net Working Capital (A – B)		28,500
Add: 5% for Contingencies on NWC		1,425
Working Capital requirement		29,925

Illustration 5.23

Problem

X Ltd. sells good at a Gross Profit of 20%. It includes depreciation as a cost of production. Further information are as follows:

Annual figures	(₹ '000)
Sales at 3 months credit	9,600

Material usage at 2 months credit	240
Lag in payment of wages 1 month	360
Lag in payment of manufacturing expenses (in cash) 2 months	4,800
Lag in payment of administrative expenses 1 month	120
Sales promotion expenses paid in advance (on half-yearly basis)	72

Tax liability to be paid in four equal instalments of which one falls in next year 120

The company maintains a month's stock of raw materials and finished goods. Cash in hand and at bank is ₹1,50,000. Determine the Working Capital requirement.

[C.S. (Final) December, '08, Adapted]

Solution

WN 1: Calculation of Depreciation

Sales – Gross Profit = Cost of Goods Sold

9,600 – 20% of 9,600 = 9,600 – 1,920 = 7,680

Cost of goods sold – Materials – Wages = Cost of Sales

7,680 – 240 – 360 = Cost of sales

7,080 = Cost of sales

WN 2: Cash cost of manufacturing = 4,800

7,080 (Total cost of manufacturing) – 4,800 (Cash cost of manufacturing)
= ₹2,280 (Depreciation)

Total Cost of Sales – Depreciation + Administrative expenses + Selling expenses
= Cash cost of sales

7,680 – 2,280 + 120 – 72 = Cash cost of sales

Cash cost of sales = 5,448

Statement showing Working Capital Requirement

	Amount (₹ '000)	Amount (₹ '000)
A. Current Assets		
Stock:		
(i) Raw materials $\left(\frac{240}{12}\times 2\right)$	40	
(ii) Finished Goods: $\left(\frac{540}{12}\times 1\right)$	45	
(iii) Debtors: $\left(\frac{5,448}{12}\times 3\right)$ (WN:2)	1,362	
(iv) Sales promotion expenses paid in advance $\left(\frac{72}{12}\times 6\right)$	36	
Total Current Assets		1,483
B. Current Liabilities		
(i) Materials $\left(\frac{240}{12}\times 2\right)$	40	

(Contd.)

(ii) Wages $\left(\frac{360}{12}\times 1\right)$	30	
(iii) Cash manufacturing expenses $\left(\frac{4,800}{12}\times 2\right)$	800	
(iv) Administration expenses $\left(\frac{120}{12}\times 1\right)$	10	
(v) Advance Tax $\left(\frac{120}{12}\times 3\right)$	30	
Total Current Liabilities		910
Net Working Capital requirement (A – B)		573
Add: Cash in hand and at bank		150
Working Capital requirement		723

Illustration 5.24

Problem

The following information is available for C Ltd.

	(₹ in lakhs)
Average stock of raw materials	40
Average WIP	50
Average finished goods inventory	20
Average accounts receivable	75
Average accounts payable	30
Average raw materials purchases and consumed daily	5
Average WIP value daily	10
Average cost of goods sold per day	10
Average sales daily	25
Determine the Operating Cycle.	

Solution

Computation of the money block period of Working Capital

$$\text{Raw materials storage or conversion period} = \frac{\text{Average stock of raw materials}}{\text{Average consumption of raw materials daily}}$$

$$\text{So, Raw materials storage or conversion period} = \frac{40,00,000}{5,00,000}$$

Raw materials storage or conversion period = 8 days

$$\text{Work-in-progress conversion period} = \frac{\text{Average work-in-progress}}{\text{Average cost of production daily}}$$

$$= \frac{50,00,000}{10,00,000} = 5 \text{ days}$$

$$\text{Finished Goods conversion period} = \frac{\text{Average stock of finished goods}}{\text{Average cost of goods sold daily}}$$

$$= \frac{20,00,000}{10,00,000} = 2 \text{ days}$$

$$\text{Debtors collection period} = \frac{\text{Average Debtors}}{\text{Average Credit sales daily}}$$

$$= \frac{75,00,000}{25,00,000} = 3 \text{ days}$$

$$\text{Creditors payment period} = \frac{\text{Average Creditors}}{\text{Average credit purchase daily}}$$

$$= \frac{30,00,000}{5,00,000} = 6 \text{ days}$$

Operating Cycle = 8 + 5 + 2 + 3 – 6 = 12 days

5.13 SUMMARY

- There are three concepts of Working Capital (WC)—gross, net and zero.
- Gross working capital is the total assets of all current assets.
- Net Working Capital is the excess of current assets over current liabilities.
- Zero WC = Inventories plus receivables minus payables.
- There are two components of working capital—current assets and current liabilities. Each component is to be separately estimated to determine the correct amount of working capital.
- Working capital can be permanent and temporary. Permanent working capital is that level of working capital which is required all the time or rather which should be maintained all the time in a firm to ensure smooth functioning of a firm without any fund crisis. Temporary or variable working capital is that working capital which is required over and above the permanent working capital, i.e., in excess of permanent working capital.
- Gross WC means the total current assets. The net WC is the difference between current assets
- The need of working capital arises from the cash/operating cycle of a firm.
- Management of working capital refers to the management of current assets as well as current liabilities.
- Factors influencing working capital requirements are: (a) Nature of business, (b) Size of business, (c) Business cycle, (d) Sales volume, (e) Production cycle, (f) Production policy, (g) Credit policy, (h) Operational efficiency, (j) Inventory policy, (k) Seasonal variations, and (l) Level of competition in market.
- Operating cycle refers to the time period required for conversion of cash back into cash again. Operating cycle constitutes the four stages: (a) Procurement of raw materials (raw material and storages stage); (b) Conversion of raw materials in work-in-progress (work-in-progress stage); (c) Conversion of work-in-progress into finished goods (finished goods inventory stage); and (d) Sale of finished goods (debtors collection stage).

- Net operating capital cycle period is the summation of storage or holding period/time lag of each of the stages of operating cycle. Net operating cycle period is determined as follows:

  Net Operating Cycle or Working Capital Cycle Period or Duration
  = Raw materials storage period (R) + Work-in-Progress period(W) + Finished Goods storage period (F) + Debtors Collection period(D) – Creditors payment period (C).

  Or, Net Operating Cycle Period or Duration = R + W + F + D – C

- Raw materials storage or conversion period = $\frac{\text{Average stock of raw materials}}{\text{Average consumption of raw materials}}$

  Average consumption of raw materials = $\frac{\text{Consumption of Raw materials}}{\text{365 days/12 months/52 weeks}}$

- Work-in-Progress conversion period = $\frac{\text{Average work-in-progress}}{\text{Average cost of production/ cost of goods manufactured}}$

- Finished goods conversion period = $\frac{\text{Average stock of finished goods}}{\text{Average cost of goods sold}}$

- Debtors collection period = $\frac{\text{Average Debtors}}{\text{Average Credit Sales}}$

- Creditors payment period = $\frac{\text{Average Creditors}}{\text{Average Credit Purchase}}$

- Net operating cycle period = $\frac{\text{365 days/12 months/52 week}}{\text{Net operating Cycle period in days/months/week}}$

- Working capital requirement = $\frac{\text{Total operating expenses during the year}}{\text{Net Operating Cycle period (365 days/12 months/52 week)}} \times \frac{\text{365 days/ 12 months/ 52 week}}{}$

EXERCISES

A. Short-answer Type Questions (5 Marks)

1. What is meant by 'Working Capital'? Mention two limitations of the sources of Working Capital.
2. What do you mean by 'Negative Working Capital'? *[C.U. B.Com. (G), 2001, 2008, 2010]*
3. What is temporary Working Capital? *[C.U. B.Com. (G), 2014]*
4. What is meant by Net Working Capital? Mention two importance of Working Capital. *[C.U. B.Com. (G), 2015]*
5. What is meant by liquidity? *[C.U. B.Com. (G), 2005, 2009]*
6. What do you mean by conservative Working Capital policy? *[C.U. B.Com. (G), 2013]*

7. Name two important committees set up for the management of Working Capital requirement. *[C.U. B.Com. (G), 2001]*
8. What do you mean by Working Capital cycle? State the factors to be considered to forecast Working Capital requirement.
9. (a) Define the term 'Net Working Capital'.
   (b) What factors are to be considered in determining the Working Capital need of a concern? *[C.U. B.Com. (G), 2009]*
10. Discuss the objectives of Working Capital management.
11. What factors are to be considered in determining the Working Capital need of a concern? *[C.U. B.Com. (G), 2015]*
12. What do you mean by 'Positive Working Capital' and 'Negative Working Capital'? Illustrate your answer.
13. Explain the importance of Working Capital cycle in the Working Capital management. *[C.U. B.Com. (H), 1983, 1994]*
14. State the factors to be considered to forecast Working Capital requirements. *[C.U. B.Com. (H), 1991, 1995, 1995]*
15. What do you mean by negative Working Capital? What is its significance? *[C.U. B.Com. (H), 1997]*
16. Explain the liquidity profitability tangle in Working Capital management. *[C.U. B.Com. (H), 2005]*
17. Explain how the Operating Cycle period can be reduced. *[C.U. B.Com. (H), 2006]*
18. What do you understand by gross Working Capital and Net Working Capital? Give examples. *[C.U. B.Com. (H), 2007]*
19. Define and distinguish between Permanent Working Capital and fluctuating Working Capital. *[C.U. B.Com. (H), 2008]*
20. Write short notes on Working Capital Leverage. *[C.U. B.Com. (H), 2008]*
21. State the Operating Cycle concept of Working Capital. *[C.U. B.Com. (H), 2009]*
22. Write short notes on Hard Core Current Assets. *[C.U. B.Com. (H), 2010]*
23. What do you mean by negative Working Capital? What are its implications? *[C.U. B.Com. (H), 2011]*
24. Distinguish between fixed and Variable Working Capital of a firm. *[C.U. B.Com. (H), 2012]*

B. Essay Type Questions **(10 Marks)**

1. (a) What do you mean by Working Capital cycle? What are the factors on which the duration of cycle depends.
   (b) State the importance of Working Capital in managing a business. *[C.U. B.Com. (H), 1983, 1991]*
2. What are the factors of determining Working Capital of a manufacturing company? *[C.U. B.Com. (H), 2014]*

3. (a) What do you mean by permanent and temporary Working Capital?
   (b) State the factors to be considered in determining Working Capital of a firm.
   [C.U. B.Com. (H), 2014]
4. State the factors which determine Working Capital requirements of a manufacturing firm. *[C.U. B.Com. (H), 2007]*

C. Practical Problems

1. A company has prepared its annual budget, relevant details are given below.
   (a) Sales ₹46.80 lakhs: 78,000 units
   25% cash sales and balance on credit
   (b) Raw material cost: 60% of sales value
   (c) Labour cost: ₹6 per unit
   (d) Variable overheads: ₹1 per unit
   (e) Fixed overheads: ₹5 lakhs (including ₹1,10,000 as depreciation)
   (f) Budgeted stock levels:
   Raw materials: 3 weeks
   Work-in-progress: 1 week (Material 100%, Labour and overheads 50%)
   Finished goods: 2 weeks
   (g) Debtors are allowed credit for 4 weeks.
   (h) Creditors allow 4 weeks credit.
   (i) Wages are paid bi-weekly, i.e., by the 3rd week and by the 5th week for the 1st and 2nd weeks and the 3rd and 4th weeks, respectively.
   (j) Lag in payment of overheads: 2 weeks
   (k) Cash-in-hand required: ₹50,000
   Prepare the Working Capital budget for a year for the company, making whatever assumptions that you may find necessary. [1 year = 52 weeks]
   [Ans. Raw Material: ₹1,62,000 Work-in-Progress: ₹63,000 Finished Goods: ₹1,44,000 Debtors: ₹2,70,000 Creditors: ₹2,16,000 Net Working Capital: ₹4,37,000]
2. A Company provided the following data:

	Per unit cost (₹)
Raw Materials	52.00
Direct Labour	19.50
Overheads	39.00
Total Cost	110.50
Profit	19.50
Selling Price	130.00

The following additional information is available:
   (a) Average raw materials in stock: 1 month.

(b) Average materials in process: ½ month
(c) Average finished goods in stock: 1 month
(d) Credit allowed by suppliers: 1 month
(e) Credit allowed to debtors: 2 months.
(f) Time lag in payment of wages: 1½ weeks.
(g) Overheads: 1 month
(h) One-fourth of sales is on cash basis.
(i) Cash balance is expected to be ₹1,20,000.

You are required to prepare a statement showing the Working Capital needed to finance a level of activity of 70,000 units of annual output. The production is carried throughout the year on even basis and wages and overheads accrue similarly. (Calculation be made on the basis of 30 days a month and 52 weeks a year.)

[Ans. Raw Material: 3,03,333 Work-in-Progress: ₹2,36,979 Finished Goods: ₹6,44,583 Debtors: ₹15,16,667 Creditors: ₹3,03,333 Net Working Capital: ₹22,51,354]

3. From the following details, prepare an estimate of the requirement of Working Capital:

Production	60,000 units
Selling price per unit	₹5
Raw materials	60% of selling price
Direct Labour	10% of selling price
Overheads	20% of selling price
Materials in hand	2 months
Production time	1 month
Finished goods in stores	3 months
Credit for materials	2 months
Credit allowed to customers	3 months
Average cash balance	₹20,000

Wages and overheads are paid at the beginning of the month following. In production, all the required materials are charged in the initial stage and wages and overheads accrue evenly.

[Ans. Raw Material: ₹30,000 Work-in-Progress: ₹18,750 Finished Goods: ₹67,500 Debtors: ₹75,000 Creditors: ₹30,000 Net Working Capital: ₹1,73,750]

4. A proforma cost sheet of a company provides the following particulars:

Element of Cost	Amount per unit (₹)
Raw materials	80
Direct labour	30
Overhead	60
Total cost	170
Profit	30
Selling price	200

The following further particulars are available:

Raw materials are in stock on an average for 1 month. Materials are in process on an average for ½ month. Finished goods are in stock on an average for 1 month. Credit allowed by suppliers is 1 month. Credit allowed to customers is 2 months. Lag in payment of wages is 1½ weeks. Lag in payment of overhead expenses is 1 month. One-fourth of the output is sold against cash. Cash in hand and at bank is expected to be ₹ 25,000.

You are required to prepare a statement showing the Working Capital needed to finance a level of activity of 1,04,000 units of production.

You may assume that production is carried on evenly throughout the year, wages and overheads accrue similarly and a time period of 4 weeks is equivalent to a month.

[Ans. Raw Material: ₹6,40,000 Work-in-Progress: ₹6,80,000 Finished Goods: ₹13,60,000 Debtors: ₹47,45,000 (ex profit) Creditors: ₹6,40,000 Net Working Capital: ₹35,35,000]

5. A proforma cost sheet of a company provides the following particulars:

Elements of Cost	
Material	40%
Direct Labour	20%
Overheads	20%

The following further particulars are available:

(a) It is proposed to maintain a level of activity of 2,00,000 units.
(b) Selling price is ₹12 per unit.
(c) Raw materials are expected to remain in stores for an average period of 1 month.
(d) Materials will be in process, on average of ½ month.
(e) Finished goods are required to be in stock for an average period of 1 month.
(f) Credit allowed to debtors is 2 months.
(g) Creditor allowed by suppliers is 1 month.

You may assume that sales and production follow a consistent pattern.

You are required to prepare a statement of Working Capital requirements, a forecast Profit and Loss Account and Balance Sheet of the Company assuming that:

	₹
Share Capital	15,00,000
8% Debentures	2,00,000
Fixed Assets	13,00,000

[Ans. Raw Material: ₹80,000 Work-in-Progress: ₹80,000 Finished Goods: ₹1,60,000 Debtors: ₹3,20,000 (ex profit) Creditors: ₹80,000 Net Working Capital: ₹5,60,000 GP: ₹4,80,000 Net Profit: ₹4,64,000 Balance Sheet total: ₹22,44,000]

6. Using the following data, calculate Working Capital cycle for A Ltd. (₹ in '000)

Average Raw materials—3,000

Average work-in-progress—2,800
Average finished stock—8,000
Average Debtors—10,000
Average Creditors—600
Total raw materials—24,000
Total Cost of Production—90,000
Total Credit Sales—1,50,000
Total Credit Purchases—30,000
(Assuming 360 days in a year)

[Ans. Raw Material Conversion Period: 45 Days, Work-in-Progress Conversion Period: 11 Days Finished Goods Conversion Period: 32 Days Creditors Payment Period (Creditors Payment Period): 24 Days DP: 7 Days Net Operating Cycle: 105 Days]

7. From the following data, compute the duration of Operating Cycle for each of the 2 years and comment on the increase/decrease:

Particulars	Year 1	Year 2
Stock:		
Raw Materials	20,000	27,000
WIP	14,000	18,000
Finished Goods	21,000	24,000
Purchases	96,000	1,35,000
Cost of goods sold	1,40,000	1,80,000
Sales	1,60,000	2,00,000
Debtors	32,000	50,000
Creditors	16,000	18,000

Assume 350 days per year for computational purposes.

[Ans: Net Operating Cycle: 177 Days, 198 Days]

8. From the following particulars compute the Net Operating Cycle Period of X Ltd. (Assuming 360 days in a year.)

Particulars	1 April 2015	31 March 2015
Stock of Raw Materials	33,000	51,000
Stock of WIP	35,000	43,000
Stock of Finished Goods	36,000	18,000
Sundry Debtors	50,000	40,000
Sundry Creditors	32,000	48,000

Additional information for the year ended 31 December 2015:

i) Sales: ₹5,40,000
ii) Purchases of raw materials: ₹4,50,000
iii) Manufacturing expenses: ₹44,000
iv) Distribution expenses: ₹14,000

[Ans. Raw Material Conversion Period: 35 Days, PP: 30 Days, Finished Goods Conversion Period: 20 Days, Debtors: 30 Days, Creditors: 32 Days, Net Operating Cycle: 83 Days]

9. From the following data, compute the duration of Operating Cycle for each of the 2 years and comment on the increase/decrease:

Particulars	Year 1	Year 2
Stock of Raw Materials	75,000	1,05,000
Stock of WIP	54,000	72,000
Stock of Finished Goods	70,000	1,20,000
Debtors	75,000	1,35,000
Creditors	60,000	62,500
Raw Materials consumed	4,50,000	6,75,000
Cost of Production	5,40,000	7,20,000
Cost of goods sold	7,20,000	10,80,000
Sales	9,00,000	13,50,000
Purchases	4,80,000	7,50,000

Assume 350 days per year for computational purposes.

[Ans: Net Operating Cycle: 116 Days, 138 Days]

10. From the following data provided by a manufacturing enterprise, compute the Working Capital requirement to finance an activity level of 60%:

(i) Production capacity: 2,00,000 units p.a.
(ii) Selling price per unit: ₹25
(iii) Cost of raw materials: 40% of selling price
(iv) Cost of labour: 20% of selling price
(v) Overhead (including depreciation ₹1,20,000): ₹6,00,000
(vi) Planned stock will include raw materials for ₹1,50,000 and 20,000 units of finished goods.
(vii) Materials will stay in the process for 1 month.
(viii) 40% of purchases were made against cash.
(ix) 20% of sales were made against cash.
(x) Credit allowed to debtors: 1½ months.
(xi) Credit allowed by creditors: 2 months.

(xii) Lag in wage payment: ½ month.
(xiii) Bank Overdraft: ₹2,00,000
(xiv) Cash in hand: ₹82,000
(xv) Production is carried on evenly during the year and wages and overheads accrue in the same way.

[Ans. Raw Material: ₹1,50,000 Work-in-Progress: ₹1,45,000 Finished Goods: ₹3,80,000 Debtors: ₹2,88,000 (incl profit) Creditors: ₹1,20,000 Net Working Capital: ₹7,00,000]

11. From the following data provided by a manufacturing enterprise, compute the Working Capital requirement:
(i) Expected annual sales: ₹2,08,000
(ii) Cost of raw materials: 60% of sales
(iii) Expenses: 15% of sales
(iv) Profit: 25% of sales
(v) Credit allowed to debtors: 6 weeks
(vi) Credit allowed by creditors: 6 weeks
(vii) Raw materials in store: 4 weeks
(viii) Processing period: 2 months
(ix) Finished goods in store: 3 months
(x) Bank Overdraft: ₹20,000
(xi) Cash in hand: ₹10,000
(xii) Bills Payable: ₹8,000
(xiii) Production is carried on evenly during the year and expenses accrue in the same way.

[Ans. Raw Material: ₹9,600 Work-in-Progress: ₹21,600 Finished Goods: ₹36,000 Debtors: ₹24,000 (incl profit) Creditors: ₹14,400 Net Working Capital: ₹86,800]

12. From the following information, estimate the Working Capital requirement:
(i) Annual production: 15,600 units
(ii) Selling price per unit: ₹12
(iii) Per unit raw material cost: ₹5
(iv) Per unit labour cost: ₹4
(v) Per unit overhead cost: ₹2
(vi) Raw materials in store: 3 weeks
(vii) Processing period: 4 weeks
(viii) Finished goods in store: 5 weeks
(ix) Credit allowed to debtors: 4 weeks
(x) Credit allowed by creditors: 3 weeks
(xi) Lag in wage and overhead payment: 2 weeks
(xii) Production is carried on evenly during the year and wages and overheads accrue in the same way.

[Ans. Raw Material: ₹4,500 Work-in-Progress: ₹9,600 Finished Goods: ₹16,500 Debtors: ₹14,400 (incl profit) Creditors: ₹4,500 Net Working Capital: ₹36,900]

13. From the following data provided by a manufacturing enterprise, compute the Working Capital requirement to finance an activity level of 60%:
    (i) Production capacity: 40,000 units p.a.
    (ii) Selling price per unit: ₹16
    (iii) Per unit raw material cost: ₹6
    (iv) Per unit labour cost: ₹3
    (v) Per unit overhead cost: ₹4
    (vi) Raw materials in store: 2 months
    (vii) Processing period: ½ month
    (viii) Finished goods in store: 1 month
    (ix) Credit allowed to debtors: 3 months
    (x) Credit allowed by creditors: 1½ months
    (xi) Lag in wage payment: ½ month
    (xii) No lag in payment of overheads.

    [Ans. Raw Material: ₹24,000 Work-in-Progress: ₹9,500 Finished Goods: ₹26,000 Debtors: ₹96,000 (incl profit) Creditors: ₹18,000 Net Working Capital: ₹1,34,500]

14. From the following data provided by Q Ltd., compute the Working Capital requirement:
    Activity level: 3,00,000 units of output p.a.
    Selling price per unit: ₹50
    Per unit raw material cost: ₹20
    Per unit labour cost: ₹5
    Per unit overhead cost: ₹15
    Raw materials in store: 2 months
    Processing period: ½ month
    Finished goods in store: 1 month
    Credit allowed to debtors: 2 months
    Credit allowed by creditors: 1 month
    Expected minimum cash balance: ₹25,000
    Production is carried on evenly during the year.

    [Ans. Raw Material: ₹10,00,000 Work-in-Progress: ₹3,75,000 Finished Goods: ₹10,00,000 Debtors: ₹25,00,000 (incl profit) Creditors: ₹5,00,000 Net Working Capital: ₹44,00,000]

15. From the following information, compute the Working Capital requirement:
    (i) Activity level: 10,400 units of output p.a.
    (ii) Selling price per unit: ₹5
    (iii) Cost of raw materials: 40% of sales
    (iv) Cost of labour: 10% of sales

(v) Overhead: 30% of sales
(vi) Profit: 20% of sales
(vii) Credit allowed to debtors: 2 months
(viii) Credit allowed by creditors: 2 months
(ix) Raw materials in store: 2 months
(x) Processing period: 6 weeks
(xi) Finished goods in store: 6 weeks
(xii) Lag in wage and overhead payment: 2 weeks
(xiii) Cash in hand: ₹10,000
(xiv) Production is carried on evenly during the year and expenses accrue in the same way. Assume 1 month = 4 weeks.

[Ans. Raw Material: ₹3,200 Work-in-Progress: ₹3,600 Finished Goods: ₹4,800 Debtors: ₹8,000 (incl profit) Creditors: ₹3,200 Net Working Capital: ₹25,600]

16. From the following information provided by P Ltd., compute the Working Capital requirement:
(i) Expected annual sales: ₹3,60,000
(ii) Cost of raw materials: 50% of sales
(iii) Expenses: 30% of sales
(iv) Profit: 20% of sales
(v) Credit allowed to debtors: 2½ months
(vi) Credit allowed by creditors: 1½ months
(vii) Raw materials in store: 1 month
(viii) Processing period: 2 months
(ix) Finished goods in store: 4 months
(x) Cash in hand: ₹6,000
(xi) Bank Overdraft: ₹1,00,000
(xii) Production is carried on evenly during the year and expenses accrue in the same way.

[Ans. Raw Material: ₹15,000 Work-in-Progress: ₹39,000 Finished Goods: ₹96,000 Debtors: ₹75,000 (incl profit) Creditors: ₹22,500 Net Working Capital: ₹1,08,500]

17. From the following information provided by Z Ltd., compute the Working Capital requirement:
(i) Expected monthly sales: 16,000 units @ ₹10 per unit
(ii) Cost of raw materials: 40% of sales
(iii) Cost of labour: 30% of sales
(iv) Overhead: ₹8,000 per week
(v) Stock will include raw materials for ₹48,000 and 8,000 units of finished goods.
(vi) Credit allowed to debtors: 5 weeks
(vii) Credit allowed by creditors: 1 month
(viii) Processing period: 2 weeks

(ix) Lag in overhead payment: 2 weeks
(x) Production is carried on evenly during the year and expenses accrue in the same way.

[Ans. Raw Material: ₹48,000 Work-in-Progress: ₹52,000 Finished Goods: ₹72,000 Debtors: ₹2,00,000 (incl profit) Creditors: ₹64,000 Net Working Capital: ₹2,92,000]

18. From the following data provided by M Ltd., compute the Working Capital requirement:
Activity level: 1,56,000 units of output p.a.
Selling price per unit: ₹265
Per unit raw material cost: ₹90
Per unit labour cost: ₹40
Per unit overhead cost: ₹75
Raw materials in store: 1 month
Processing period: 2 weeks
Finished goods in store: 1 month
Credit allowed to debtors: 2 months
Credit allowed by creditors: 1 month
Lag in payment of wages: 1½ weeks
Lag in payment of overhead: 1 month
20% of output is sold against cash.
Expected minimum cash balance: ₹60,000
Production is carried on evenly during the year and wages and overheads accrue in the same way.

[Ans. Raw Material: ₹10,80,000 Work-in-Progress: ₹8,85,000 Finished Goods: ₹24,60,000 Debtors: ₹50,88,000 (incl profit) Creditors: ₹10,80,000 Net Working Capital: ₹74,13,000]

19. From the following data provided by K Ltd., compute the Working Capital requirement:
Activity level: 1,20,000 units of output p.a.
Selling price per unit: ₹100
Per unit raw material cost: ₹30
Per unit labour cost: ₹20
Per unit overhead cost: ?
Per unit profit: 25% of selling price
Raw materials in store: 1 month
Processing period: ½ month
Credit allowed to debtors: 3 months
Credit allowed by creditors: 1½ months
Lag in payment of wages: ½ month
Lag in payment of overhead: 1 month
30% of output is sold against cash.

Expected minimum cash balance: ₹1,00,000

Production is carried on evenly during the year and wages and overheads accrue in the same way.

[Ans. Raw Material: ₹3,00,000 Work-in-Progress: ₹2,62,500 Debtors: ₹21,00,000 (incl profit) Creditors: ₹4,50,000 Net Working Capital: ₹19,62,500]

Note: There are no finished goods with the assumption that finished goods are sold immediately after the completion of production.

20. From the following data provided by N Ltd., compute the Working Capital requirement:

Annual Production: 60,000 units

Selling price per unit: ₹20

Per unit raw material cost: ₹12

Per unit labour cost: ₹2

Per unit overhead cost: 4

Raw materials in store: 2 months

Processing period: 1 month

Finished goods in store: 3 months

Credit allowed to debtors: 3 months

Credit allowed by creditors: 2 months

Expected cash balance: ₹10,000

Wages and overheads are paid in the beginning of the month following. In production, all the required materials are charged in the initial stage and wages and overheads accrue evenly.

What is the effect of double shift working on the Working Capital requirement?

[Ans.

Items	Single Shift (₹)	Double Shift (₹)
Raw materials	**1,20,000**	**2,40,000**
Work-in-Progress	**75,000**	**75,000**
Finished goods	**2,70,000**	**5,40,000**
Debtors	**3,00,000**	**6,00,000**
Creditors	**1,50,000**	**3,00,000**
Net Working Capital	**6,25,000**	**11,65,000**

Increase in Working Capital requirement: (₹11,65,000 – 6,25,000) / 6,25,000 = 86.4%]

21. From the following data provided by ABC Ltd., compute the Working Capital requirement to finance an activity level of 80%:

Production capacity: 1,30,000 units p.a.

Selling price per unit: ₹16

Cost of raw material: 40% of sales

Cost of labour: 25% of sales
Overhead: 15% of sales
Raw materials in store: 2 months
Processing period: 1½ months
Finished goods in store: 1½ months
Credit allowed to debtors: 1½ months
Credit allowed by creditors: 2 months
Lag in wage and overhead payment: 3 weeks
Cash in hand is to be maintained at the rate of 20% of Working Capital.

[Ans. Raw Material: ₹1,02,400 Work-in-Progress: ₹1,15,200 Finished Goods: ₹1,53,600 Debtors: ₹1,92,000 (incl profit) Creditors: ₹1,02,400 Net Working Capital: ₹5,28,000]

22. The per unit cost structure of X Ltd. which has been operating at a single shift till 31 December 2015 is as follows:
Unit cost of raw materials: ₹8
Unit labour cost (60% fixed): ₹6
Unit overhead cost (75% fixed): ₹4
Unit selling price: ₹20
Sales during the year 2015 amounted to ₹6,00,000. At 31 December 2015, the company held:
Stock of raw materials at cost: ₹50,000
Work-in-Progress at cost: ₹52,500
Finished goods at cost: ₹90,000
Sundry debtors: ₹1,50,000
In view of the increased market demand, it is proposed to double production by working an extra shift. It is expected that a 10% discount will be available from the suppliers of raw materials and selling price will be reduced by 5% in view of increased volume of business. The period of credit allowed to customers will remain the same. Credit availed from the suppliers will also remain unchanged, i.e., 2 months. Lag in wage and overhead payment will continue to remain at 1 month. Ascertain the additional Working Capital requirement.

[Ans.

Items	Single Shift (₹)	Double Shift (₹)
Raw materials	**50,000**	**90,000**
Work-in-Progress	**52,500**	**42,750**
Finished goods	**90,000**	**1,39,000**
Debtors	**3,42,500**	**5,56,750**
Creditors	**40,000**	**72,000**
Net Working Capital	**2,77,500**	**4,51,250**

Increase in Working Capital requirement: (₹4,51,250 – ₹2,77,500) = ₹1,73,750]

6 CHAPTER Working Capital Management (II)

CHAPTER OUTLINE

6.1 Source of Finance to Meet Working Capital Requirement
6.2 Financing Current Assets: Strategies of Financing
6.3 Bank Financing—Recommendations of Tandon Committee and Chore Committee
6.4 Management of Cash
6.5 Receivables Management
6.6 Inventory Management
6.7 Tools and Techniques of Inventory Management
6.8 Summary

6.1 SOURCE OF FINANCE TO MEET WORKING CAPITAL REQUIREMENT

Working Capital management is the process of financing and administration of the firm's Current Assets (CA). Once the financial manager has estimated to invest in Current Assets such as raw material, working-in-progress, finished goods, debtors, etc., the next step is that he/she must arrange funds for Working Capital.

6.1.1 Different Sources of Working Capital

The finance manager should make use of both long-term and short-term sources of funds in a way that the overall cost of Working Capital is the lowest and the funds are available on time and for the period they are really needed.

Now let us discuss in detail the various sources of finance, which are mainly available for Working Capital and their relative merits and demerits. The financial manager must consider different aspects such as cost, flexibility, reliability and restrictions whenever he selects sources of finance (Figure 6.1), for working capital.

Financing Working Capital through Long-term Sources

The fund which is required for 5–20 years and above is called long-term fund. Financing of Working Capital through long-term sources provides reduction of risk and increases the

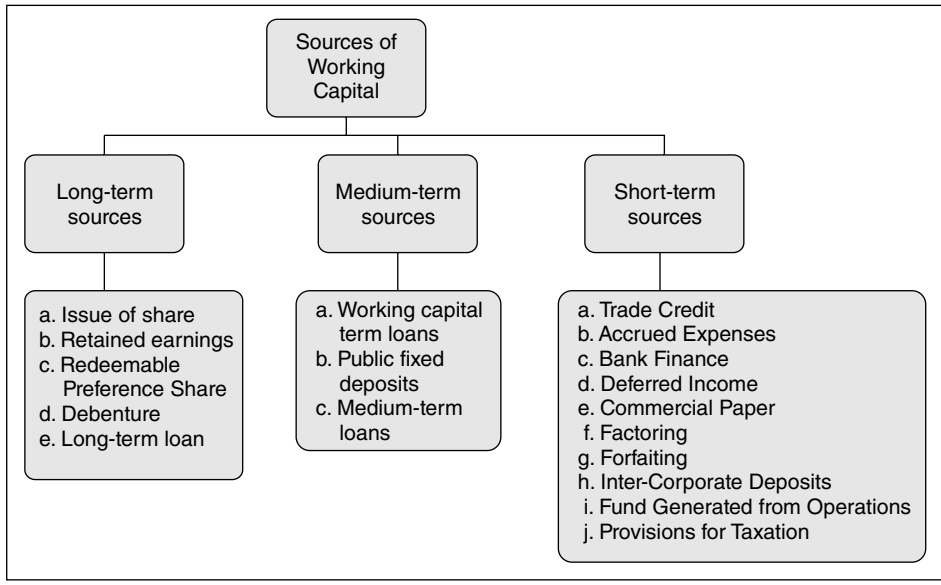


Figure 6.1 Flowchart Showing Different Sources of Finance Available for Working Capital

liquidity. Some of the long-term sources of working capital like share capital and retained earnings are permanent in nature. This means that the enterprise may have its interrupted use for an unlimited duration. These long-term sources can be raised through the following methods:

1. ***Issue of shares:*** Issue of shares is the most important sources for raising the long-term or Permanent Working Capital. Shares are of two types—Equity shares and preference shares. Maximum amount of permanent Working Capital should be raised by the issue of equity shares.
2. ***Retained earnings:*** It means the reinvestment by a concern of its surplus earning in its business. This is a part of the earned profits that may be ploughed back by the firm in meeting their Working Capital needs. It is an internal source of finance and is the most suitable.
3. ***Redeemable preference shares:*** Preference shares are those which carry the following preferential rights over other classes of shares:
   - A preferential right to payment of fixed dividend over equity shareholder.
   - A preferential right to repayment of capital in case of winding up of the company to other classes of shares.

   Redeemable preference shares are those which can be redeemed during the lifetime of the company. According to the Companies Act, 2013, no company can now issue preference shares which are irredeemable or redeemable after 20 years from the date of their issue.

4. ***Debentures:*** A debenture is an instrument issued by the company acknowledging its debt to its holder. It is also an important source of long-term Working Capital. The firm issuing debenture also enjoys a number of benefits, such as Trading on Equity, retention of control, tax benefit, etc.
5. ***Long-term loans:*** Financing institutions such as commercial banks, Life Insurance Corporation of India, Industrial Finance Corporation of India, State Financial Corporations, Industrial Development Bank of India, etc. provide long-term and medium-term loans. This type of finance is ordinarily repayable in instalments.

Financing Working Capital through Medium-term Sources

The funds which are basically required for a period of 2–5 years are called medium-term funds. Previously the commercial banks were concentrating on short-term and medium-term loans in the form of Working Capital loans whereas the financial institutions such as IDBI, ICICI and IFCI were concentrating on long-term funds. But, recently, the commercial banks have also entered into providing medium-term as well as long-term funds to trade and industry, either independently or sometimes in collaboration with one or more specialised financing institutions. The medium-term funds can be raised through the following methods:

1. ***Working Capital term loans:*** It refers to the quantum of credit that a bank should disburse. The banks usually sanction 'Working Capital term loans' which the borrower is to repay in a phased manner. Such repayment time allowed is a maximum of 5 years. To put a pressure on the borrower for early repayment of such loan, the banks generally charge 1% higher rate on such loans over and above the rates charged in cash credit account.
2. ***Public fixed deposits:*** Public deposits are the fixed deposits accepted by a business enterprise directly from public deposit as source finance have many advantages such as simple and convenient source of finance, taxation benefits, inexpensive sources of finance, etc.
3. ***Medium-term loans:*** These loans are generally provided by banks or financial institutions. The period of loans varies from 3 to 5 years. The investment of these loans from funds is in plant and machinery, vehicle and certain other equipment. The procedures of granting such loan may not be as high as in the case of long-term loans. In addition, in most cases consortium finance may not be required.

Financing Working Capital through Short-term Sources

Funds available for a period of 1 year or less are called short-term sources of finance. They are raised from sources, which can provide funds only for short period quickly, and its cost is less than the funds raised from long-term sources. The day-to-day expenses incurred in the routine operations of a firm are financed by short-term funds. These funds are usually met by taking short-term loans or getting the bills discounting from the commercial banks. Spontaneous sources and bank loans are important sources of short-term funds. The source of short-terms finances are discussed as follows:

1. ***Trade credit:*** Trade Credit refers to the credit that a buyer gets from suppliers of goods in the normal course of business. In practice, the buying firms do not have to pay cash immediately for the purchases made. This deferral of payments is a short-term financing called trade credit. This source of financing contributes to about *one-third of the total short-term Working Capital requirements* of Indian firms. The dependence on this source is higher due to lesser cost of finance as compared with other sources. Small and new firms are usually more dependent on the trade credit, as they find it difficult to obtain funds from other sources.
2. ***Accrued expenses:*** Accrued expenses represent a liability that a firm has to pay for the services which it has already received. It is an interest-free source of finance. In these cases, the amount may be due but the payments are not paid immediately. These are used by the firm incurring such expenses till the time they are accrued. Since these expenses are not yet in the accountant's general ledger, they will not appear on the financial statements unless an adjusting entry is entered prior to the preparation of the financial statements. However, postponement of salary and wages beyond normal level will affect the morale of the employees, resulting in reduced efficiency and higher labour turnover. The most common accrued expenses are salary, wages and taxes. For example, a firm may have a policy of paying salary and wages on a monthly basis. The longer the payment interval, the greater the amount of funds provided by the employees. Similarly, the sales commission or target incentives, sales tax, etc. are always payable with a time lag.
3. ***Bank finance:*** Working Capital advance by commercial banks represents the most important source for financing Current Assets. In India, banks are the main institutional sources of Working Capital finance. After trade credit, bank credit is the most important source of financing Working Capital requirements. The firm gives an assessment of its Working Capital requirement on the basis of firm's sales and production plans and the desirable levels of Current Assets to the bank. On this request, the bank provides a credit limit to the firm, which the firm can use as per the need. Credit limit is the maximum funds which a firm can obtain form the banking system. The various forms of bank finance are as follows:
   - ***(i) Cash credit:*** Under a cash credit arrangement, a pre-determined limit for borrowing is specified by the bank. It is an arrangement by which a banker allows his customer to borrow money up to a certain limit. He is not required to borrow the entire sanctioned credit once, rather, he can draw periodically to the extent of his requirements and repay by depositing surplus funds in his cash credit account. There is no commitment charge; therefore, interest is payable on the amount actually utilised by the borrower; cash credit limits are sanctioned against the security of Current Assets. The interest is charged at the specified rate on the amount withdrawn and for the relevant period.

(ii) ***Overdraft:*** A firm, already having a current account with a banker is allowed to withdraw above the balance in the current account. This withdrawal facility is called 'overdraft'. The amount so overdrawn may be repaid by depositing back in the current account as and when the firm wants. The firm need not get permission from the banker every time it is overdrawing but onetime approval is necessary. However, a bank can review and modify the overdraft limit at any time. It is a very flexible arrangement from the borrower's point of view since he can withdraw and repay funds whenever he desires within the overall stipulations. Interest is charged on daily balances—on the amount actually withdrawn—subject to some minimum charges.

(iii) ***Note lending:*** Note lending is different from cash credit and overdraft account. It is not a running account. Note lending is sanctioned for a period of about 2–3 months. It is a form of loan given to a borrower against promissory notes/debt instruments. Interest is charged on the complete loan amount sanctioned unlike cash credit or overdraft account, where interest is charged only on the utilised or withdrawn amount. Note lending is not as popular as cash credit or overdraft arrangement.

(iv) ***Discounting of bills/purchase of bill:*** The company which sells goods on credit will normally draw a bill on the buyer who will accept it and send it to the seller of goods. To convert such debt instruments into cash immediately, the firm submits them into the bank, which encashes these instruments at a fee known as 'discounting'. The banks give short-term advances to their customers by discounting the bills of exchange. The discount depends upon the amount of the bill, the maturity period and the prime lending rate prevailing at that time. The bills may be payable on demand or on maturity. Whenever bills payable on demand is discounted, it is called ***bills purchased***, and when the bills payable at maturity is discounted by bank, it is called ***bills discounting***. Before purchasing or discounting the bills, the bank satisfies itself as to the creditworthiness of the drawer. Though the term bills purchased implies that the bank becomes owner of the bills, in practices, bank holds bills as security for the credit.

(v) ***Letter of credit:*** A letter of credit (L/C) is an arrangement whereby a bank helps its customer to obtain credit from its (customer's) suppliers. A bank opens an L/C in favour of a customer to facilitate his purchase of goods. If the customer does not pay to the supplier within the credit period, the bank makes the payment under the L/C arrangement. Unlike cash credit or overdraft facility, the L/C arrangement is an indirect financing; the bank will make payment to the supplier on behalf of the customer only when he fails to meet the obligation. Letter of credit is popularly used in international trade. Suppliers, particularly the foreign suppliers, insist that the buyer should ensure that his bank will make the payment if he fails to honour its obligation. This is ensured through a letter of credit (L/C) arrangement.

(vi) ***Bank guarantees:*** Bank guarantee is one of the facilities that the commercial banks extend on behalf of their clients in favour of third parties who will be the beneficiaries of the guarantees.

(vii) ***Line of credit:*** Line of Credit is a commitment by a bank to lend a certain amount of funds on demand specifying the maximum amount.

4. ***Deferred Income:*** Deferred Income represents funds received by the firm for goods and services which it has agreed to supply in future. These receipts increase the firm's liquidity in the form of cash; therefore, they constitute an important source of financing. For example, advance payments made by customers constitute the main item of Deferred Income. These payments are common in case of expensive products such as boilers, turnkey projects and large contracts or where the product is in short supply and the seller has strong bargaining power as compared to the buyer. These payments are not recorded as revenue until goods and services have been delivered to the customers. They are, therefore, shown as a liability in the firm's balance sheet.
5. ***Commercial Papers:*** Commercial Papers (CP) are debt instruments with fixed maturity period issued by corporate for raising short-term resources from the money market. These are unsecured debts of corporate. This is an instrument that enables highly rated corporate borrowers for short-term borrowings and provides an additional financial instrument to investors with a freely negotiable interest rate. Corporate bodies need to have a good Balance Sheet and high credit rating for registering themselves with the Reserve Bank of India to participate in Commercial Paper market. The maturity period ranges from minimum 7 days to less than 1 year from the date of issue. CP can be issued in denomination of ₹5 lakh or multiples there of. Commercial Papers are issued at a discount and have a buyback facility.
6. ***Factoring:*** Factoring is a financial innovation. It is a method of financing whereby a firm sells its trade debts at a discount to a financial institution. In other words, factoring is a continuous arrangement between a financial institution, (namely the factor) and a firm (namely the client) which sells goods and services to trade customers on credit. As per this arrangement, the factor purchases the client's trade debts including accounts receivables either with or without recourse to the client, and thus, exercises control over the credit extended to the customers and administers the sales ledger of his client. To put it in a layman's language, a factor is an agent who collects the dues of his client for a certain fee.

   It is both a financial and management support to the customers. It is a business activity in which a financial intermediary takes over the whole responsibility of collecting a firm's receivables. The factor fully manages the sales ledger and provides with credit control and collection services of all the outstanding debts. The invoices that are issued upon a sale are sent to the factor that typically advances upto 80–90% of the invoice amount to the seller. The balance, less charge, is paid when the customer makes payment

directly to the factor. These services are disclosed to the customer who typically receives a letter from the factor, or attached note to your invoice, containing payment instructions to the factor.

7. ***Forfaiting:*** Forfaiting refers to discounting of future trade-related receivables under credit, made available by exporters to the customers. Forfaiting is the process of purchasing receivables from exporters; the forfaiter assumes all the risks associated with receivables. Unlike factoring, which is firm-based, forfaiting is transaction-based. In factoring, a firm sells all its receivables to a factoring service provider, whereas in forfaiting, the firm sells the receivables arising out of one of its transactions, generally international sales. Forfaiting assumes political transfer and commercial risks and is generally availed by exporters. Forfaiting helps exporters to encash the trade credit in international trade transactions.
8. ***Inter-Corporate Deposits (ICD):*** Sometimes, the companies borrow funds for a short-term period; say up to 6 months, from other companies, which have surplus liquidity for the time being. The ICD are generally unsecured and are arranged by a financier. The ICD are very common and popular in practice, as these are not influenced by the legal hassles. The convenience is the basic virtue of this method of financing.
9. ***Funds generated from operations:*** Funds generated from operations, during an accounting period, increase Working Capital by an equivalent amount. The two main components of funds generated from operations are profit and depreciation. Working Capital will increase by the extent of funds generated from operations. Students may refer to funds flow statement given earlier in this chapter.
10. ***Provision for taxation:*** Firms use to maintain provision for payment of taxes. Corporate taxes are paid after the firm has earned profits. These taxes are paid quarterly during the year in which profits are earned. This is a deferred payment of the firm's obligation and thus, is a source of finance.

6.2 FINANCING CURRENT ASSETS: STRATEGIES OF FINANCING

6.2.1 Working Capital Policies in Relation to Sales

There is an inevitable relationship between the sales and the Current Assets. The actual and the forecast sales have a major impact on the amount of Current Assets, which the firm must maintain. Thus, depending upon the sales forecast, the financial manager should also estimate the requirement of Current Assets. This uncertainty may result in spontaneous increase in Current Assets in line with the increase in sales level, and may bring the firm to a face-to-face tight Working Capital position (Figure 6.2).

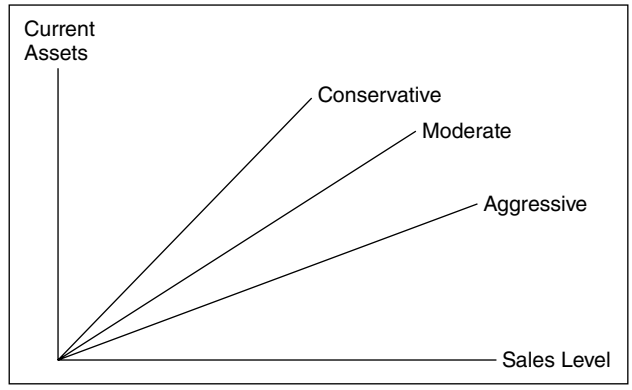


Figure 6.2 Different Types of Working Capital Policies

In order to overcome this uncertainty, the financial manager may establish a minimum level as well as a safety component for each of the current asset for different levels of sales. There are three types of Working Capital policies which a firm may adopt, i.e. conservative, moderate and aggressive Working Capital policy. These policies describe the relationship between sales level and the level of current asset and have been shown in Figure 6.2.

Figure 6.2 shows that in case of moderate Working Capital policy, the increase in sales level will be coupled with proportionate increase in level of current asset also, e.g. if the sales increase or are expected to increase by 10%, then the level of Current Assets will also increase by 10%. In case of conservative Working Capital policy, the firm does not like to take risk. For every increase in sales, the level of Current Assets will be increased more than proportionately. Such a policy tends to reduce the risks of shortage of Working Capital by increasing the safety component of Current Assets. The conservative Working Capital policy also reduces the risk of non-payment to liabilities. In case of aggressive working capital policy the firm use to take more risk. Here, for every increase in sale, the level of current assets with be increased less than proportionately. This policy require lower level of investment current assets, and hence attempts to increase the return on an investment. But at the same time the firm is likely to be exposed to a greater risk of non-payment of liabilities.

6.2.2 Alternative Strategies of Financing

After estimating the Working Capital for any firm, the next step is how to finance the Working Capital requirement. There are two sources of financing, working capital i.e. (i) Short-term and (ii) Long-term. For evaluating the alternative strategies of finance, we have not considered the 'mid-term source of Working Capital' separately. All the sources of working capital with more than one year has been treated as 'long-term sources'. Short-term financing refers to borrowing funds or raising credit for a maximum of 1-year period, i.e. the debt is payable within a year at the most, whereas, the long-term financing refers to the borrowing of funds

or raising credit for 1 year or more. The finance manager has to mix funds from these two sources optimally to ensure profitability and liquidity. The mixing of finances from long term and short term should be such that the firm should not face either short of funds or idle funds. The proportion of short-term and long-term sources for financing Current Assets will depend upon the consideration of a number of factors such as flexibility, cost, risk preference, demand and supply position in the money market and so on. There are five types of policies in practice. These are as follows:

1. Hedging or Matching Policy
2. Conservative Policy
3. Aggressive Policy
4. Highly Aggressive Policy
5. Zero Working Capital Strategy

1. Hedging or Matching Policy: The hedging approach is also known as the *matching approach.* The basic objective of this method of financing is that the permanent component of Current Assets and fixed assets would be met with long-term funds and the short term or seasonal variations in Current Assets would be financed with short-term debt.

This approach states that Permanent Working Capital should be financed with long-term capital (long-term liabilities + equity), and temporary Working Capital should be financed with short-term credit. For example, machine with a useful life of 5 years should be financed through a 5-year loan. Building can be financed by 25-year mortgage bond. Assets having useful life of 30 days may be financed with a 30-day borrowing.

Figure 6.3 shows that when the level of permanent Current Assets increases long-term finance also increases. Fluctuating Current Assets are financed entirely by short-term sources. Thus, when there is no need for fluctuating Current Assets there will be no short-term financing. But uncertainty about the lives of assets cause problem regarding application of matching plan. For example, a firm may finance receivables with a 30-day loan expecting its realisation and use the cash generated to retire the loan. But if debtors do not mature their obligations on time, cash will not be forthcoming and this will create financial problems.

The justification of the matching policy is that since the purpose of financing is to invest in an asset, the liability should be liquidated when the life of the asset expires. Use of long-term sources for financing short-term assets will be costly as the funds will remain idle after the expiry of assets lives. Similarly, financing long-term assets with short-term sources is inconvenient and costly as they are to be renewed on a continuous basis upto the lives of the assets concerned.

For example, if 15-year loan is used to purchase inventory having useful life of 60 days, then the financing will be too expensive as one will have to pay interest on the loan for

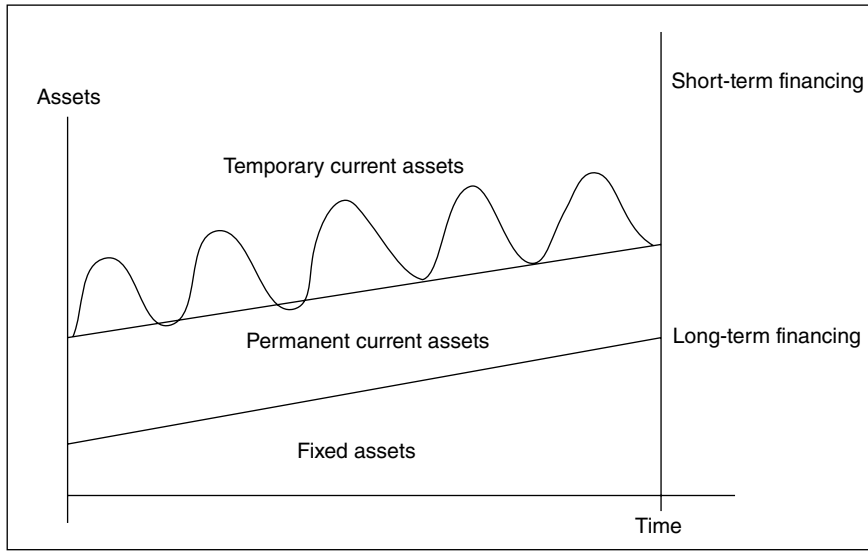


Figure 6.3 The Hedging/Matching Approach

15 years, and, thus, the funds will not be utilised for the full 15 years. Matching implies that the useful life of the asset should coincide with the payment period of the funds borrowed. However, practically, exact matching is not possible due to uncertainty in the useful life of the asset and paying capacity of the buyer.

Thus, when matching policy is followed:

Long-term fund = Fixed Assets + Hard core or permanent Current Assets
Short-term fund = Fluctuating (temporary or variable) Current Assets

2. ***Conservative Policy:*** A conservative strategy suggest not to take any risk in Working Capital management and to carry high levels of Current Assets in relation to sales. An exact maturity matching may be difficult in practice as stated above. A firm may adopt a conservative policy towards financing its fixed assets and Current Assets. It may be stated in general that larger the percentage of funds obtained from long-term sources, the more conservative is a firm's financing policy and vice versa. According to this plan, a firm wants to be safe by resorting to more and more long-term financing. Thus, when conservative policy is followed, it may take the following form:

Long term Fund = Fixed Assets + Hard core Current Assets + Part of fluctuating Current Assets
Short term Fund = Part of fluctuating assets

In this case, a firm meets its peak requirements only from short-term sources. When long-term funds will be released it may be invested in marketable securities to store liquidity during off season and apply the same to meet a part of its seasonal requirements. Availability of sufficient Working Capital will enable the smooth operational activities

of the firm and there would be no stoppages of production for want of raw material, consumables. The higher liquidity levels reduce the risk of insolvency. But lower risk translates into lower return. Large investments in Current Assets lead to higher interest and carrying costs and encouragement for inefficiency. But conservative policy will enable the firm to absorb day-to-day business risks and assures continuous flow of operations.

The advantage of this approach are higher sales volume, increased demand due to liberal credit policy and increased goodwill among the suppliers due to payment in short time. The disadvantages are increased Cost of Capital, higher risk of bad debts, shortage of liquidity in long run to longer Operating Cycles, etc.

3. ***Aggressive Policy:*** Under this approach Current Assets are maintained just to meet the Current Liabilities (CLs) without keeping any cushion for the variations in Working Capital needs. The Core Working Capital is financed by long-term sources of capital, and seasonal variations are met through short-term borrowings. Adoption of this strategy will minimise the investment in Net Working Capital and ultimately it lowers the cost of financing Working Capital. It is opposite to conservative approach, i.e. a firm may rely more on short-term sources than on long-term sources to finance its Current Assets. Thus, larger the percentage of funds obtained from short-term sources for financing Current Assets of a firm, the more aggressive is the financing policy and vice versa. But reliance on more and more short-term sources will be riskier as these sources will have to be renewed for financing a part of hard core Current Assets on a continuous basis. When an aggressive policy is followed, it may take the following form.

   Long term = Fixed Assets + Part of hard core Current Assets
   Short term = Part of hard core Current Assets + Fluctuating Current Assets

   The advantage of this approach is that lower level of fund is tied in the Working Capital which results in lower financial costs. The main drawback of this strategy is that it necessitates frequent financing and also increases risk as the firm is vulnerable to sudden shocks.In the long run, the firm stays behind the competitors.

4. ***Highly Aggressive Policy:*** Under this plan, even a part of fixed assets may be financed from short-term sources

   Long term = (Major) Part of fixed assets
   Short term = (Minor) Part of fixed assets + Entire Current Assets (hard core + fluctuating)

   The above financing policy will be highly risky to a firm as short-term sources will have to be renewed on a continuous basis not only for financing entire Current Assets but also for a part of fixed assets. In relation to Working Capital, it may be stated that when this policy is followed net Current Assets (Current Assets less Current Liabilities) will be always negative. Following highly aggressive policy accompanied by other symptoms may, therefore, expose a firm to failure or sickness.

5. ***Zero Working Capital Strategy:*** Zero Working Capital is a situation in which there is no excess of Current Assets over Current Liabilities to be funded. The concept is used

to drive down the level of investment required to operate a business, which can also increase the Return on Investment for shareholders. Management prefers low levels of Working Capital since Working Capital earns an extremely low rate of return. Some companies are now driving Working Capital to record low levels, so-called Zero Working Capital. There are two requirements to implement Zero Working Capital:

- ***Demand-based production:*** Demand-based organisations do everything only as they are demanded: fill customer orders, receive supplies, manufacture products and other functions are done only as needed. The production facilities run 24 hours a day non-stop according to the demands within the market place. There are no inventories; everything is supplied immediately as needed. The end result of this demand-driven organisation is that little, if any, Working Capital is necessary to run the business.
- ***Receivable and payable terms:*** The terms under which credit is granted to customers must be curtailed, whereas payment terms to suppliers must be extended. Ideally, cash should be received from customers before it is due for payment to suppliers. This essentially means that customer payments are directly funding the payments to suppliers.

For example, a computer manufacturer can insist upon cash in advance credit card payments from its customers, orders component parts from suppliers on credit, assembles them under a just-in-time system, and then pay its suppliers. The result can be not only Zero Working Capital, but even negative Working Capital. Zero Working Capital would call for a fine balancing act in Financial Management, and the success in this endeavour would get reflected in healthier bottom lines. Under this strategy,

Total Current Assets – Total Current Liabilities = Zero

6.2.3 Difference Between Conservative and Aggressive Strategies of Financing Current Assets

The main differences between conservative and aggressive strategies of financing Current Assets are explained in Table 6.1 as follows:

Table 6.1 Difference between Conservative and Aggressive Strategies of Financing Current Assets

Basis of Comparison	Conservative Strategies	Aggressive Strategies
1. Definition	A company is said to be conservative when it depends more on long-term source for satisfying its financial requirements.	A company is said to be aggressive when it depends more on short-term sources for satisfying its financial requirements.
2. Liquidity	Liquidity is high, because of heavy usage of long-term funds. It can take benefit of unexpected opportunities.	Liquidity is low due to greater reliability on short-term funds even for a part of long-term assets. It does not maintain idle funds and thus saves interest cost on them.

(Contd.)

Basis of Comparison	Conservative Strategies	Aggressive Strategies
3. Profitability	Under normal situation, profitability is lower in this strategy because of too much of idle and costly funds. Higher rate and greater amount of interest cost decreases the profitability.	Since, the interest cost is minimised in the strategy, higher profitability is attained.
4. Risk	There is very low risk of insolvency as higher level of liquidity is maintained in the business in the strategy.	There is high risk of insolvency due to extremely rigid liquidity position being maintained.
5. Asset utilisation	Too high level of Current Assets makes its assets utilisation ratio low.	Too low level of Current Assets makes the asset utilisation ratio high.
6. Working Capital	More Working Capital is needed to implement the conservatism. Higher Working Capital avoids all risks.	Vary low Working Capital is maintained which increases risk but saves the interest cost.
7. Cost	It is more costly.	It is less costly.

6.3 BANK FINANCING—RECOMMENDATIONS OF TANDON COMMITTEE AND CHORE COMMITTEE

Banks in India today constitute the major suppliers of Working Capital credit to any business activity. In addition to financial institutions, banks provide finance to industrial entrepreneurs in India. They provide finance in two ways—long-term loans to invest in the permanent assets and short-term loans for Working Capital finance. However, the interest rates are different for the two different loans—a higher interest rate is charged for long-term loans and a lower interest rate for Working Capital loans. This is because of two reasons. One, the long-term loans carry high risk and more administrative cost; second, when banks accept deposits from the public they pay higher interest for long-term deposits than for short-term deposits.

Due to these differences in interest paid, often firms take loan for Working Capital purpose but actually invest in fixed assets for long-term purpose. It has also been found that cheap bank credit has been used to build up disproportionate stocks of materials to realise trading profits. This results in loss of interest of the banks and slower economic development.

Thus, Reserve Bank of India (RBI) has appointed different study groups from time to time to suggest ways and means of making the bank credit an effective instrument for economic growth, industrialisation as well as to improve the profit of the banking sectors. Various Committees were also constituted by the RBI for the purpose of providing working capital finance and these committees suggested various recommendations. Reports submitted by the following committees are significant in this respect:

1. Dehejia Committee Report 1969
2. Tandon Committee Report 1974

3. Chore Committee Report 1980
4. Marathe Committee Report 1982
5. Chakravarthy Committee Report 1985
6. Kannan Committee Report 1997

However, we shall discuss on Tandon Committee Report and Chore Committee Report only.

6.3.1 Tandon Committee

Till mid-1970, the principle of commercial bank lending in India was predominantly security-oriented. It was more or less net worth-based, collateralised financing. Major Banks were nationalised in 1969 and with that the approach to lending is also changed. In 1974, as per the direction of RBI, a study group under the chairmanship of P. L. Tandon was formed to examine the existing methods of lending and suggest changes. The group submitted its report in August 1975, which came to be popularly known as the Tandon Committee Report. With the acceptance of major recommendation by the Reserve Bank of India, a new era of lending began in India.

The Tandon Committee suggests the banks to move towards need-based lending breaking away from the traditional methods of security-oriented lending. As per the recommendations of this Committee, the corporate should be discouraged from accumulating too much of stocks of Current Assets and should move towards very lean inventories and receivable levels. The committee even suggested the maximum levels of raw material, stock-in-process and finished goods which a corporate operating in an industry should be allowed to accumulate. These levels were termed as inventory and receivable norms.

The study group observed that there was no uniformity in approach among banks in assessing Working Capital requirement especially with regard to inventories (including safety stock) and receivables. Hence there is a need for fixing the norms for Current Assets. The study group felt that the banker had to finance only a part of the fund requirements of the borrower for carrying Current Assets, the remaining part must be found from owner's own funds, plough back of surplus and long-term borrowed funds.

The Important Terms of Reference for the Tandon Committee Group

The important terms of reference for the Tandon Committee Group were as follows:

1. To suggest guidelines for commercial banks to follow up and supervise credit from the point of view of ensuring proper end-use of funds and keeping a watch on the safety of advances.
2. To make recommendations for obtaining periodical information that may be obtained by banks from the borrower.
3. To make suggestions for prescribing inventory norms for different industries.
4. To suggest criteria regarding satisfactory Capital Structure and sound financial basis in relation to borrowings.

5. To suggest whether the existing patterns of financing Working Capital requirements by cash credit/overdraft system, etc. are required to be modified, if so, to suggest modifications.

Findings of the Committee

On the basis of the reference given above, the committee studied the existing system of Working Capital finance provided to the industry and identified the following as its major weaknesses.

1. The banks do not have any credit appraisal or planning. It is the borrower who decides how much he would borrow.
2. The security-based approach to lending has led to division of funds to purchase of fixed assets.
3. Bank credit is treated as the first source of finance rather than being taken as a supplementary to other sources of finance.
4. The Working Capital finance should be made available only for a short period, as it has otherwise, led to accumulation of inventories with the industry.

Recommendations of Tandon Committee

The committee has suggested the following in general for a well-functioning banking sector.

1. Assessment of the need-based credit of the borrower on a rational basis of their business plans.
2. Bank credit would be only supplementary to the borrowers' resources and not a replacement of them, i.e. bank would not finance 100% of borrowers' Working Capital requirement.
3. Bank should ensure proper end-use of bank credit by keeping a closer watch on the borrowers' business, and impose financial discipline on them.
4. Working Capital finance would be available to the borrower on the basis of industry-wise norms (prescribed first by the Tandon Committee and the Reserve bank of India) for holding different Current Assets, viz.
   - Raw material including stores and other items used in the manufacturing process
   - Stocks-in-process
   - Finished goods
   - Accounts receivable
   - Spares
5. Credit would be made available to the borrower in different components such as cash credit, bills purchased and discounted Working Capital term loan, etc. depending upon the nature of holding of various Current Assets.
6. In order to facilitate a close watch on the operation of the borrowers, bank would require them to submit, at regular intervals, data regarding their business and financial operations for both the past and future periods.

The major recommendations of the Committee are as follows:

1. ***Inventory and receivable norms:*** The borrowers are allowed to keep reasonable Current Assets particularly inventory and debtors. The normal Current Assets based on economic ordering levels and certain level of safety should be financed by banker. Finance to borrower in the form of Working Capital should not be made available for profit making or to keep excess inventory. Similarly, the bank should finance the bills receivable, which are in line with the practices of the borrower's industry. The norms have been worked out according to the time element. The limit of the raw materials is expressed as so many months of total consumption in the year. The work-in-progress limit determined as so many months of cost of production, the finished goods and bills receivable limits are determined by cost of sales and credit sales respectively. The Tandon Committee has suggested norms for 15 industries.
2. ***Lending norms or Maximum Permissible Bank Finance (MPBF):*** Tandon Committee introduced the concept of Maximum Permissible Bank Finance (MPBF) in the Working Capital finance by banker. The Committee suggested that bank should attempt to supplement the borrowers' resources in financing the Current Assets. It has recommended that the Current Assets first should be financed by trade creditors and other current liabilities. The remaining Current Assets, which is called *Working Capital gap*, should be financed particularly by bankers in the form of bank credit and through long-term borrowings or owner's funds. In the context of this approach, the committee has suggested *three alternative methods* for working out the MPBF. Each successive method reduces the involvement of short-term bank credit to finance the Current Assets.
   - **First method:** In the first method, 25% of the Working Capital Gap [CA–(CL excluding bank borrowing)] should be contributed by borrower through long-term funds and remaining 75% can be financed from bank borrowings. This method will give a minimum current ratio of 1:1. The term Working Capital gap refers to the total of CA less CL, other than bank borrowings. In this method,

     MPBF = 75% of (Current Assets – Current Liabilities other than bank borrowings)
   - **Second method:** Under this method, the borrower should provide 25% of the total Current Assets through long-term funds and this will give a current ratio of 1.33:1. In this method,

     MPBF = (75% of Current Assets) – (Current Liabilities other than bank borrowings)

Illustration 6.1

Problem

The maximum permissible bank borrowings as per the first and second method can be ascertained as follows:

Particulars	1st Method	2nd Method
A. Current Assets (CA)	1,00,000	1,00,000
B. Current Liabilities excluding bank borrowings (CL)	20,000	20,000
C. Working Capital Gap (CA – CL) or (A – B)	80,000	80,000
D. Borrowers contribution	25% of C or Working Capital gap through long-term source, i.e. 20,000	25% of A or Current Assets through long-term source, i.e. 25,000
E. Maximum Permissible Bank Finance (MPBF) (C – D)	60,000	55,000

Solution

The calculation of MPBF as per the second Method may be done in the following way also:

MPBF = (75% of Current Assets) – (Current Liabilities other than term borrowings)
= (75% of 1,00,000) – (20,000) = 75,000 – 20,000 = 55,000

- **Third method:** In this method, the borrower should contribute from long-term sources to the extent of core Current Assets (Fixed Current Assets) and 25% of the balance of the Current Assets. The remaining of the Working Capital gap can be met from bank borrowings. This method will further strengthen the current ratio to 1.5:1. In this method,

  MPBF = {75% of (Current Assets – Core Current Assets)} – Current Liabilities other than bank borrowing

Illustration 6.2

Problem

The maximum permissible bank borrowings as per the third method can be ascertained as follows:

	Amount (₹)
Total CA required by the borrower	100,000
Less: Core Current Assets (assumed)	8,000
Balance	92,000
25% to be provided by borrower through long-term funds (92000 × 25%)	23,000
Balance	69,000
Less: Current Liabilities (excluding bank borrowing) Maximum permissible bank borrowing	 20,000 49,000

(This method was not accepted for implementation and hence is of only academic interest).

- ***Suitability of lending method to bankers:*** The committee recommended the first method mainly as a stop-gap method till borrowers get used to the new approach of lending. The borrowers who are already in the second method would not be allowed to revert to the first stage. At present, all sanctions of Working Capital by banks are based on Method 2. The second method of lending is more acceptable to bankers since it provides more cushion to them as far as the quantum of margin is concerned compared to the first method of lending. Obviously, the amount of maximum permissible bank finance under the second method is lesser when compared to the first method.

3. ***Style of credit:*** The Tandon Committee also suggested that total MPBF should be bifurcated into two components:
   - Loan component represents the minimum level of borrowing throughout the year
   - Demand cash credit component, which would take care of the fluctuating needs and is required to be reviewed periodically.

   The demand cash credit component should be charged slightly higher interest rate than the loan components. This would provide the borrower an incentive for better planning. Apart from the loan component and cash credit component, a part of the total financing requirements should also be provided by way of bills limit to finance the seller's receivables. The proposed system of lending and the style of credit might be extended to all borrowers having credit limits in excess of ₹10 lakhs from the banking system.
4. ***Information and reporting system***: In order to ensure that the borrowers do not use the cash credit facility in an unplanned manner and they keep only required level inventories and receivables, the committee suggested a new information system. Under this system, the borrowers are required to submit the following documents to the bankers periodically.
   - A copy of the audited financial statements at the end of each year
   - A copy of a projected financial statement and funds flow statement for the next year
   - Quarterly budgeting cum reporting statements
   - Monthly stock statement

   The Tandon Committee further suggested that the information system might be introduced to start with in respect of borrowers with limit of ₹1 crore and above from the entire banking system and then extended progressively to others.

Illustration 6.3

Problem

According to the second method of lending by a bank as per Tandon Committee suggestion, the maximum permissible bank borrowing bases on the following information is total Current Assets, ₹80,000; Current Assets other than bank borrowings, ₹20,000; core Current Assets, ₹10,000. What is its MPBF?

Solution

MPBF under Second Method λ

$$= (75\% \text{ Current Assets}) - (\text{Current Liabilities other than bank borrowings})$$

$$\lambda = (₹80{,}000 \times 75\%) - ₹20{,}000 = ₹60{,}000 - 20{,}000$$

$$= ₹40{,}000$$

Criticism of Tondon Committee Report

The implementations of the norms suggested by the Tondon Committee in respect of inventories and receivables for the purpose of granting short-term credit by the bank created some problems. Some of the important problems are changing economic conditions, matching the borrowers' contribution with his credit requirement the complexities encountered in arriving at norms for inventory and receivables, and the validity of norms for finished goods during slack demand conditions. Reserve Bank of India accepted the recommendations of the Tondon committee but found that the gap between sanctioned cash credit limit and its utilisation remained unanswered. In this context RBI appointed Chore Committee.

6.3.2 Chore Committee

Although Tandon Committee made a significant contribution towards modernising lending system of Indian commercial bank, both the banking community and the industry were slow to implement the system in true spirit. The RBI became anxious and wanted to make a further in-depth study of the working of lending system and constituted a working group under the chairmanship of K.B. Chore in April 1979. The group submitted its report in August 1979. Chore group worked within the framework of lending system proposed by the Tandon Committee. After reviewing various systems of lending, the group came to the conclusion that even if increasing use of bill and loans are made in Working Capital finance, a borrower would still require cash credit limits mainly for holding of stocks. The group proposed a drawee bill system to ease payment to small suppliers and also to make increasing use of bill.

Terms of Reference

1. The committee was asked to review the cash credit system in recent years with particular reference to the gap between sanctioned limit and the extent of their utilisation.
2. To suggest alternative types of credit facilities, which should ensure greater credit discipline and enable the banks to relate credit limits to increase in output or other production activities.

Recommendations of Chore Committee

The main recommendations of the group were as follows:

1. ***Credit system:*** The advantage of the existing system of extending credit by a combination of three types of lending, viz. cash credit, loan and bill should be retained. There is a need to remove difficulties in the use of bill system of finance and to remove drawbacks in cash credit system.
2. ***No bifurcation of credit limit:*** Bifurcation of cash credit limit into a loan component and a fluctuating cash credit component has not found acceptance either on the part of the banks or the borrowers. Therefore, the committee recommends withdrawing bifurcation of accounts.
3. ***Separate limit for peak and non-peak level requirements:*** The banks have been asked to fix separate credit limits wherever feasible for the normal non-peak level and peak level

credit requirements and indicate the periods during which the separate limits would be utilised by the borrowers. If, however, there is no pronounced seasonal trend, peak-level and normal requirements should be treated as identical and limits should be fixed on that basis. It should be noted that peak-level and non-peak level concepts apply not only to agriculture-based industry but also to certain other consumer industries where the demand may have pronounced seasonal tendencies.

4. ***Submission of quarterly statements:*** The quarterly statements should be submitted by all the borrowers enjoying Working Capital limit of ₹50 lakh and above and they will have to bring gradual additional contribution based on second method of lending as prescribed by the Tandon Committee.
5. ***Reducing over-dependence on bank borrowings:*** Medium and large borrowers need to reduce over-dependence on bank finance. Cash generation within the unit should be utilised to reduce borrowings for Working Capital purpose.
6. ***Enhancement of owner's contribution:*** The committee suggested that all the borrowers should switch to second method of lending as suggested by the Tandon Committee to ensure a minimum current ratio of 1.33: 1.
7. ***Financing temporary requirements through loan:*** To meet unforeseen contingencies, the additional finance should be given by way of a separate demand loan.
8. ***Penal interest:*** The borrower should be asked to give his quarterly requirement of funds before the commencement of the next quarter. The non-submission of the returns in time is partly due to certain features in the forms themselves. Simplified forms have been proposed. If the borrower does not submit the return within the prescribed time, he should be penalised by charging the whole outstanding in the account at a penal rate of interest.
9. ***Relaxation from norms:*** Requests for relaxation from inventory norms and for ad-hoc increase in limits would be subjected by banks to close scrutiny and agreed to only in exceptional circumstances.
10. ***Toning-up Assessment Technique:*** The banks should devise their own lists in the light of the instructions issued by Reserve Bank for the scrutiny of data at operational level.
11. ***Delays in sanction:*** Delays on the part of banks in sanctioning credit limits could be reduced in cases where the borrowers cooperate in giving the necessary information about their past performance and future projections in time.
12. ***Bill system:*** As one of the reasons for the slow growth of the bill system is the stamp duty on usance bills and difficulty in obtaining the required denominations of stamps, these questions may have to be taken up with the state governments.
13. ***Sales bills:*** Banks should review the system of financing book debts through cash credit and insist on the conversion of such cash credit limits into bill limits.
14. ***Drawee bill system:*** A stage has come to enforce the use of drawee bills in the lending system by making it compulsory for banks to extend at least 50% of the cash credit limit against raw materials to manufacturing units whether in the public or private sector by way of drawee bills. To start with, this discipline should be confined to borrowers having aggregate Working Capital limits of ₹50 lakh and above from the banking system.

15. ***Segregation of dues of small-scale industries:*** Banks should insist on the public sector undertakings/large borrowers to maintain control accounts in their books to give precise data regarding their dues to the small units and furnish such data in their quarterly information system. This would enable the banks to take suitable measures for ensuring payments of the dues to small units by a definite period by stipulating, if necessary, that a portion of limits for bills acceptance should be utilised only for drawee bills of small-scale units.
16. ***Discount house:*** To encourage the bill system of financing and to facilitate call money operations an autonomous financial institution on the lines of the Discount House in the United Kingdom may be set up.
17. ***Delay in collection of bills/cheques:*** To reduce the delay in collection of bills and cheques, return of documents by the collecting branches, etc., the Group suggested toning up the communication channels and systems and procedures within the banking system.
18. ***Bills facilities and current accounts with other banks*:** Although banks usually object to their borrower's dealing with other banks without their consent, some of the borrowers still maintain current accounts and arrange bill facilities with other banks. Apart from diluting the control over the advance by main banker, this practice often enables the borrower to divert sales proceeds for unapproved purposes without the knowledge of his main banker. Banks should be properly advised in this matter by the Reserve Bank to check this unhealthy practice.

6.4 MANAGEMENT OF CASH

Cash is the lifeblood of every business. It is the most liquid current asset a firm can hold. It is denominated in the currency of the nation in which the firm exists. Cash management means making sure that all the business generated revenues are effectively controlled and utilised in the best possible manner to result gains for the organisation. Cash management involves the efficient collection, disbursement and temporary investment of cash. Efficient cash management helps the company to remain healthy and strong. Poor cash management may end up pushing the company to crisis.

In the process of operation, a firm utilises cash in various productive activities such as purchase of raw material, maintenance of a nominal level of inventory, for payment of wages and salaries, for payment of various production costs; overhead expenses; distribution and selling expenses; for payment taxes in time and for repayment of borrowed debt, etc. Apart from these expenses, the firm also needs certain amount of cash at hand to meet contingent payments. Cash at hand also helps in availing trade and cash discounts from vendors, which reduces the cost of inputs. Trade discounts are available on bulk purchases, and cash discounts are available on immediate cash payments to suppliers. To benefit from such discounts, the firm should have 'ready' cash. Moreover, when the firm maintains ready cash balance, it can meet emergencies such as strikes, fires and breakdown of machinery, etc.

Thus, efficient cash management practice means an elaborate form of cash management, where the firm is able to accurately assess its current cash position and make fairly reliable predictions at key intervals about how much cash it requires to meet the company's contingency and day-to-day expenses. It also includes proper utilisation of cash in the operation of two business.

6.4.1 Objectives and Need of Cash Management

The main objectives and need of cash management for a business are as follows:

1. ***Provide adequate cash to each of its units:*** The modern-day business comprises numerous units spread over vast geographical areas. It is the duty of the finance manager to provide adequate cash to each of the units. For the survival of the business, it is absolutely necessary that there should be adequate cash. It is the duty of the finance manager to maintain liquidity at all parts of the organisation while managing cash.
2. ***No funds are blocked in idle cash:*** The financial manager has also to ensure there are no funds blocked in idle cash. Idle cash resources entail a great deal of cost in term of interest charges and in terms of opportunities costs. Hence the questions of cost of idle cash must also be kept in mind by the finance manager. A cash management scheme therefore, is a delicate balance between the twin objectives of liquidity and costs.
3. ***The surplus cash (if any) should be invested in order to maximise returns for the business:*** The surplus cash should be invested in profitable marketable securities (investment which can be easily diluted within one financial year for normal growth of the firms). Cash management aims at reducing the amount of free cash that is being held by the firm. This tends to enhance the firm's profitability, as idle cash reduces and cash for investment increases. Similarly, deficit should be financed on existing financing lines, i.e. higher Cost of Capital should be avoided. Another way of dealing with deficit is to maintain a cash balance for meeting unpredictable deficits, or payments by the firm should be delayed.

   However, while efficient cash management reduces free Cash Flows, it does not reduce overall business activities or enhance the risk structure of the firm regarding its financial obligations.

6.4.2 Reasons for Cash Surplus

Cash surpluses arise for many reasons and last for varying time periods. The treasurer will need to consider opportunities for short-term investment in order to put any cash surpluses to work. Some of the reasons of cash surplus are as follows:

1. Profitability from operations
2. Low capital expenditure
3. Absence of profitable avenues of investment
4. Sale of a part of business
5. Raising of funds from issue of stock and bonds for long-term capital project; temporary fund is not used
6. Conservative dividend distribution policy

The firm may keep surplus funds in liquid form for the following reasons:

1. To buy-back shares in near future
2. To enhance the dividend payment to shareholders
3. Waiting for strategic opportunity to arise like acquisition and takeover of weak units
4. When the return on reinvestment is lower than the bank deposit rate

6.4.3 Reason for Cash Deficit

The continuous deficit in Cash Flow will show the signal for forthcoming situation of financial distress. The Cash Flow problems may arise from the following reasons:

1. Continuous operating losses will cause deficit in Cash Flows. A company which is unable to cover the depreciation charge but is in the surplus state of cash is the potential unit for cash starvation.
2. When the rate of inflation is higher, the need for cash also increases and it will cause excessive outflow of cash over the inflow.
3. Non-recurring expenditure or payments may cause Cash Flow problems. The situation may arise in times of repayment of long-term debt, purchase of capital goods out of internal accruals, payment of dividends and corporate tax, etc.
4. When the seasonal or cyclical sales are higher then such firms may require more funds than in the off-season which will also create Cash Flow problem.
5. Over-trading is one of the reasons which cause Cash Flow problems. A firm that do business more than its Working Capital can absorb will create Cash Flow problems.
6. Continuous growth in business of a firm may lead to continuous cash requirements to support its production and Working Capital shortages.
7. Inefficient Working Capital management such as poor collection of debtors, failure to raise invoices in time, excessive holding of inventory, payments without proper sanction, managing without cash planning and cash budgeting, failure to recognise the requirements of Working Capital for purchase of capital equipment, failure to get Working Capital limits and its enhancement in time, etc., will lead to Cash Flow problems.

Effect of Cash Deficit

The cash shortages can result in making of sub-optimal investment and sub-optimal Financing Decisions.

1. ***Sub-optimal investment decisions:*** These decisions would include disposal of profitable lines or divisions inability to undertake profitable investment project and failure to maintain an adequate level of Working Capital, etc.
2. ***Sub-optimal financing decisions:*** These decisions would include the taking out of very expensive loans and being granted overdraft facilities subject to restrictive covenants which could include personal guarantees from directors, restrictions on investment restrictions on additional finance, restrictions on directors' remuneration, restrictions on dividend payment, etc.

6.4.4 Motives for Holding Cash

Some minimum amount of cash is required to be maintained by the firms in their bank accounts against the services they take from these banks. In turn, banks provide a variety of services to business firms, such as clearance of cheque, supply of income credit and overdraft. There can be several motives for holding cash. These are discussed in the following section:

Transaction Motive

Firms create product or render services or do both. Whatever the nature of business may be for the firm, its essential requirement is cash. In the process of operation, a firm is always making certain transactions with other entities, such as purchases, sales, salary and payments for dividends, taxation, etc. Some transactions may require immediate payments or receipts, whereas other transactions do not require immediate Cash Inflow or outflow. Similarly, there is a regular inflow of cash from operating sources, viz. revenues. Thus, for every firm there will be two way flows of cash-receipts and payments. But since they do not perfectly synchronise, a minimum cash balance is necessary to uphold the operations of the firm if cash payments exceed receipts. Thus, a firm keeps a certain amount of cash to meet its certain routine transactions in which immediate cash payment is required. If more cash is needed for payments than receipts, it may be raised through Bank Overdraft. On the other hand if there are more cash receipts than payments, it may be spent on marketable securities.

Precautionary Motive

Cash balances held in reserve for random, unforeseen fluctuations in Cash Flows are known as precautionary balances. Precautions against natural calamities, external contingencies, such as civil war, economic regression and internal complexities, such as breakdown, must be taken care of by the firm. In such situations, the firm may require cash to meet additional obligations. Hence, the firm should hold cash reserves to meet such contingencies. Such cash may be invested in the short-term marketable securities which may provide the cash when necessary.

The unexpected cash needs at short notice may also be the result of the following:

- Uncontrollable circumstances such as strike, natural calamities, such as drought, flood, etc.
- Unexpected delay in collection of trade dues
- Cancellation of some order for goods due to unsatisfactory quality
- Increase in cost of raw materials, rise in wages, etc.

The higher the predictability of a firm's Cash Flows, the lower will be the necessity of holding this balance and vice versa. The need for holding the precautionary cash balance is also influenced by the firm's capacity to have short-term borrowed funds and also to convert short-term marketable securities into cash. For example, a firm which has access to bank accommodation at very short notice and/or marketable securities that can be converted into cash very quickly, can afford to have a comparatively low cash balance to run its operation.

Speculative Motive

Speculative cash balances may be defined as the cash balances that are held to enable the firm to take advantage of any bargain purchases that might arise. According to the economist Keynes, speculative motive for holding cash creates the ability for a firm to take advantage of various special opportunities that enhances its wealth. To take the advantage of unexpected opportunities, a firm holds cash for investment in profit-making opportunities. Such a motive is purely speculative in nature. In order to tap profitable investment opportunities that cannot be predicted, the firm has to maintain speculative funds.

For example, sometimes the price of material input may decline sufficiently. In such a case, the firm must buy enough inputs to take advantage of the price. These transactions are of speculative nature requiring ready cash to be held by the firm. While the precautionary motive is defensive in nature, the speculative motive represents an aggressive approach. This motive helps to take advantage of the following:

- An opportunity to procure raw material at a reduced price by taking advantage of quantity and cash discounts and also making other purchases at favourable prices.
- A chance to speculate on interest rate movements by purchasing securities when a decline in the interest rates in expected.

6.4.5 Efficient Cash Management

In an efficient cash management, cash at hand and at bank, in spite of all its significance, should be optimum. That is, it should be at a minimum level that will take care of the immediate needs and the contingent requirements of the firm. For an overall efficient, effective and economical cash management, one needs to emphasise on efficient collections, efficient use of short-term money, discouragement of idle fund, efficient disbursements and monitoring of cash movement from the firm's bank branch to its headquarter.

Efficient cash management is supported by the fact that the firm develops and uses different sources of short-term money that are flexible enough and readily available at nominal cost. The firm discourages usable funds (collections or borrowed capital) to stand idle for more than a day. For profitable and flexible investment of cash, surplus that arises should be profitably invested in marketable securities so that as long as this cash is not required it generates profits, and as soon as it is needed it can be encashed quickly. Effective cash management involves the following:

- Efficient collections
- Efficient disbursements
- Continuous and dynamic monitoring of cash movement

Collections are the sale receipts received by the firm from its customers by selling its products or services to them. More efficient the collection of the sale proceeds, the more cash the firm has, and the availability of funds increases as collection time decreases. Efficient collection management can be done by speeding up collections, decentralisation of collection system,

etc. There are two popular decentralised collection systems that speed up cash collection and reduce the float time. These are as follows:

- Lockbox System
- Concentration Banking

The Lockbox System

It is a simple method used in reducing collection float and accelerating firm's collections or remittances. When a firm adopts the lockbox system, it takes a post office box in its name, called *lockbox*, and requests its customers to mail their payments to these lockboxes. These lockboxes are attended by local collection banks or local branch or depot personnel one or more times every day (if possible even on holidays). These cheques are deposited directly into the local bank account of the firm. If it is through the local bank, then the company authorises its bank to collect its sale receipts from the lockboxes.

The bank then sends particulars of cheques along with letters or other accompanying materials to the firm for information. After the cheques are realised, surplus funds from the local banks are transferred (usually by wire) to the central account or accounts of the firm. Thus the lockbox system helps to reduce the mailing time, because cheques are received at a nearby post office instead of at corporate headquarters, and deposited and cleared locally. It also helps in reducing the processing time as the deposits are made by the local bank. Hence, firm saves on its time and efforts for processing the mails and reduces the availability delay as the firm encourages its customers to draw the cheque on local banks.

In this way, the firm is in a better position to use its collections immediately. This system reduces mail float, clearing float as well as processing float. Banks do charge some fee against these services. Whenever firms analyse the possibility of adopting such systems, they must evaluate the cost and benefits attached. The benefits derived from the speeding up of collections must be greater than the costs of the lockbox system. Lockboxes are widely dispersed because they are usually adopted by multinationals, large and big companies, which have their branches in many states.

Advantages

1. A lockbox system reduces the mail float because lockboxes can be established at different geographical locations and thus reduces mailing time.
2. To ensure that check processing time is minimised, some banks offering lockbox services pick up and process mail on a continuing basis and process checks on a 24-hour basis.
3. Another advantage is that the bank performs the clerical work for processing the incoming cheques prior to deposits. In this respect, it is superior to the concentration banking system.
4. The lockbox system enjoys the additional advantages of eliminating the cheque processing float completely because they do not record the checks until it has been deposited.

Disadvantages

The main disadvantage of this system is the cost. The bank will provide a number of additional services, as stated above, to the usual clearing of cheques. Accordingly, it will require compensation for the additional services—usually in the form of increased deposits from the firm. Because the cost is almost directly proportional to the number of cheques deposited, this system is not profitable if the average remittance is small.

Illustration 6.4

Problem

The information given below is available for a given firm which wants to adopt a lockbox system. Suggest the feasibility of adopting the lockbox system by the firm.

Average number of daily payments to lockbox	200
Average size of payments	₹1,000
Rate of interest per day	0.02%
Saving in mail time	1 day
Saving in processing time	1 day
Processing charge per cheque	₹0.3

Solution

The lockbox system will increase the collected balance for the firm by

[200 payments/day × ₹1,000 per payment × (1 + 1) days saved] = ₹4,00,000

Now, this ₹4,00,000 can be invested at the rate of 0.02% per day.

₹4,00,000 invested at 0.02% per day will give rise to a daily return of 0.02% × 4,00,000 = ₹80 per day

The bank charges ₹0.3 per cheque for processing the cheques under the lockbox scheme. Then the cost of adopting lockbox system = 0.3 × 200 = ₹60 per day. The firm earns a profit of ₹80 – ₹60 = ₹20 per day.

The firm earns a profit of ₹80 – ₹60 = ₹20 per day.

Since the opportunity cost of the present system is ₹80, which exceeds the per day cost of the lockbox system that is ₹60, the system should be adopted.

Illustration 6.5

Problem

X Ltd. has a centralised collection system. The firm has a daily average collection of ₹6,00,000. The company now wants to adopt a lockbox system. This will save the company 3 days on collection receipt. Further, processing time will also be reduced by 1 day.

1. Calculate the reduction in cash balance of the firm by use of lockbox system.

2. Calculate the annual opportunity cost of the present system, assuming a 6% return on marketable securities.
3. If the annual cost of the lockbox system is ₹1,00,000, should the company adopt this system?

Solution

1. Total time saved = 3 + 1 = 4 days
   Time savings × Daily average collection = Reduction in firm's cash balances = 4 × 6,00,000 = ₹24,00,000.
2. Opportunity cost = 6% × ₹24,00,000 = ₹1,44,000
3. Opportunity cost (₹1,44,000) is greater than the annual cost (₹1,00,000). Hence the company should adopt it.

Note: Lockbox system will increase the collected cash balance of X Ltd. and hence the company have to maintain lower cash balance. This will result in reduction in cash balance.

Concentration Banking

In concentration banking, the company establishes a number of strategic collection centres in different regions instead of a single collection centre at the head office. When the firms open up different collection centres in different parts of the country in order to reduce the postal delays, it is known as *concentration banking*. It is one of the important and popular ways of reducing the size of the float. Here the firm requests its customers to mail their payments to a local or regional collection centre instead of mailing it to the head office. This system reduces the period between the times a customer mails in his remittances and the time when they become spendable funds with the company. Payments received by the different collection centres are deposited with their respective local banks, which in turn transfer all surplus funds to the concentration bank of the head office. The concentration bank with which the company has its major bank account is generally located at the headquarter.

Surplus funds from the local banks are transferred by mail or wire form the local bank accounts to a concentration bank or banks. The choice between a wire or mail transfer depends on two factors: the amount involved and the cost of finance. In general, wire transfers are economical only when large sums of money are involved and the firm can earn a reasonable return on short term, low risk and highly liquid investments.

Advantages

1. It reduces mail float significantly. The customers receive the bills from the collection centres instead of from head office, and secondly when they send their cheques to the collection centres, the mailing time is shorter than the time required for mailing them to the head office.
2. Average bank float is also reduced. This is mainly because of reduction in the volume of outstation cheques as most of the cheques deposited in the collection centre's bank are drawn on banks in that area.
3. This system reduces the time of collection and hence results in better cash management.
4. Cash concentration improves the control of the firm over inflows and outflows of cash.
5. Disbursing cash from one place becomes easier and efficient.

6. Cash concentration also reduces idle cash balances.
7. The balance at regional offices is kept low, which is almost equal to the actual total expenses of the regional branches.
8. Any excess funds are moved to the concentration bank(s). Excess funds in concentration banks(s) are invested for short-term periods to provide better yields to the firm.

However, cash concentration is encouraged by timely transfer of funds to and from concentration banks and regional branches. For efficient fund transfer, firms use cheques and drafts as a payment and receipt mode. The other methods like automated clearing house (ACH), electronic transfer and wire transfer are also used for remitting funds. The main issue here is selecting the collection centres, which largely depends on the volume of billing/business in a particular geographical area. However, the cost of concentration system is the minimum account balance required to be maintained in these current accounts.

6.4.6 Cash Management Models

In recent years, several types of mathematical models have been developed that helps to determine the optimum cash balance to be carried by a business organisation. The purpose of all these models is to ensure that cash does not remain idle unnecessarily and at the same time the firm is not confronted with a situation of cash shortage. All these models can be put in two categories

1. Inventory type models or William J. Baumol's Cash Management Model
2. Stochastic models or Miller and Orr Model

Inventory type models have been constructed to aid the finance manager to determine optimum cash balance of his firm. William J. Baumol's Economic Order Quantity (EOQ) model applies equally to cash management problems under conditions of certainty or where the Cash Flows are predictable. However, in a situation where the EOQ Model is not applicable, stochastic model of cash management developed by Miller and Orr helps in determining the optimum level of cash balance.

Inventory Type Models or William J. Baumol's Cash Management Model or Baumol's EOQ Cash Management Model (1952)

This model was developed by William J. Baumol. In November 1952, he published this model in *Quarterly Journal of Economics,* titled 'The Transactions Demand for Cash: An Inventory Theoretical Approach'. This was the first formal model of cash management that incorporated opportunity cost and transaction costs. According to this model, optimum cash level is that level of cash where the carrying costs and transactions costs are the minimum. The carrying costs refer to the cost of holding cash, namely, the interest foregone on marketable securities. The transaction costs refer to the cost involved in getting the marketable securities converted into cash. This happens when the firm falls short of cash and needs to sell the securities resulting in clerical, brokerage, registration and other costs.

The optimum cash balance according to this model will be that point where these two costs are minimum. The Baumol's model finds a correct balance by combining holding cost and transaction costs, so as to minimise the total cost of holding cash (Figure 6.4).

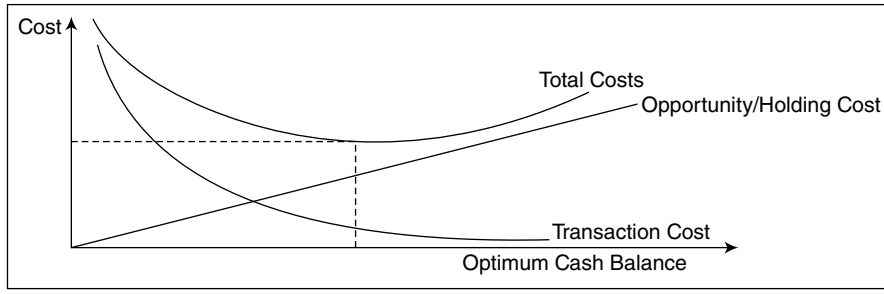


Figure 6.4 Graphical Presentation of Baumol's Model (Trade-off Between Holding Cost and Transactions Cost)

The formula for determining optimum cash balance is as follows:

$$C = \sqrt{\frac{2A \times F}{O}}$$

where,

C = Optimum cash balance

A = Annual (or monthly) cash disbursement

F = Fixed cost per transaction

O = Opportunity cost of one rupee per annum (or per month)

Assumptions

The following are the assumptions of Baumol's model:

1. The first assumption of this model is that the firm is able to forecast correctly and precisely the amount of cash required by it. Cash needs of the firms are known with certainty.
2. The firm makes its cash payments uniformly over a period of time. Thus, the cash payments arise uniformly over the future time period.
3. The firm very well understands the opportunity cost of the cash held by it. The opportunity cost of interest forgone by not investing in marketable securities. Such holding cost per annum is assumed to be constant.
4. The transaction cost of the firm is constant and known. The transaction cost is the cost incurred whenever the firm converts its short-term securities to cash.
5. The surplus cash is invested into marketable securities and those securities are again disposed of to convert them again into cash. Such purchase and sale transactions involve certain costs such as clerical brokerage registration and other costs. The cost to be incurred for each such transaction is assumed to be constant/fixed. In practice, it would be difficult to calculate the exact transaction cost.
6. The short-term marketable securities can be freely bought and sold. Existence of free market for marketable securities is a perquisite of the Baumol model.

Limitations

The limitations in Baumol's model are as follows:

1. The model can be applied only when the payments position can be reasonably assessed.
2. The major demerit of this model is that it does not allow the Cash Flows to fluctuate. The Cash Flows are assumed to be constant and known over the time period, which practically is not possible in real world. Firms are unable to use their cash balance uniformly.
3. Similarly the firms cannot predict their daily Cash Inflows and outflows.
4. Degree of uncertainty is high is predicting the Cash Flow transactions. Behaviour of Cash Inflow and outflow is assumed to be too smooth and certain. Cash Inflow and outflow of businesses are too erratic. Daily cash balance may fluctuate, leading to an unpredictable pattern of Cash Flow. Thus at no point an ideal optimum cash balance *C* be maintained practically.
5. The model merely suggests only the optimal balance under a set of assumptions. But in actual situation it may not hold good. Nevertheless it does offer a conceptual framework and can be used with caution as a benchmark.

Illustration 6.6

Problem

The outgoings of X Ltd. are estimated to be ₹10,00,000 p.a., spread evenly throughout the year. The money on deposit earns 12% p.a. more than money in a current account. The switching costs per transaction are ₹200. Calculate the optimum amount to be transferred, number of transactions p.a., average balance in the short notice account and aggregate fixed cash.

Solution

According to Baumol, the optimum amount to be transferred each time is ascertained as follows:

$$C = \sqrt{\frac{2AF}{O}}$$

where, C = Optimum transaction size

A = Estimated cash outgoings per annum, i.e. ₹10,00,000

F = Fixed cost per transaction, i.e. ₹200

O = Opportunity cost of one rupee per annum = Interest rate on fixed deposit, i.e. 12% p.a.

$$C = \sqrt{\frac{2 \times 200 \times 10,00,000}{0.12}} = ₹57,735 \text{ say } ₹58,000$$

Optimum amount to be transferred is ₹58,000.

Number of transaction p.a. = ₹10,00,000/₹58,000 = 17 transactions

Average balance in the short notice account = ₹58,000/2 = ₹29,000

Aggregate fixed cost = 17 × 200 = ₹3,400

Illustration 6.7

Problem

ABC Ltd. has an estimated cash payments of ₹8,00,000 for a 1month period and the payments are expected to steady over the period. The fixed cost per transaction is ₹250 and the interest rate on marketable securities is 12% p.a. Calculate the optimum transaction size.

Solution

The optimum transaction size will be calculated as follows:

$$C = \sqrt{\frac{2AF}{O}}$$

where,

A = Estimated monthly cash payment, i.e. ₹8,00,000

F = Cost per transaction, i.e. ₹250

O = Interest per annum, i.e. 12%p.a. (For 1 month, the rate of interest is 1% or 0.01)

Optimum cash balance = $\sqrt{\frac{2 \times 250 \times 8,00,000}{0.01}}$ = ₹2,00,000

Optimum transaction size = 2,00,000

Average cash balance = ₹2,00,000/2 = ₹1,00,000

Number of transactions = ₹8,00,000/₹2,00,000 = 4 transactions

Illustration 6.8

Problem

A firm maintains a separate account for cash disbursement. Total disbursements are ₹2,62,500 per month. Administrative and transaction cost of transferring cash to disbursement account is ₹25 per transfer. Marketable securities yield is 7.5% per annum. Determine the optimum cash balance according to William J Baumol model. *[CA (Inter), 2009]*

Solution

Determination of optimal cash balance according to William J. Baumol Model

$$\text{Optimum cash balance} = \sqrt{\frac{2AF}{O}}$$

where

A = Annual disbursement

F = Administrative and transaction cost

O = Marketable securities yield

$$C = \sqrt{\frac{2 \times 2,62,500 \times 12 \times 25}{0.075}}$$

$$= \sqrt{\frac{15,75,00,000}{0.075}}$$

$$= \sqrt{2,10,00,00,000}$$

Optimum cash balance, C = ₹45,826.

Stochastic Models or Miller–Orr Cash Management Model (1966)

The Miller and Orr Model (MO) model overcomes the demerits of the Baumol model. This model assumes that the Net Cash Flows are normally distributed with a zero value of mean and Standard Deviation. In other words, the MO model extended the existing Baumol model and stated that cash balances take too erratic pattern of distribution over a time period. However, over long periods, they tend to show normal distribution. The MO model basically states that there are two control limits:

1. ***The upper control limit:*** This states the upper limit for cash balance. If at any time the cash balance exceeds this limit, the extra cash is transferred to marketable securities and investments.
2. ***The lower control limit along with the return point:*** This states the lower limit for cash balance. If at any time the cash balance reach this limit, the investments are liquidated and liquidity of the firm is enhanced.

Thus, when the Cash Flows of the firm deviate randomly, they hit the upper limit. At this point, the firm purchases adequate amount of marketable securities, which helps the firm to reduce its free cash and thus return to a normal level of cash balance (return point). In the same way, when the firm's Cash Flows deviate lower and hit the lower limit, the firm liquidates its investments (marketable securities) so that its cash balance returns to the normal level (return point).

Assumptions

The basic assumptions of the model are as follows:

1. The major assumption with this model is that there is no underlying trend in cash balance over time.
2. The optimal values of 'h' (upper limit) and 'z' (return point) depend not only on opportunity costs, but also on the degree of fluctuation in cash balances.

Limitations

The model is having the following limitations:

1. The first and important problem is in respect of collection of accurate data about transfer costs, holding costs, number of transfers and expected average cash balance.
2. The model does not take into account the cost of time devoted by financial managers in dealing with the transfers of cash to securities and viceversa.
3. The model does not take into account the short-term borrowings as an alternative to selling of marketable securities when cash balance reaches lower limit.

This model is designed to determine the time and size of transfers between an investment account and cash account. In this model, control limits are set for cash balances. These limits may consist of h as upper limit, z as the return point and '0' (zero) as the lower limit (Figure 6.5).

- When the cash balance reaches the upper limit (h), the transfer of cash equal to $h–z$ is invested in marketable securities account.

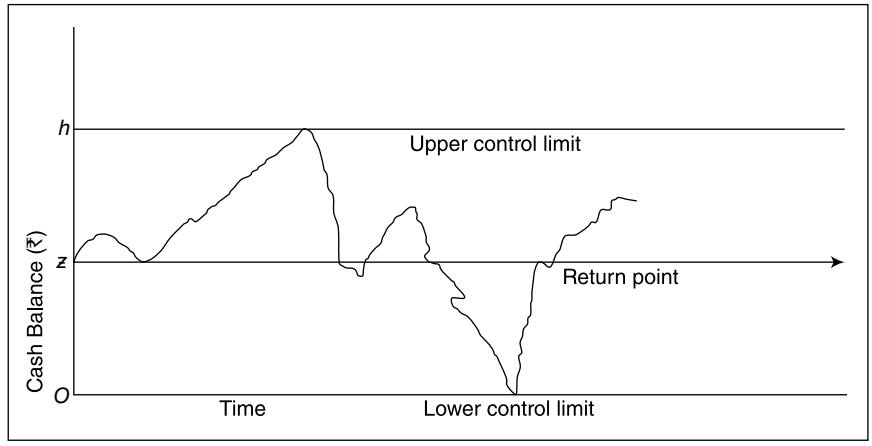


Figure 6.5 Graph Showing the Upper and Lower Control Limit in Miller and Orr Model

- Then the new cash balance is z.
- When cash balance touches lower control limit (0), marketable securities to the extent of ₹(z – 0) will be sold.
- Then the new cash balance again return to point z.
- During the period when cash balance stays between (h, z) and (z, 0), i.e. high and low limits, no transactions between cash and marketable securities account is made.

The spread between the upper and lower cash balance limits can be computed using Miller and Orr Model as follows:

$$Z = 3\left(\frac{3}{4} \times \frac{\text{Transaction Cost} \times \text{Variance of Cash Flows}}{\text{Interest Rate}}\right)^{\frac{1}{3}}$$

$$\text{Return Point} = \text{Lower Limit} + \frac{Z(\text{Spread})}{3}$$

$$\text{Variance of Cash flows} = (\text{Standard deviation})^2$$

Or, the model can be written as follows:

The optimum value of z, the return to point for security transactions is:

$$Z = 3\sqrt[3]{\frac{3b\sigma^2}{4}}$$

where,

b = fixed cost associated with a security transaction

σ^2 = variance of daily Net Cash Flows

i = interest rate per day on marketable securities

With the control limits the Miller–Orr model will minimise the total costs—fixed and opportunity—of cash management. The average cash balance is approximately $(z + h)/3$. However, for obvious reasons, this balance will be higher than that under the inventory model.

The MO Model is more realistic since it allows variations in cash balance within the lower and upper limits. The finance manager can set the limits according to the firm's liquidity requirements, i.e. maintaining the minimum and maximum cash balance.

Illustration 6.9

Problem

Lower control limit set	₹20,000
Interest rate per day	0.03%
Variance of Cash Flow per day	₹90,000
Switching costs per transaction	₹20

Solution

Interest rate per day/annum = 0.03%
Variance of Cash Flows per day = ₹90,000
Transaction Cost per sale = ₹20
Cash balance lower limit = ₹20,000

$$\text{Spread (between control limits)} = 3\left(\frac{\frac{3}{4}\times 20\times 90{,}000}{0.0003}\right)^{1/3}$$

= ₹22,990 say ₹23,000

Therefore, the upper limit is equal to the lower limit of ₹20,000 plus the spread of a ₹23,000, i.e. ₹43,000.

The return point is equal to the lower limit of ₹20,000 plus the spread of ₹23,000/3, i.e. ₹20,000 + 23,000/3 = ₹27,667.

Therefore, the firm's cash management policy should be based on lower and upper control limits of ₹20,000 and ₹43,000, respectively. The firm need to initiate action if the cash balance moves outside this band or control limit.

6.4.7 Cash Budget as a Tool for Efficient Cash Management

Cash budget is a summary statement of the firm's expected Cash Flows and cash balances over the projected period. Cash budget is the most significant device to plan for and control cash receipts and payments. This information helps the finance manager to determine the future cash needs of the firm, plan for the financing of these needs and exercise control over the cash and to reach liquidity of the firm. It is a forecast of expected cash intake and outlays. The cash budget should be coordinated with the other activities of the business. The functional budgets may be adjusted according to the cash budgets. The available funds should be fruitfully used and the concern should not suffer for the wants of funds. Based on the cash budget, the firm can easily determine its surplus and deficit and manage cash. On the basis of cash budget, the firm can decide to invest surplus cash in marketable securities and earn profits.

The various purposes of cash budgets are as follows:

1. Coordinate the timings of cash needs. It identifies the period(s) when there might either be a shortage of cash or an abnormally large cash requirement.
2. It also helps to pinpoint period(s) when there is likely to be excess cash.

3. It enables firm which has sufficient cash to take advantage like cash discounts on its accounts payable.
4. Finally, it helps to plan/arrange adequately needed funds (avoiding excess/shortage of cash) on favourable terms.

The following are the steps for preparing the cash budget:

Step 1: Selection of the time period of the budget depending on the requirements and needs of the organisation.

Step 2: Identifying and selecting those factors which affect the Cash Flows of the firm. The factors that generate Cash Flows are generally divided into following two categories:

1. Operating (Cash Flows generated by operations of the firm)
2. Financial (Cash Flows generated by financial activities of the firm.

6.4.8 Recent Developments in Cash Management

Due to technological development, the firm used to apply various innovative techniques for handling of cash. It is important to understand the latest developments in the field of cash management, since it has a great impact on how we manage our cash. Both technological advancement and desire to reduce cost of operations has led to some innovative techniques in managing cash. Some of them are as follows:

Electric Fund Transfer

With automation and computerisation of banking system, the corporate cash management has also tried to incorporate the advantages of automated fund transfers. Electronic fund transfer speeds up the cash receipt and reduces the cash transit. This will help the customers in the following ways:

- Instant updation of accounts
- The quick transfer of funds
- Instant information about foreign exchange rates

Electronic fund transfer mechanism automatically transfers money from one account to another regularly. These systems reduce not only the transit float but also the float of the cash in the bank. It reduces the clearing period.

Zero Balance Account

For efficient cash management some firms employ an extensive policy of substituting marketable securities for cash by the use of zero balance accounts. Every day the firm totals the cheques presented for payment against the account. The firm transfers the balance amount of cash in the account, if any, for buying marketable securities. In case of shortage of cash, the firm sells the marketable securities.

Money Market Operations

One of the tasks of treasury function of larger companies is the investment of surplus funds in the money market. The chief characteristic of money market banking is one of size. Banks

obtain funds by competing in the money market for the deposits by the companies, public authorities, high net worth investors (HNI) and other banks. Deposits are made for specific periods ranging from overnight to 1 year; highly competitive rates which reflect supply and demand on a daily, even, hourly basis are quoted. Consequently, the rates can fluctuate quite dramatically, especially for the short-term deposits. Surplus funds can thus be invested in money market easily.

Petty Cash Imprest System

For better control on cash, generally the companies use petty cash imprest system wherein the day to day petty expenses are estimated taking into account past experience and future needs and generally a week's requirement of cash will be kept separate for making petty expenses. Again, the next week will commence with the predetermined balance. This will reduce the strain of the management in managing petty cash expenses and help in managing the cash efficiently.

Electronic Cash Management System

Most of the cash management systems nowadays are electronically based, since speed is the essence of any cash management system. Electronically, transfer of data as well as funds play a key role in any cash management system. Various elements in the process of cash management are linked through a satellite. Various places that are interlinked may be the place where the instrument is collected, the place where cash is to be transferred in company's account and the place where the payment is to be transferred, etc.

Virtual Banking

Broadly virtual banking denotes the provision of banking and related services through extensive use of information technology without direct recourse to the bank by the customer. The origin of virtual banking in the developed countries can be traced back to the seventies with the installation of Automated Teller Machines (ATMs). Subsequently, driven by the competitive market environment as well as various technological and customer pressure, other types of virtual banking services have grown in prominence throughout the world.

Introduction of computerised settlement of clearing transactions, use of Magnetic Ink Character Recognition (MICR) technology, provision of inter-city clearing facilities and high value clearing facilities, Electronic Clearing Service Scheme (ECSS), Electronic Funds Transfer (EFT) scheme, Real Time Gross Settlement System (RTGS), Delivery versus Payment (DVP) for government securities transactions and setting up of Indian Financial Network (INFINET) are some of the significant developments.

6.5 RECEIVABLES MANAGEMENT

A large number of companies are practicing credit sales. Receivables represents amount owed to the firm as a result of credit sale of goods or services in the ordinary course of business.

These are the claims of firm against its customers and form a part of the Current Assets. Hence, accounts receivable is among the largest and most liquid assets of the total assets the companies hold. Receivables are also known as accounts receivables; trade receivables, customer receivables, debtors, etc. A typical manufacturing company has a receivable to total asset ratio in the range of 20–25%. This represents a considerable investment of funds and so the management of this asset can have a significant effect on the profitability of the company. The ultimate goal of accounts receivable is to enhance the Working Capital available with the firm.

Receivables management is the process of making decision relating to investment in trade debtors. Certain investment in receivables is necessary to increase the sales and profits of a firm. But at the same time investment in this asset involves cost consideration also. Further there is always risk of bad debts too. Accounts receivable management means managing the credit sales of the firm. The credit sales result in accounts receivables which may be converted to cash after the credit period. Accounts receivable management can improve cash available with the firm and hence leads to significant financial gain for the firm. An efficient management of accounts receivable implies lesser amount of outstanding account balances, which means lesser bad debts for the company. Efficiently managed accounts receivable enhances the firm's Cash Inflow and thus creates large cash support to firm's cash requirements.

6.5.1 Types of Credit

There is a time lag between provision of goods and services and the receipt of cash for them. This time lag can result in a firm's Working Capital requirements from banks. Any increase in time lag, will cause serious liquidity problems and sometimes can cause insolvency of the firm. There are two types of credit generally offered to the customers:

1. ***Trade credit:*** These credits issued by a business to another business. For example, an invoice state that payment is expected within 30 days of the date of invoice. In effect, this gives 30 days credit to the customer.
2. ***Consumer credit:*** This credit is generally offered to the end consumer. For example, the consumer durables dealer offer hire purchase terms to the customers, whereby the consumer takes out to repay the goods purchased. Failure to repay will result in the goods being repossessed.

6.5.2 Objectives of Receivable Management

The basic objective of accounts receivable management is to collect the funds due and to help the management in meeting their Cash Flow requirements. An effective accounts receivable management can help and support the management in achieving the desired Cash Flow through the timely collection of outstanding debts. Thus, the objective of receivable management is to take a sound decision as regards investment in debtors. *In the words of Bolton, S.E.,*'The objective of receivables management is to promote the sales and profits until that point is reached where the Return on Investment in further funding of receivables is less than the cost of funds raised to finance that additional credit'. The main objectives of receivable management are as follows:

Achieving Growth in Sales and Profits

If a firm allows credit sales, it will usually be able to sell more goods or services than if it insists on immediate cash payment. Similarly, additional sales normally results in higher profits for the firm. This proposition will hold good only when the marginal contribution or gross margin is greater than the additional costs associated with administering the credit policy.

Meeting Competition

To survive in the competitive market, firms have to establish credit policies similar to those of competitors. Thus, by adapting its terms of trade to the industry norms, a firm will avoid loss of sales from customers who would buy elsewhere if they did not receive the expected credit.

Increasing Profits

If the direct result of maintaining receivables is to increase sales, an indirect result is that the additional sales normally result in higher profits for the firm. This is the case when the marginal contribution or gross margin is greater than the additional costs associated with administrating the credit policy. If the firm does not realise higher profits from its credit policy and receivables, it should consider an all-cash sales program.

The above three objectives have a single purpose, i.e. to generate a larger flow of Operating Revenue, and hence profit, than would be achieved in the absence of a commitment of funds to debtors. As extension of credit involves cost and risk, the management should weigh benefits (for taking the risk) against cost. The optimum point may be considered as the point where the Return on Investment in further funding of receivables is less than the cost of funds raised to finance that additional credit (i.e. Cost of Capital).

6.5.3 Granting Credit to Customers

Since the debtors constitute an investment of the part of the firm, while granting credit care should be exercised to ensure that the risk involved is kept to a minimum. Accordingly, before grating credit the reputation or credit worthiness of the customer should be ascertained as far as possible. In case of an old customer, necessary information will be available from past records. But in other cases, the credit controller may have to take the help of established channels for information. These include the following:

Banker's Inquiry

It reveals that the customer has an account and has done nothing to warrant his banker refusing to act for him. But bankers will be reluctant to disclose his customer's affairs

Trade Reference

Reputable credit organisations may be approached for getting information about the credit worthiness of proposed customers. References may also be made to firms with whom the customers had entered into transactions in the past. The information that a customer has met his commitments regularly and without default will speak in favour of his credit reputation.

Credit Agencies

These are valuable sources for assessing the credit worthiness of would be customers. These organisations are very efficient and can supply desired information quickly on request.

Published Financial Statements

The published financial statements of would be customers may be used for assessing their credit worthiness. Accounting ratios (current ratio, quick ratio, etc.) may be computed to know the liquidity position of the customers. Turnover of creditors would be an indication of the speed with which creditors are liquidated. But all these analyses will be based on past annual data.

6.5.4 Financing Receivables

Pledging of accounts receivables and factoring have emerged as the important sources of financing of account receivables now-a-days.

Pledging

This refers to the use of a firm's receivable to secure a short-term loan. A firm's receivables can be termed as its most liquid assets and this serve as prime collateral for a secured loan. The lender scrutinises the quality of the accounts receivables, selects acceptable accounts, creates a lien on the collateral and fixes the percentage of financing receivables which ranges around 50–90%. The major advantage of pledging accounts receivable is the ease and flexibility it provides to the borrower. Moreover, financing is done regularly. This, however, suffers on account of high cost of financing.

Factoring

Factoring is a relatively new concept in financing of accounts receivables. This refers to outright sale of accounts receivables to a factor or a financial agency. A factor is a firm that acquires the receivables of other firms. The factoring lays down the conditions of the sale in a factoring agreement. The factoring agency bears the right of collection and services the accounts for a fee (Figure 6.6).

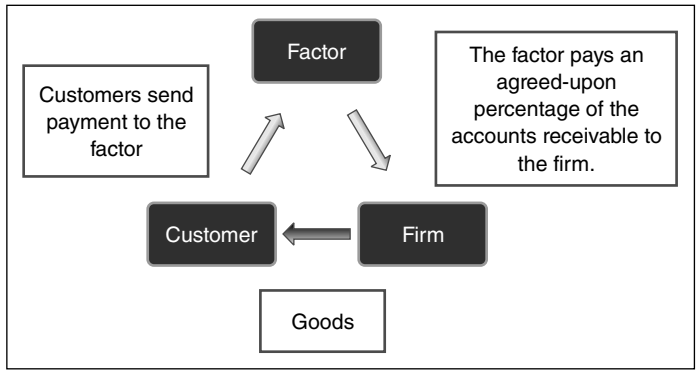


Figure 6.6 The Process of Factoring

6.5.5 Costs Involved in Receivable Management

The costs related to credit sales can be categorised into **six** broad groups:

Monitoring/Administrative Costs

When a company maintains receivables, it has to incur additional administrative expenses in the form of salaries to clerks who maintain records of debtors, expenses on investigating the creditworthiness of debtors, etc.

Default Cost

When overdue debtors cannot be collected in spite of serious efforts, a firm may be forced to write off the claim. Default cost is, therefore, in the nature of bad debt loss on debtors account. Firms generally make provision for bad debt losses in the normal course of business based on past experience, credit reputation of the customers and so on.

Opportunity Costs

Cost associated with the diversion of funds to receivable instead of being invested in some profitable investment opportunity. If the very same funds are invested in investment opportunities available to the firm, then the firm will earn extra revenues. However, investments in receivables will earn no direct profit. They even have a chance of becoming bad debts. Opportunity cost is the cost associated with foregoing of the next best alternative available to the firm. For example, the firm invests say ₹10,000 into receivables. If the funds are not invested into receivables, the firm can easily earn a 10% return by investing the amount into a profitable venture available to it. So the opportunity cost of the firm is ₹10,000 (10% of ₹1,00,000).

Collection Costs

These are costs, which the firm has to incur for collection of the amount at the appropriate time from the customers. This cost is incurred in exercising the extra efforts to monitor and recover the funds blocked in receivable. Collection cost increases when the debts are received very late after the expiry of credit period or they are received partially as a portion of debts becomes bad debts. Sometimes, this cost is wasted as the book debts get converted into bad debts and are not received by the firm. It includes:

- Expenses incurred to obtain information regarding credit worthiness of potential customers.
- Costs of additional steps to increase the chances for eventful payment.

Cost of Financing Receivables

When a firm maintains receivables, some of the firm's resources remain blocked in them because there is a time lag between the credit sale to customer and receipt of cash from them as payment. Whether this additional finances is met from its own resources or from outside, it involves a cost to the firm in terms of interest (if financed from outside). Hence, there will be two costs involved.

- Cost of additional borrowed Working Capital funds.
- Cost of existing debt which is not decreased by the investment of revenues earned by the firm.

Costs of Denying Credit

In a competitive market, if the competitors grant credit, it will be difficult for the firm to deny credit to the customers, at least extend some special inducements to increase the sales or to withstand in the market. Generally, the customers prefer to purchase goods on credit, and are not willing to pay until he satisfies with the goods as regards quality and specifications.

6.5.6 Factors Affecting the Size of Receivables

The level of sales determines the present and future level of receivable. If sales levels are estimated to increase, a proportionate increase in receivables is also forecasted. The following are a few factors that affect the level of receivables:

Level of Credit Sales

The first major factor in determining the volume of receivables is the level of the firm's credit sales. Since the terms of trade are similar in most industries, one firm in the industry with a large volume of sales may have a larger level of receivables than a firm with a small volume of sales. Sales levels can be used to forecast changes in receivables. If a firm predicts an increase of 20% in its credit sales for the next period, it will probably also experience a 20% increase in receivables.

Credit Policies

The philosophy behind the firm's policies on extending credit determines the amount of risk that it is willing to undertake in its sales activities. If the firm has a relatively lax credit policy, it will experience a higher level of receivables than a firm with a more rigid policy. This is true for two reasons:

- ***Strong customers will be less careful:*** A Lax credit policy encourages firms to settle their accounts without haste. Companies that otherwise pay their bills on time are not overly concerned if they are a few days late in paying bills to a firm that seems to accept slow payments as normal.
- ***Weak customers will default:*** With pressure to pay, weak firms are more prompt in payment. In the absence of this pressure, defaults on payments are more common. A number of firms may delay for long periods and then declare bankruptcy, resulting in bad-debt losses.

  In estimating their credit policies, the firms try to find a satisfactory middle ground between the excessive collection costs that accompany a highly aggressive policy and the excessive defaults and bad debt that accompany a lax policy.

Credit Terms

When credit terms are relaxed credit sale increases, and when credit terms are tightened the credit sale decreases. Thus, credit terms are directly proportional to sales.

Costs of Receivables

If the cost of maintaining receivables is high, the firm should reduce its receivables. If the cost of maintaining the receivables is quite low, the firm should go for a relaxed credit policy. Large receivables usually imply high management and collecting cost, and low receivable levels mean low management and monitoring cost.

Nature of Business

For certain types of businesses, credit sale and receivables are inherent in their collection policy, e.g. durable industry and automobile, whereas certain businesses have no scope of credit transactions such as shopping malls and FMCG products.

Collection Policy

Effective collection policy reduces the size of receivables and total time period of collections, whereas lenient and slow collection efforts increase receivables for a given firm.

Quality of Customers

Low quality customers have a tendency to delay payments and thus increase receivable level as well as the cost of maintaining receivables for the firm. High-quality customers have a tendency to adhere to the stipulated credit norms specified by the firm and make timely payments, thus reducing the burden of stretching receivables for the supplier firm.

Age and Experience of the Management

Expert management knows how to speed up collections and how to effectively lay down and implement a centralised and economical collection policy. Experience helps the management in determining the appropriate techniques and tools to be used in the speedy collection of the receivables from the customers.

Length of Time the Customer has been in Business

The firm has confidence in its regular and old customers. These customers do not delay payments and are compatible with the firm's credit policy. Generally, new customers tend to delay payments and add to firm's receivables and bad debts.

6.5.7 Policies for Managing Accounts Receivable

The period of credit and extent of receivables depend upon the credit policy followed by the firm. The purpose of maintaining or investing in receivables is to meet competition and to increase the sale and profits of the business. Companies adopt several marketing and selling strategies and tactics to sell, promote and position their products and services and to create competitive advantage to earn surplus value. The firm should establish its receivables policies after carefully considering both the benefits and costs of different policies. Three major factors should be analysed:

Profits

The firm should investigate different possibilities and forecast the effect of each on its future profits. The cost of funds tied up in receivables, collection costs, bad-debt losses and money lost with discounts for early payment should be compared with additional sales or losses of sales as a result of each proposed policy. These factors may be compared using an income statement in the marginal-analysis format. This is explained later.

Growth in Sales

Sometimes firms are willing to accept short-term setbacks with respect to profits if a new policy enables the firm to increase its sales significantly. A firm may adopt a certain policy to gain a foothold in a previously closed market. Because growth is so important aside from profits, it should be viewed as a separate factor in determining receivable policies.

Possible Problems

In spite of increased sales and profits, some policies may be accompanied by obvious and annoying problems. For example, by relaxing its credit terms, the firm may gain new customers. But if the firm's management must be concerned with collection policies and bad debts on a continuing basis, the firm might not be able to focus on its goals of increasing sales and reducing costs through other means. In such a case, the firm may choose to maintain tight credit with the intention of building sales without changing its terms of trade.

In any case, the final decision should be made after forecasting profits, considering the impact of the new policies on growth of sales, and evaluating the difficulties that will accompany the new policies. If a firm feels that the disadvantages of liberal credit policy outweigh increased profits and sales, the policy should be rejected. If growth is important, policies that encourage expansion into new markets will be sought. If profits are the main concern, policies will be found to promote the chances for long-term profits.

Table 6.2 Credit Policy for Different Firms

Risk Class	Description of Firm	Credit Policy
1.	Large firms whose financial position and past record indicate virtually no risk.	Open credit up to certain limit without approval required.
2.	Financially sound firms not supported by a detailed past record.	Open credit with approval for purchases in excess of certain amounts up to a specified limit.
3.	Solid firms with past records that indicate some risk.	Limited credit line with frequent checks.
4.	Not-too-solid firms that require close watching.	Restricted credit
5.	High-risk weak firms.	No credit.

6.5.8 Debtors Payment Terms

An important aspect of the credit control policy is to devise suitable payment terms, covering when should payment be made and how this should be achieved.

- Credit terms have to take into account the expected profit on the sale and the seller's cash needs
- Credit terms also establish when payment is to be received, an important matter from the seller's point of view

In addition to specifications relating to the nature of the goods to be supplies, the terms and conditions of sale normally cover the price, delivery, date of payment, frequency of payment (if in instalments) and discounts. The terms must be simple to understand and early enforceable.

Some of the examples of the payment terms are as follows:

- ***Payment after specified days after delivery*—**It might be expressed as net 30 which means that the customer has 30 days from invoice date within which to pay the bill and that no discount is offered for early payment.
- ***Credit period with cash discount for early payment***—For example, 2/10 net 30 means that 2% cash discount is given if payment is made within 10 days, and the maximum credit period is offered upto 30 days.
- ***Weekly credit***—All supplies in a week must be paid by a specified day in the next week.
- ***Half monthly credit***—Similar to a weekly credit, save that suppliers in the first half of the month must be paid by a specified period in the second half.
- ***10th and 25th*—**Similar to a half monthly credit, supplies received from the 16th up to the end of Month 1 must be paid for by the 10th of Month 2; supplies received in the period from the 1st and the 15th of a month must be paid for by the 25th of that month.
- ***Monthly credit*—**Payment of a month's suppliers must be made by a specified date in the following month.

6.5.9 Forming of Credit Policy

The decisions relating to matters such as credit policy specifies the length of credit period, discount policy, reports on credit control, procedures against slow payers, etc. Before setting up of credit policy the firm should consider the factors such as sales, market share, profit, return on capital employed, competition, risks involved, etc. A firm must establish its own credit policy for proper management of debtors, otherwise it will lead to more outstanding balances in debtors account and the risk of bad debts will also arise. A credit policy can be established by a firm keeping in view of the following:

- Credit period to be allowed to the general customers
- Credit period to be allowed to the special customers and the nature of speciality of the customers to be predetermined
- Credit rating system to be established
- Cash discount policy for cash purchases and early payment of debt balance by customer to be established

- Establishment of collection policy of debtors balances
- Establishment of proper accounting systems for close scrutiny of debtors balances
- Management Information System to be established for increase in efficiency in receivables management
- Establishment of policy for taking necessary steps in case of bad and doubtful debts
- Credit insurance cover to avoid the risk of bad debts to be considered
- Establishment of policy in appointing sales recovery forces
- Establishment of proper documentation for credit sales

A credit policy is related to decision such as *credit standards, length of credit periods, cash discount and discount period*. These are discussed as follows:

Credit Standards

The credit standards of a firm are the minimal requirements for credit extension to its customers. They emphasise the strictness of credit policy of the firm in a holistic view. Credit standards are said to be liberal or relaxed when the credit policy decision-making involves stretching of credit period and negligible monitoring of credit collections thus giving customers ample stretch of time to make their payment as per their convenience. On the other hand, they may become stringent or tightened as the credit policy variables are tightened and strictly adhered to.

Variables of Credit Standards

Credit standards of a given firm are evaluated based on the firm's sales volume, investment in accounts receivables and the amount of bad debt losses actually incurred by it.

1. ***Volume of sales:*** Sales volume is directly proportional to the degree of relaxation of credit standards for a normal firm. As the credit standards are tightened, the volume of sales decreases and vice versa.
2. ***Investment in accounts receivables:*** The size of the receivables depends upon the extent to which the credit policy is relaxed by the firm. Highly relaxed credit policy implies large investments in receivable. Contrarily, when the credit policy becomes strict, credit sales decreases and the investment in receivable also decreases.
3. ***Bad-debt losses:*** As the receivables increase, chances of occurrence of bad debts also increases and thus it reduces the total profits earned.

Length of Credit Period

Length of Credit period means the period allowed to the customers for making the payment. The customers paying well in time may also be allowed certain cash discounts. There are no bindings on fixing the terms. The length of credit period and quantum of discount allowed determine the magnitude of investment in receivables. A firm may allow liberal credit terms to increase the volume of sales. The lengthening of this period will mean blocking of more money in receivables, which could have been invested somewhere else to earn income. There may be an increase in debt collection costs and bad debts losses too. If the earnings from additional sales by length of credit period are more than the additional costs then the credit terms should be liberalised.

Cash Discount

The discount given to the customers on early payments on the purchases made by them is known as *cash discount*. A percentage of cash payment which is to be made by the customers is waived off by the firm. This difference in cash payment by the customers is the cash discount. Cash discount acts as an incentive for credit customers to pay in time.

For example, if a firm allows 30-days credit to its customers plus a discount of 2% if the payment is made within 12 days of the invoice date, then the credit terms of the firm are stated as '2/12 net 30,' where the total credit period is 30 days. If the customer pays within 12 days of the invoice date, the customer gets a rebate of 2% on the total cash payment.

6.5.10 Extending Credit Period: Profitability

Credit period to be granted to customers may be extended to effect increase in sales. However, extension of credit terms cannot be done arbitrarily. One has to compare additional profits (arising from increase in sales due to extension of credit terms) with costs associated with the decision.

Extension of credit period increases average debtors. Additional investment that has to be made due to comparatively relaxed credit term has to be determined. Then the cost of additional investment in debtors has to be ascertained. In computing costs of additional investment in debtors or opportunity savings, either of the two approaches that are generally followed may be adopted. The first is the appropriate required rate of return for the level of risk in the investment of debtors. The second approach takes cost of Debt Capital as the cost of financing investment in debtors. The decision rule can be formulated thus; costs of additional investment in debtors or savings from freeing funds should not exceed the expected additional contribution/profit when a change in credit policy is to be accepted. Two assumptions are made in this approach of credit extension decision. First, volume and sales increase can be attained with available capacity and resources. Second, increase in sales volume will not have any adverse effect on prices.

6.5.11 Introduction of Cash Discount

An attempt to speed up the payment of debts may be made through introduction of cash discount at certain specified rate. According to this scheme, debtors who will liquidate their debts within a specified time instead of taking full advantage of the credit period granted would be entitled to cash discount. The decision regarding the cash discount scheme will be taken by comparing the associated costs and benefits. Costs will be the discounts on credit sales that the debtors will avail of. Opportunity savings will be the benefits. That is, as a result of introduction of cash discount, the average debtors balance will come down. Reduction in investment of average debtors can, therefore, be ascertained. Required rate of return applied to reduction in the investment of debtors will give opportunity savings. Thus, if opportunity savings arising out of speed up in collection is higher than the cost of the discount, the cash discount scheme would be profitable.

The percentage of cost of early settlement discount to the company can be calculated by using the formula given as follows:

$$\text{Cost of Cash Discount} = \left[\frac{D}{(100-D)} \times \frac{365}{(N-S)}\right] \times 100$$

where, D = Discount offered, *N* = Number of days credit offered, for no discount, *S* =Number of days credit allowed with the settlement discount

Steps in Evaluation of Increase in Cash Discount

The following steps are suggested in evaluation of decision to increase the percentage of cash discount, e.g. increase of cash discount from existing rate of 1–2%.

Step A:

Ascertain the saving in cost of funds due to decrease in investment in debtors' balance, by increasing percentage of cash discount offered to customers for early cash payment.

Decrease in Debtors = Present Debtor Balance – New Debtor Balance

Note: (i) Present Debtors Balance = $\frac{\text{Sales}}{365} \times$ Present debtors collection period

(ii) New Debtors Balance = $\frac{\text{Sales}}{365} \times$ New debtors collection period

Saving in cost of funds due to decrease of debtors balance

= Decrease in Debtors × Required pre-tax rate of returns

Step B:

Ascertain the increase in cost due to increase in percentage of cash discount:

Increase in Cost of Cash Discount = Annual sales × Percentage taking discount × Percentage of discount

Step C:

Ascertain the increase in profit due to increase in cash discount:

Incremental Pre-tax Profit = Marginal returns – Marginal costs (i.e. A – B)

Illustration 6.10

Problem

A supplier offers credit to a company under terms of 2/20 net 60. Calculate the implicit cost of credit.

Solution

Implicit cost of credit = $\frac{2}{98} \times \frac{365}{4} \times 100 = 18.6224$ or 18.62%

Illustration 6.11

Problem

What is the opportunity cost of not taking a discount, when the credit terms are 2/20 net 45? Assume 1 year = 360 days.

Solution

$$\text{Opportunity cost of not taking the discount} = \frac{\text{Discount}}{100 - \text{Discount}} \times \frac{360}{N} \times 100$$

$$= \frac{2}{98} \times \frac{365}{25} \times 550 = 29.4\%$$

Illustration 6.12

Problem

A firm is considering offering 30-day credit to its consumers. The firm likes to charge them an annualised rate of 24%. The firm wants to structure the credit in terms of a cash discount for immediate payment. How much would the discount rate have to be?

Solution

Current credit period = 30 days

Desired charge of interest on credit amount = 24% p.a.

Interest at the rate of 24% p.a. for 30 days = 24 × 30/365 = 0.019726 or 1.9726%

A rupee given on credit should fetch after 30 days = ₹1.00 + 0.019726
= ₹1.019726

Present Value as on Zero date = 1/1.019726 = ₹0.980656

Cash discount that can be offered on cash sales = 1 – 0.980656
= ₹0.019344, i.e. 1.93%

Illustration 6.13

Problem

XYZ Ltd. Currently has sales of ₹30,00,000 with an average period of 2 months. At present, no discounts are offered to the customers. The management of the company is thinking to allow a discount of 2% on cash sales which results in the following:

(a) The average collection period would reduce to one month

(b) 50% of customers would take advantage of 2% discount

(c) The company normally requires a 25% return on its investment

Advise the management whether to extend discount on cash sales or not.

Solution

Current Debtors	(₹30,00,000 × 2/12)	5,00,000
Revised Debtors	(₹30,00,000 × 1/12)	2,50,000
Reduction of investment in Debtors balance		2,50,000

Discount to be offered = 30,00,000 × 50/100 × 2/100 = 30,000

Increase in profit due to decrease in debtors = 2,50,000 × 25/100 = ₹62,500

Net increase in profit = 62,500 – 30,000 = ₹32,500

Analysis—It is suggested to offer 2% discount on cash sales, which will result increase in profit by ₹32,500.

$$\text{Cost of Cash Discount} = \left[\frac{2}{100-2} \times \frac{365}{60-0}\right] \times 100 = \left[\frac{2}{98} \times \frac{365}{60}\right] \times 100$$

$$= 12.4\%$$

Since cost of discount 12.4% is less than the rate of Return on Investment 25%, it is suggested to extend the discount terms of cash sales.

Illustration 6.14

Problem

The Sales Manager of AB Limited suggests that if credit period is given for 1.5 months then sales may likely to increase by ₹1,20,000 per annum. Cost of sales amounted to 90% of sales. The risk of non-payment is 5%. Income tax rate is 30%. The expected Return on Investment is ₹3,375 (after tax). Should the company accept the suggestion of Sales Manager? *[CA (Inter), 2008]*

Solution

Credit period = 1.5 months

Increase in Sales	1,20,000
Less: Cost of Production	1,08,000
Contribution	12,000
Less: Bad Debts	6,000
	6,000
Less: Tax @30%	1,800
Profit after Tax	4,200

Conclusion:

Since, net profit is ₹4,200 and expected return is ₹3,375, therefore as Profit After Tax (PAT) is positive hence, the suggestion of the sales manager may be accepted.

Illustration 6.15

Problem

RST Limited is considering relaxing its present credit policy and is in the process of evaluating two proposed policies. Currently, the firm has annual credit sales of ₹225 lakhs and accounts receivable turnover ratio of five times a year. The current level of loss due to bad debts is ₹7,50,000. The firm is required to give a return of 20% on the investment in new accounts receivables. The company's variable costs are 60% of the selling price. Given the following information, which is better option?

(Amount in ₹lakh)			
	Present policy	**Policy Option I**	**Policy Option II**
Annual credit sales (₹)	225	275	350
Accounts receivables-Turnover ratio	5	4	3
Bad debt losses (₹)	7.5	22.5	47.5

[CA (Inter), 2010]

Solution

Evaluation of Credit Policies for RST Ltd.

	Present Policy	**Policy Option I**	**Policy Option II**
Annual Credit Sales	225	275	350
Accounts Receivable Turnover	5 times	4 times	3 times
Average Collection Period (12/Accounts Receivables Turnover)	2.4 months	3 months	4 months
Average Level of Accounts Receivables (Annual Credit Sales/ Accounts Receivable Turnover)	45	68.75	116.67
Marginal Increase in Investment in Receivables Less Profit Margin	—	14.25	28.75
Marginal Increase in Sales	—	50	75
Profit on Marginal Increase in Sales (40%)	—	20	30
Marginal Increase in Bad Debt Losses	—	15	25
Net Gain	—	5	5
Required Return on Marginal Investment at the rate of 20%	—	2.85	5.75
Surplus (Deficit) after Required Rate of Return	—	2.15	(0.75)

Advise: On the basis of above analysis the Policy Option I has a surplus of ₹2.15 lakhs whereas Option II shows a deficit of ₹0.75 lakhs on the basis of 20% return. Therefore, Policy Option I is better.

Illustration 6.16

Problem

A new customer with 10% risk of non-payment desires to establish business connections with you. He would require 1.5 month of credit and is likely to increase your sales by ₹1,20,000 p.a. Cost of sales amounted to 85% of sales. The tax rate is 30%.

Should you accept the offer if the required rate of return is 40% (after tax)?

[CA (Inter), 2011]

Solution

Working Notes:

I. Receivable Turnover = $\frac{12}{1.5}$ = 8 times

II. Average Investment in Receivables = $\frac{\text{Cost of Sales}}{\text{Receivables Turnover}} = \frac{1,02,00}{8}$ = ₹12,750

III. Opportunity Cost of Funds Blocked = 12,750 × 40/100 = 5,100

Evaluation of Credit to New Customer

A. Profit on Additional Sales	
Increase in Annual Sales	1,20,000
Less: Cost of Sales being 85%	1,02,000
	18,000
Less: Bad Debts Loss (10% on Sales)	12,000
Profit before Tax	6,000
Less; Tax at the rate of 30%	1,800
Net Profitafter Tax	4,200
B. Opportunity Cost of Investment	
In Receivables (12,750 × 40)	5,100
C. Net Benefit/Loss (A – B)	**(900)**

Decision: The offer should not be accepted since ₹4,200 the estimated profit after tax on additional sales is less than the required return on additional investment of ₹5,100 in receivables.

Illustration 6.17

Problem

A company is presently having credit sales of ₹12 lakh. The existing credit terms are 1/10, net 45 days and average collection period is 30 days. The current bad debts loss is 1.5%. In order to accelerate the collection process further as also to increase sales, the company is contemplating liberalisation of its existing credit terms to 2/10, net 45 days. It is expected that sales are likely to increase 1/3 of existing sales, bad debts increase to 2% of sales and average collection period to decline to 20 days. The contribution to sales ratio of the company is 22% and opportunity cost of investment in receivables is 15% (pre-tax). 50% and 80% of customers in term of sales revenue are expected to avail cash discount under existing and liberalisation scheme respectively. The tax rate is 30%.

Should the company change its credit terms? (Assume 360 days in a year). *[CA (Inter), 2012]*

Solution

Evaluation of Credit Policy

Working Notes:

(i) Computation of Cash Discount

Cash Discount = Total credit sales × % of customers who take up discount ×rate

$$\text{Present Policy} = \frac{12,00,000 \times 50 \times .01}{100} = ₹6,000$$

Proposed Policy = 16,00,000 × 0.08 × 0.02 = ₹25,600

(ii) Opportunity Cost of Investment in Receivables

Present Policy = 9,36,000 × (30/360) × (70% of 15)/100 = 78,000 × 10.5/100 = ₹7,280

Statement showing Evaluation of Credit Policies

Particulars	Present Policy	Proposed Policy
Credit Sales	12,00,000	16,00,000
Variable Cost at the rate of 78% of sales	9,36,000	12,48,000
Bad Debts at the rate of 1.5% and 2%	18,000	32,000
Cash Discount	6,000	25,600
Profit before tax	2,40,000	2,94,400
Tax at the rate of 30%	72,000	88,320
Profit after tax	1,68,000	2,06,080
Opportunity Cost of Investment in Receivables	8,190	7,280
Net Profit	1,59,810	1,98,800

Advise: Proposed policy should be adopted since the net benefit is increased by (₹1,98,800 – 1,59,810) = ₹38,990.

[Note: Opportunity cost of investment in receivables can be computed alternatively taking contribution at the rate of 22% into consideration. The net benefit then would change accordingly to ₹1,95,137.**]**

6.6 INVENTORY MANAGEMENT

Inventories are assets (goods) held by the firm for manufacturing various products or for sale to realise revenue for the firm. It means stock of goods, or a list of goods in manufacturing concern; it may include raw material, work in progress and stores, etc. Inventories constitute about 50–60% of Current Assets. Every enterprise needs inventory for smooth running of its activities. It serves as a link between production and distribution processes. As such, inventories are a vital element in the efforts of the firm to achieve desired sales levels. Depending upon the nature of the industry and firm, inventories may be durable or nondurable, perishable or non-perishable, valuable or inexpensive. The basic function of stock (inventory) is to safeguard

the production process from changes in the environment. Thus, it is very essential to have proper control and management of inventories for successful Working Capital management.

Inventory management refers to an optimum investment in inventories. It should neither be too low to affect the production adversely nor too high to block the funds unnecessarily. Excess investment in inventories is unprofitable for the business. Both excess and inadequate investments in inventories are not desirable. The firm should operate within the two danger points. The purpose of inventory management is to determine and maintain the optimum level of inventory investment.

6.6.1 Types of Inventory

Inventory is broadly classified based on the production process it is in, which include raw material inventory, semi-finished goods inventory and finished goods.

Raw Material (RM)

Raw materials are those basic inputs that are converted into finished product through the manufacturing process. Thus, raw materials inventories are those units which have been purchased and stored for future production. For example, raw materials range from iron ore awaiting processing into steel to electronic components are to be incorporated into stereo amplifiers.

a. Work-in-process (WIP)

Work-in-process inventories are semi-manufactured products. They represent products that need more work before they become finished products for sale. The production of the final product takes time to complete. So, in the production process, a firm has to maintain inventory of work-in-process which will become the final product.

b. Finished goods (FG)

These are finished and final products which are ready for sale. It is held in order to reduce the demand–supply gap of the product. The manufacturing firm typically carries inventories of RM, WIP, FGs, and stores and spares. Wholesalers and traders usually keep inventories of finished goods only.

The levels of three kinds of inventories for a firm depend on the nature of its business. A manufacturing firm will have substantially high levels of all three kinds of inventories, whereas a retail or wholesale firm will have a very high level of finished goods inventories and no raw material and work-in-process inventories.

6.6.2 Benefits of Holding Inventories

By holding inventories the firm is able to separate the processes of purchasing, producing and selling. If firms were not willing to hold adequate raw materials and finished goods, purchasing would take place only when immediate production and sales were anticipated.

When a customer signed a purchase agreement, the firm would not be able to offer rapid delivery. Inventories are used to provide cushions so that the purchasing, production and sales functions can proceed at their own optimum paces. In achieving the separation of these functions, the firm realises a number of specific benefits:

Avoiding Losses of Sales

If the firm does not have goods available for sale it will lose sales. Customers requiring immediate delivery will purchase their goods from the firm's competitors.

Gaining Quantity Discounts

If a firm is willing to maintain large inventories in selected product lines, it may be able to make bulk purchases of goods at large discounts. Suppliers frequently offer a greatly reduced price if the firm orders double or triple its normal requirement. By paying less for these goods, the firm can increase profits, as long as the costs of maintaining the inventories are less than the amount of the discount.

Reducing Order Costs

Every time a firm places an order, it incurs certain costs. The costs are related to filling up, checking and mailing of forms, accepting, inspecting and counting of goods on arrival and checking of invoices, etc. The variable costs associated with individual orders can be reduced if the firm places a few large rather than numerous small orders.

Achieving Efficient Production Runs

Once an assembly line or piece of machinery is prepared to receive certain raw materials and perform selected production operations, a set-up cost is incurred. This cost must be absorbed in the subsequent production run. Inventories assist the firm in making sufficiently long runs to achieve efficient production. Adequate inventories also protect against shortages that would delay or halt production and lead to considerable cost to the firm.

6.6.3 Costs Associated with Inventories

When a firm holds goods for future sale, it exposes itself to a number of risks and costs. The effective management of inventory involves a trade-off between having too little and too much inventory. In achieving this trade-off, the financial manager should realise that risks and costs may be closely related. The costs of holding inventories are as follows:

Material Costs

These are the costs of purchasing the goods plus transportation and handling. This may be calculated by adding the purchase price (less and discounts), the delivery charges and the sales tax (if any).

Order Costs

These are the variable costs of placing an order for the goods. Each separate shipment involves certain expenses connected with requesting and receiving materials. Examples of these costs are the typing of the order and the inspection of the goods after they arrive. The fewer the orders, the lower the order cost will be for the firm.

Carrying Costs

These are the expenses of storing goods. Once the goods have been accepted, they become part of the firm's inventories. The following are the examples of different kinds of carrying costs:

1. ***Storage Costs:*** The firm must provide for storage space, usually through the operation of a warehouse or supply room. The firm must employ workers to move, clean, count, record and protect the goods. All of these activities dealing with the physical holding of the goods are considered storage costs.
2. ***Insurance:*** In spite of the best precautions taken, firms must protect themselves against such hazards as fire or accidents in the warehouse. Larger amounts of inventory require larger amounts of insurance. The insurance premiums represent a carrying cost on inventory.
3. ***Obsolescence and Spoilage:*** When firms hold goods, they expose themselves to the possibility that the goods will not be saleable when the time arrives. Obsolescence is the cost of being unable to sell goods because of current market factors deriving from changes in styles, tastes or other factors. If a product is no longer wanted, the firm must sell it at a fraction of its value or destroy it. Spoilage occurs when a product is not saleable because of deterioration during the storage, such as foods that rot, plants that die, garments that are attacked by moths, candles that discolour or chemicals that decompose.
4. ***Damage or Theft:*** Although a firm makes every effort to protect goods against damage and safeguard items against pilferage, goods are damaged and stolen. A portion of these expenses are not covered by insurance and are losses to the firm. Some businesses, particularly retail stores and firms producing luxury goods, face this carrying cost.

Cost of Funds Tied Up in Inventory

Whenever a firm commits its resources to inventory, it is using funds that otherwise might be available for other purposes. A portion of the inventory is financed by trade credit from suppliers and involves no cost. The balance of the inventory must be financed from the firm's general funds and involves a cost. If the firm is considering an expansion of inventory and plans to borrow to obtain funds, the firm will have to pay interest on the additional debt.

Cost of Running Out of Goods

Whenever a firm incurs shortages of products, it incurs costs. If the firm is unable to fill an order, it risks losing a sale. If the firm runs out of raw materials, it may force a costly shutdown

of the production process. Adequate inventory helps reduce additional costs and lost revenues due to shortages.

6.6.4 Importance of Inventory Management

Inventory management covers a large number of problems including fixation of minimum and maximum levels, determining the size of inventory to be carried, deciding about the issue, receipts and inspection procedures, determining the Economic Order Quantity, proper storage facilities, keeping check over obsolescence and ensuring control over movement of inventories. The importance of the inventory management is summarised as follows:

Transaction Motive to Avoid Loss Related to the Gap between the Demand and Supply of Goods

As and when the demand for the product arises, the firm has to deliver goods. The stock of RM and WIP is also needed for efficient and smooth production run. If demand has to be met in time, the goods from plant have to be supplied in time. Thus adequate inventory of RM, WIP and FGs is needed to manufacture the product, allow smooth flow of material and the final product in the production process and distribution cycle of the firm to match the predicted demand and related supply of the product.

Gaining Quantity Discounts

The firm purchases and stores material during favourable economic conditions in order to minimise the cost of material input. Suppliers usually give trade discounts on bulk purchases by customers. Thus, the firm gains from discount on the bulk purchases of material inputs. This decreases the overall cost to the firm.

Reduction in Ordering Cost

The costs involved between the time of placing the order and receiving the supply of goods ordered which are then inspected and counted before final payment are known as *operating cost*. Operating costs are independent of the size of order. Hence, if the firm increases the size of its order and thus decreases the frequency of its order, its Operating Cycle is reduced, reducing the overall cost to the firm.

Efficiency and Economy of Production Run

There are certain costs in starting the machine to run the production process. These costs are termed as *start-up costs*. Start-up cost is independent of the length (time duration) of production run. Thus, if the firm increases its production run (i.e. for a longer time period) and thus decreases the frequency of production run, start-up costs are reduced, thereby reducing the overall cost to the firm. Such production runs are said to be efficient and profitable.

Precautionary Motive

Inventory acts as buffer stock. It acts as a shock absorber and co-ordinates the various interdepartmental processes such as purchasing, production and selling. Adequate inventory of RM and WIP is maintained to run large, efficient and smooth production runs.

Creating Goodwill among Customers

Meeting customers' demand in time even in case of errors in forecasted demand creates goodwill and loyalty on part of the customers.

6.6.5 Objectives of Inventory Management

The objective of inventory management is to minimise the total cost associated with holding inventories. The purpose of inventory management is to keep the stocks in such a way that neither there is over-stocking nor under-stocking. The main objectives of inventory management are operational and financial. The operational objectives mean that the materials and spares should be available in sufficient quantity so that the work is not disrupted for want of inventory. The financial objectives mean that investment in inventories should not remain idle and minimum Working Capital should be locked in it. The following are the objectives of inventory management:

1. To ensure the continuous supply of raw material, spare and finished goods so that the production should not suffer at any time.
2. To avoid both over-stocking and under-stocking of inventory.
3. To maintain the investment in inventories at the optimum level as required in the operational and sales activities.
4. To keep material cost under control so that they contribute in reducing the cost of production and overall costs.
5. To eliminate duplication in ordering stocks. This is possible with the help of centralised purchase.
6. To minimise the losses through pilferages, wastages and damages.
7. To design the proper organisation for inventory management.
8. To ensure the perpetual inventory control so that the material shown in the stock ledgers should be actually lying in the stores.
9. To facilitate the furnishing of data for short-term and long-term planning and control of inventory.

6.7 TOOLS AND TECHNIQUES OF INVENTORY MANAGEMENT

Effective inventory management requires an effective control, system for inventories. A proper inventory control not only helps in solving the acute problem of liquidity but also increases the profits and causes substantial reduction in the Working Capital of the concern. The following are the important tools and techniques in inventory management and control:

1. Determination of Stock Level
2. Determination of Economic Order Quantity
3. A.B.C. Analysis
4. V E D Analysis
5. Inventory Turnover Ratio
6. JIT Control System

6.7.1 Determination of Stock Level

Carrying too much and too little inventories is harmful to the firm. If the inventory level is too little, the firm will face frequent stock outs involving heavy ordering costs and if the inventory is too high, it will be unnecessary tie-up of capital. Therefore, an efficient inventory management requires that a firm should maintain an optimum level of inventory where inventory costs are minimum. Various inventory/stock levels are as follows:

Minimum Stock Level

The minimum stock level is that quantity below which stocks should not normally be allowed to fall. If stocks go below this level, there will be danger of stoppage of production due to shortage of supplies. The following factors are taken into account while fixing the minimum stock level:

- Average rate of consumption of material.
- Average lead time
- Re-order level
- Nature of the item
- Stock-out cost

Formula

$$\text{Minimum Level} = \text{Re-order level} - (\text{Average usage} \times \text{Average lead time})$$

Maximum Stock Level

The maximum stock level is that quantity above which stocks should not normally be allowed to exceed. The following factors are taken into consideration while fixing the maximum stock level:

- Average rate of consumption of material
- Lead time
- Re-order level.
- Maximum requirement of materials for production at any time.
- Storage space available as cost of storage and insurance.

Formula

Maximum Level = Re-order level – (Minimum consumption) × (Minimum lead times) + Reordering quantity

Re-order Level

This is the point fixed between the maximum and minimum stock levels and at this time, it is essential to initiate purchase action for fresh supplies of the material. In order to cover the abnormal usage of material or unexpected delay in delivery of fresh supplies, this point will usually be fixed slightly higher than the minimum stock level. The following factors are taken into account while fixing the re-order level:

- Maximum usage of materials
- Maximum lead time
- Maximum stock level
- Minimum stock level

Re-order level = (Maximum usage × Maximum lead time) or
(Minimum level + Consumption during lead time)

Lead time: The time taken in processing the order and then executing is known as lead time.

Rate of consumption: It is the average consumption of material in the factory.

6.7.2 Economic Order of Quantity

The Economic Order Quantity (EOQ) refers to the order size that will result in the lowest total of order and carrying costs for an item of the inventory. If a firm places unnecessary orders, it will incur unneeded order costs. If it places too few order, it must maintain large stock of goods and will have excessive carrying costs. Cost of managing the inventory is made up of two parts:

Ordering Costs: This cost includes the following:

- Cost of staff posted for ordering of goods
- Expenses incurred on transportation of goods purchased
- Inspection costs of incoming material
- Cost of stationery, postage and telephone charges

Carrying costs: These are the costs for holding the inventories. It includes:

- The Cost of Capital invested in inventories
- Cost of storage
- Insurance cost
- Cost of spoilage on handling of materials
- The loss of material due to deterioration

By calculating an Economic Order Quantity, the firm identifies the number of units to order that results in the lowest total of these two costs. EOQ is the size of lot to be purchased which is economically viable. This is the quantity of the material, which can be purchased at minimum cost.

Assumptions of EOQ

1. **Demand is known:** Although it is difficult to predict accurately the firm's level of sales for individual items, the marketing manager must provide a sales forecast. Using past data and future plans, a reasonably accurate prediction of demand can often be made. This is expressed in units sold per year.
2. **Sales occur at a constant rate:** This model may be used for goods that are sold in relatively constant amounts throughout the year. A more complicated model is needed for firms whose sales fluctuate in response to seasonal or other cyclical factors.
3. **Costs of running out of goods are ignored:** Costs associated with shortages, delays or lost sales are not considered. These costs are considered in the determination of safety level in the reorder-point subsystem.
4. **Safety stock level is not considered:** The safety stock level is the minimum level of inventory that the firm wishes to hold as a protection against running out. Since the firm must always be above this level, the EOQ formula need not consider the costs of maintaining the safety stock level.

Formula:

$$\text{EOQ} = \sqrt{\frac{2AS}{I}}$$

where,

A = Annual consumption in rupees
S = Cost of placing an order
I = Inventory carrying cost of one unit

Illustration 6.18

Problem

A firm buys casting equipment from outside suppliers at the rate of ₹30 per unit. Total annual needs are 800 units. You have with you following further data:

(i) Annual Return on Investment, 10%
(ii) Rent, insurance, taxes per unit per year, ₹1
(iii) Cost of placing an order, ₹100
(iv) How will you determine the Economic Order Quantity?

Solution

Annual consumption (A) = 800 units
Ordering cost (S) = ₹100.
Annual consumption in ₹= 800 unit × ₹30 per unit = ₹24,000
Total interest cost = 10% of 24,000 = ₹2,400
Interest cost per unit = 2,400/800 = ₹3
Inventory Carrying cost (I) = Interest cost + Rent, insurance, Taxes cost = 3 + 1 = ₹4 per unit

$$EOQ = \sqrt{\frac{2AS}{I}}$$
$$= \sqrt{\frac{2 \times 800 \times 100}{4}}$$
$$= \textbf{200 units}$$

Illustration 6.19

Problem

ABC Ltd. has annual demand of 5000 units of material. Ordering cost is ₹500 per order and carrying costs are ₹100 per unit. The safety stock is 25% of EOQ. The daily usage is 20 units and lead time is 5 days. Calculate (i) EOQ (ii) Safety stock (iii) Reorder Point.

Solution

(i) $EOQ = \sqrt{\frac{2 \times 5{,}000 \times 500}{100}} = 224$ units

(ii) Safety stock = $0.25 \times 224 = 56$ units

(iii) Re-order level = (Average daily usage rate × lead time in days) + Safety stock
$= (20 \times 5) + 56 = 156$ units

6.7.3 A-B-C Analysis

A-B-C analysis is a method of material control according to value. The basic principle is that high-value items are more closely controlled than the low-value items. The materials are grouped according to the value and frequency of replenishment during a period.

'A' Class items: Small percentage of the total items but having higher values.

'B' Class items: More percentage of the total items but having medium values.

'C' Class items: High percentage of the total items but having low values.

Table 6.3 Classification of Inventory as per A-B-C Analysis

Class	No. of items	Value of the Items
	%	%
A	10	70
B	20	20
C	70	10

A-B-C analysis helps to concentrate more efforts on category A since greatest monetary advantage will come by controlling these items. An attention should be paid in estimating the requirements, purchasing, maintaining the safety stocks and properly storing of 'A' Category, material. These items are kept under a constant review so that a substantial material cost may be controlled. The control of 'C' items may be relaxed and these stocks may be purchased for

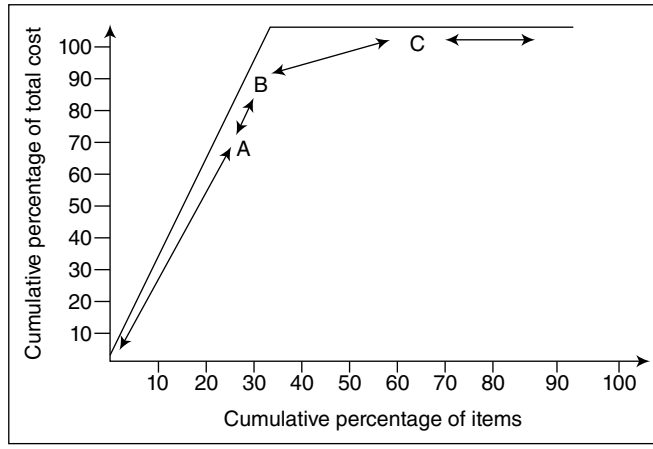


Figure 6.7 Graphical Presentation of A-B-C Analysis

an year. A little more attention should be given towards 'B' category items and their purchase should be undertaken at quarterly or half-yearly intervals (Figure 6.7).

6.7.4 V-E-D Analysis

The V-E-D analysis is generally used for spare parts. The requirement and urgency of spares parts is different from that of the material. Spare parts are classified as vital (V), essential (E), and desirable (D). The vital spares are must for running the concern smoothly and these must be stored adequately. The non-availability of spare parts will cause havoc on the concern. The E type of spares is also necessary but their stock may be kept at low figures. The stocking of D type of spares may be avoided at times. If the lead time of these spares is less, then stocking of these spares can be avoided. The classification of spares under these three categories is an important decision. A wrong classification of any spare will create difficulties for production department. The classification should be left to the technical staff because they know the need in urgency and use of these spares.

6.7.5 Just In Time (JIT) Inventory Control System

Just in time philosophy, which aims at eliminating waste from every aspect of manufacturing and its related activities, was first developed in Japan. Toyota introduced this technique in the 1950s in Japan and the US companies started using this technique in 1980s. The term JIT refers to a management tool that helps produce only the needed quantities at the needed time. Just in time inventory control system involves the purchase of materials in such a way that delivery of purchased material is assured just before their use or demand. The philosophy of JIT control system implies that the firm should maintain a minimum (zero level) of inventory and rely on suppliers to provide materials just in time to meet the requirements.

6.7.6 Inventory Turnover Ratio

This ratio is calculated to indicate whether the inventories have been used efficiently or not. The purpose is to ensure the blocking of only required minimum funds in inventory. This ratio is also known as Stock Velocity Ratio.

$$\text{Inventory Turnover Ratio} = \frac{\text{Cost of goods sold}}{\text{Average inventory at cost}}$$

where,

$$\text{Average Inventory} = \frac{\text{Opening inventory} + \text{Closing inventory}}{2}$$

$$\text{Inventory Conversion Period} = \frac{\text{Days in Year}}{\text{Inventory Turnover Ratio}}$$

6.8 SUMMARY

- The sources of working capital for a firm can be broadly categories into three types, i.e. long-term sources, mid-term sources and short-term sources.
- The major long-term sources are issue of shares, retained earnings, redeemable preference share, debentures and long term loans.
- The mid-term sources of finances are working capital term loans, public fixed deposits and medium term loans.
- The sources of short-term finance are trade credit, accrued expenses, bank finance, deferred income, commercial paper, factoring etc.
- There are five alternative strategies of financing working capital. These are: Hedging or Matching Policy, Conservative Policy, Aggressive Policy, Highly Aggressive Policy and Zero Working Capital Strategy.
- The hedging approach is also known as the *matching approach.* With this approach, short term or seasonal variation in current assets would be financed with short term debt; the permanent component of current assets and all fixes assets would be met with long term debt.
- A conservative strategy suggests not to take any risk in working capital management and to carry high levels of current assets in relation to sales.
- In Aggressive Policy, the current assets are maintained just to meet the current liabilities without keeping any cushion for the variations in working capital needs. Adoption of this strategy will minimize the investment in Net Working Capital and ultimately it lowers the cost of financing working capital.
- Zero working capital is a situation in which there is no excess of current assets over current liabilities to be funded. The concept is used to drive down the level of investment required to operate a business, which can also increase the return on investment for shareholders.

- Reserve Bank of India (RBI) has appointed different study groups from time to time to suggest ways and means of making the bank credit an effective instrument for economic growth, industrialisation as well as to improve the profit of the banking sectors.
- In 1974, a study group under the chairmanship of P.L. Tandon was formed to examine the existing methods of lending and suggest changes. Tandon Committee suggests the banks to move towards need-based lending breaking away from the traditional methods of security oriented lending.
- The RBI constituted a working group under the chairmanship of K.B. Chore in April 1979 to make a further in-depth study of the working of lending system. The group proposed a drawee bill system to ease payment to small suppliers and also to make increasing use of bill.
- All firms need cash to meet their transactions, speculative and precautionary needs. Firms need cash to carry out their daily activities such as purchasing resources and services.
- Efficient cash management requires efficient cash forecasting. We generally use cash budget as a tool for cash forecasting. Cash budgets help to estimate how much cash is required above the sales collections and other earnings of the firm.
- For accelerating cash collections, a number of methods such as computerized billing, reduction of floats, lockboxes and concentration banking can be adopted by the firm.
- Credit sales result in accounts receivables. Basically, credit sales are done to enhance sales/demand of the firm's product/service.
- Credit policy comprises: (i) credit conditions, which include credit period, cash discount, cash discount period), (ii) credit standards, which include the quality of credit period and credit takers in the market) and (iii) collection efforts, which include receivable forecasting, monitoring, analysis and evaluation and different techniques used for recovering receivables.
- Inventory forms a major portion of total current assets. The inventory can be broadly classified into three types: (i) raw material inventory, (ii) stock in process inventory and (iii) finished goods inventory.
- There are two types of inventory costs: (i) ordering costs, which deal with costs related to placing the order, transportation, receiving and inspecting the inventory ordered and (ii) carrying costs, which deal with warehousing, handling, insurance, taxes etc., costs of handling and managing the received inventory.

EXERCISES

A. Short-answer Type Questions (5 Marks)

1. Define the Economic Order Quantity. How is it computed?
2. Why should inventory be held?

3. What are ordering and carrying cost? What is their role in inventory control?
4. Explain the objective of credit policy.
5. How is the reorder point determined?
6. What is an optimum credit policy? Discuss.
7. What is the role of credit terms and credit standards in the credit policy of a firm?
8. Explain the three principal motives for holding cash.
9. Why is inventory management important? Explain the objective of inventory management.
10. What are the objectives of the collection policy? How should it be established?
11. What credit and collection procedures should be adopted in case of individual accounts? Discuss.
12. Explain the techniques that can be used to accelerate the firm's collection?
13. What are the advantages of decentralised collection over a centralised collection?
14. Write short notes on the following:
    (a) Inventory Management *[C.U. B.Com. (H), 2007]*
    (b) Inventories Management Ratio *[C.U. B.Com. (H), (2011)]*
15. Write a short note on the recommendations of Tandon Committee regarding bank financing. *[C.U. B.Com. (H), (2013)]*
16. What are the factors in determining the size of debtors? *[C.U. B.Com. (H), (2014)]*
17. Write a short note on Hard Core Current Asset. *[C.U. B.Com. (H), (2010)]*
18. Distinguish between conservative and aggressive strategies of financing Current Assets. *[C.U. B.Com. (H), (2013)]*
19. Give a brief idea about the sources of finance of Working Capital. *[C.U. B.Com. (H), (2014)]*
20. Write a short note on the recommendations of Chore Committee. *[C.U. B.Com. (H), (2014)]*

7 CHAPTER Capital Expenditure Decision (I)

CHAPTER OUTLINE

7.1 Concept of Capital Budgeting
7.2 Significance/Importance of Capital Budgeting
7.3 Objectives of Investment Decisions
7.4 Capital Budgeting Process
7.5 Types of Project
7.6 Types of Capital Investment Decisions
7.7 Project Cash Flow
7.8 Basic Principles for Measuring Project Cash Flows
7.9 Techniques of Decision Making
7.10 Summary

7.1 CONCEPT OF CAPITAL BUDGETING

Successful operation of any business depends upon the investment of resources in such a way as to bring in benefits or best possible returns from any investment. An investment can be simply defined as expenditure in cash or its equivalent during one or more time periods in anticipation of enjoying a net inflow of cash or its equivalent in some future time period or periods. An appraisal of investment proposals is necessary to ensure that the investment of resources will bring in desired benefits in future. If the financial resources were in abundance, it would be possible to accept several investment proposals which satisfy the norms of approval or acceptability. Since resources are limited, a choice has to be made among the various investment proposals by evaluating their comparative merit.

Capital Budgeting is defined as the firm's decision to invest its current funds most efficiently in long-term activities in anticipation of an expected flow of future benefits over a series of years. It should be remembered that the investment proposal is common both for fixed assets and current assets. Capital Budgeting is employed to evaluate expenditure decisions which involve current outlay but are likely to produce benefits over a period of time longer than 1 year. These benefits may be either in the form of increased revenues or reduced costs.

Van Horne has defined capital budgeting as, "The process of identifying, analysing and selecting investment projects whose return (cash flows) are expected to extend beyond one year." As per Robert N. Anthony, "Capital Budget is essentially a list of what management believes to be worthwhile projects for the acquisition of new capital assets with the estimated cost of each product".

Hence, Capital Budgeting may be defined as the decision making process by which firms evaluate the purchase of major fixed assets, including buildings, machinery, and equipment or investment in any project or extension of existing capacity, etc. The firm's Capital Budgeting Decisions will include addition, disposition, modification and replacement of fixed assets.

Features of Capital Budgeting

Capital Budgeting Decision has three basic features:

1. Decision regarding the investment for more than one year.
2. Anticipated benefits of the project will be received in future dates.
3. Require large amount of fund for investment with a relatively high degree of risk.

7.2 SIGNIFICANCE/IMPORTANCE OF CAPITAL BUDGETING

Capital Budgeting is an important financial decision-making process as it affects the profitability and competitive position of the firm mainly because it involves investment in fixed assets. The Capital Budgeting Decisions are important, crucial, and critical business decisions due to the following reasons:

1. ***Large amount of investment:*** Capital Budgeting Decisions involves the investment of large amount of funds. It is therefore necessary for a firm to make such decisions after a thoughtful consideration so as to result in the profitable use of its scarce resources. In most of the cases, supply of capital is not in abundance and, therefore, depth analysis should be done before selecting investment proposals. It must be ensured that there is a regular return from the project which is equal to or higher than its cost and the invested capital must be recovered during the lifetime of the project.
2. ***Related with financing and Dividend Decisions:*** Capital Budgeting Decision influences the other two important financial decisions of the firm, i.e. Financing Decisions and Dividend Decisions. When a firm decides to make an investment in a project it has to arrange finance (or fund) for the project. At the same time, the profitability of the project determines the future dividend decision of the firm. So, proper evaluation should be done regarding the impact of the investment on the financing and dividend policies of the company while selection of profitable investment opportunities. Since one is related with the other, a right Investment Decision will help taking appropriate financing and Dividend Decisions of the firm.

3. ***Long time period:*** Capital is generally invested with the expectations of future benefits which are likely to accrue over a long period of time. These decisions not only affect the future benefits and costs of the firm but also influence the rate and direction of growth of the firm. Investment Decisions involve greater amount of risk on account of unforeseen situations. Therefore, a right decision is to be taken to have a favourable impact on the profitability and competitive position of the firm.
4. ***Irreversibility:*** Most of the Investment Decisions are irreversible. Therefore, if a wrong decision is taken it can be avoided only at the cost of heavy 'capital loss'. Alternatively, if the firm allows the project to be completed, it will have to pay the penalty for a wrong decision for a long period to come. If a firm takes a number of wrong decisions it will have a damaging impact on the viability of the firm. So investment proposals should be properly evaluated and a right decision that will serve the long-term interest of the firm should be taken. For example, once a hundred crore rupees building construction is initiated, the firm cannot easily withdraw from the construction.
5. ***Helps in forecasting sales:*** An important part of the Capital Budgeting process is forecasting sales for possibly 10 or 15 years into the future. The spending of funds for fixed assets represent an implied forecast of future sales. So, Capital Budgeting Decision helps to predict future sales of the firm.

7.3 OBJECTIVES OF INVESTMENT DECISIONS

There are a number of objectives which necessitate investment in long lived or fixed assets of a firm. Some specific objectives related to Investment Decisions are:

1. ***Selection of the right mix of profitable projects:*** It may be said that the overall objective of Capital Budgeting is to allocate the available investible funds among the competing capital projects in order to maximise the total profitability. This is made possible by employing various evaluation techniques for the selection of investment projects which contribute the maximum towards the overall investment objective.
2. ***Capital expenditure control:*** Control of capital expenditure is the next important objective of Capital Budgeting. This is achieved by forecasting the long-term financial requirements and thereby enabling the management to plan in advance to raise funds at the right time. The objective of preparing capital budget is to plan and then compare the actual capital expenditure with the budgeted figure for controlling costs.
3. ***Determining the required quantum and the right source of funds for investment:*** The next important objective of Capital Budgeting is to determine the funds required for long-term project and to see that such estimates fall in line with the company's financial policies. It also aims to compromise between the availability of funds and needs of the capital projects.

The other objectives of Capital Budgeting are:

1. To decide whether a specified project is to be selected or not.
2. To find out the quantum of finance required for the capital expenditure.

3. To evaluate the merits of each proposal to decide which project is best.
4. Improving quality of products and creating new demand
5. Expansion of existing business
6. Diversification for survival particularly in competitive conditions
7. Improvement of efficiency
8. Meeting satisfaction of customers

7.4 CAPITAL BUDGETING PROCESS

Capital Budgeting process refers to the total process of generating, evaluating, selecting and following up on capital expenditure alternatives. The extent to which the Capital Budgeting process needs to be formalised depends on the size of the organisation, number of projects to be considered, direct financial benefit of each project under consideration. The other factors that may be considered are the composition of the firm's existing assets and management's desire to change that composition, timing of expenditures associated with the projects that are finally accepted, etc.

1. ***Planning or generation of project:*** The Capital Budgeting process begins with the identification of potential investment opportunities. Depending upon the nature of the firm, investment proposals may come from a variety of sources like production of new product, expansion of existing product and market, purchase of new equipment or replacement of existing equipment and building, etc. The opportunity then enters the planning phase. In this phase, the potential effect of the project on the firms' overall profitability is assesed and also the ability of management of the firm to exploit the opportunity is determined. Opportunities having little merit are rejected and promising opportunities are advanced in the form of a proposal to enter the evaluation phase.
2. ***Evaluation of the project:*** The evaluation of the project may be done in two steps. First the costs and benefits of the project are estimated in terms of Cash Flows and secondly the desirability of the project is judged by an appropriate criterion. Investment appraisal techniques, ranging from the simple payback method and accounting rate of return to the more sophisticated Discounted Cash Flow Techniques, are used to appraise the proposals. The technique selected should be the one that enables the manager to make the best decision in the light of prevailing circumstances.
3. ***Selection of the project:*** After evaluation of the project, the project with highest return should be selected. There is no hard and fast rule set for the purpose of selecting a project from many alternative projects. Normally, the projects are screened at various levels. However, the final selection of the project vests with the top level management. Considering the returns and risks associated with the individual projects as well as the Cost of Capital to the organisation, the organisation will choose among projects so as to maximise shareholders' wealth.
4. ***Execution of project:*** After selection of a project, the next step in Capital Budgeting process is to implement the project. Thus, the funds are apportioned for capital expenditures.

Then the funds are spent in accordance with appropriations made in the capital budget funds for the purpose of project.

5. ***Control:*** The follow-up comparison of actual performance with original estimates ensures better control. The progress of the project is monitored with the aid of the feedback reports. These reports will include capital expenditure progress report, performance reports comparing actual performance against plans set and post completion audits.
6. ***Review:*** After the project is terminated or even before, the organisation should review the entire project to explain its success or failure. This phase may have implication for firms planning and evaluation procedures. Further, the review may produce ideas for new proposals to be undertaken in the future.

7.5 TYPES OF PROJECTS

A firm invests in different types of project for successfully running its operations. The investment may be for the replacement of existing machine and equipment, or for expansion of its business or for improving the skill of the employee. The different types of projects are discussed as follows:

1. ***Replacement:*** Due to normal wear and tear or due to new technology, the machines and equipment used in the firm may become obsolete. As a result, the productive capacity and competitive ability of the firm may be adversely affected. The firm needs funds or modernisation of a certain machines or for renovation of the entire plant, etc., to make them more efficient and productive. Where renovation or modernisation is not desirable or feasible, total replacement with a new machine and equipment is required.
2. ***Expansion:*** The firm requires additional funds to invest in fixed assets when it intends to expand the production facilities in view of the increase in demand for their product in near future. Accordingly the Current Assets will increase. In case of expansion if the existing infrastructure like plant, machinery and other fixed assets are inadequate to carry out the increased production volume; thus a firm needs funds for such projects. This will include not only expenditure on fixed assets (infrastructure) but also an increase in Working Capital (Current Assets).
3. ***Diversification:*** A firm will require large funds for long-term investment if the management of the firm decided to diversify its production into other lines by adding a new line of business to its original line. For example, Godrej and Tata diversified from consumer durables and steel respectively into many other business lines.
4. ***Skill development of employee:*** Sometime for improving the skills of the employees, investment are made for their training and capacity building. For example, training institute may be built up by the firm for its employee.
5. ***Comply with statutory requirements:*** Regulators and governments ask for certain criterion to be fulfilled by an organisation. For example, investment for firefighting devices, rest room for employees, accident prevention devices, etc.

6. ***Research and development:*** The existing production and operations can be improved by the application of new and more sophisticated production and operations management techniques. New technology can be borrowed or developed in the laboratories. There is a greater need of funds for continuous research and development of new technology for future benefits or returns from such investments.
7. ***Buy or lease:*** This is the most important decision area in Financial Management whether a firm should acquire the desired equipment and building on lease or buy it. If the asset is acquired on lease, there has to be made a series of annual or monthly rental payments. If the asset is purchased, there will be a large initial commitment of funds, but no further payments. The costs and benefits of the two alternative methods should be matched and compared to arrive at a conclusion.
8. ***Project for improving goodwill of the firm:*** This type of investment is done to create a favorable image of the firm in the minds of the public. The example may be, the investment made in education of underprivileged children, guest house, customer care point, etc.

7.6 TYPES OF CAPITAL INVESTMENT DECISIONS

Different types of Capital Investment Decisions are taken by the firm in different situations. Broadly, Capital Investment Decisions may be classified in two ways. These are:

1. On the basis of decision situation
2. On the basis of firm's long term strategy

7.6.1 On the Basis of Decision Situation

Basically, three types of Capital Budgeting Decisions are considered on the basis of decision situation namely the accept-reject decision, the mutually exclusive choice decision and the Capital Rationing Decision.

1. ***Accept-reject decision:*** This is a fundamental decision in Capital Budgeting. If the project is accepted, the firm would invest in it, if the proposal is rejected, the firm does not invest in it. In general, all those proposals which yield a rate of return greater than a certain required rate of return or Cost of Capital are accepted and the rest are rejected. By applying this criterion, all independent projects are accepted. Independent projects are projects that do not compete with one another in such a way that the acceptance of one precludes the possibility of acceptance of another. Under the accept-reject decision, all independent projects that satisfy the minimum criterion should be implemented.
2. ***Mutually exclusive project decision:*** Mutually exclusive projects are those which compete with other projects in such a way that the acceptance of one will exclude the acceptance of the other projects. The alternatives are mutually exclusive and only one may be chosen.

   For example, a company is intending to buy a new folding machine. There are three competing brands, each with a different initial investment and operating costs. The

three machines represent mutually exclusive alternatives, as only one of these can be selected. It may be noted here that the mutually exclusive project decisions are not independent of the accept-reject decisions. The competing projects must be acceptable at first under accept-reject criterion. In brief, in our example, if all the three available alternatives are rejected under accept-reject criterion, the firm should look for a new alternative altogether. Mutually exclusive Investment Decisions acquire significance when more than one proposal is acceptable under the accept-reject decision. Then, some technique has to be used to determine the best one. The acceptance of this best alternative automatically eliminates the other alternatives.

3. ***Capital Rationing Decision:*** In a situation where the firm has unlimited funds, all independent investment proposals yielding return greater than some predetermined level are accepted. However, this situation does not prevail in most of the business firms in actual practice. They have a Fixed Capital budget. A large number of investment proposals compete for these limited funds. The firm must, therefore, ration them. The firm, allocated funds to projects in a manner that it maximises long run returns. Thus, Capital Rationing refers to a situation in which a firm has more acceptable investments than it can finance. It is concerned with the selection of a group of investment proposals out of many investment proposals acceptable under the accept-reject decision. Capital Rationing employs ranking of the acceptable investment projects. The projects can be ranked on the basis of a predetermined criterion such as rate of return.

7.6.2 On the Basis of Firm's Long Term Strategy

The Capital Budgeting Decisions are taken by both newly incorporated firms as well as by existing firms. The new firms may be required to take decision in respect of selection of a plant to be installed. The existing firm may be required to take decisions to meet the requirement of new environment or to face the challenges of competition. These decisions may be classified as follows:

1. ***Cost reduction decisions (replacement and modernisation decisions):*** The replacement and modernisation decisions aim to improve operating efficiency and to reduce cost. Generally, all types of plants and machinery require replacement either because of the economic life of the plants or machinery is over or because technologically outdated. The former decision is known as replacement decision while the latter is known as modernisation decision. Both replacement and modernisation decisions are called cost-reduction decisions.
2. ***Expansion decisions:*** Existing successful firms may experience growth in demand of their product line. If such firms experience shortage or delay in the delivery of their products due to inadequate production facilities, they may consider proposal to add capacity to existing product line.
3. ***Diversification decisions:*** These decisions require evaluation of proposals to diversify into new product lines, new markets, etc., for reducing the risk of failure by dealing in different products or by operating in several markets.

7.7 PROJECT CASH FLOW

Under Capital Budgeting Decisions the returns from the projects are received over a period of time. There are two alternatives to quantify the benefits from the investment. These are (i) Accounting Profit and (ii) Cash Flow. The main difference between the two is due to inclusion of certain non-cash expenses in the profit and loss account while calculating the according profit of the firm. The example of this non-cash expense may be depreciation, etc. For measuring the future benefits of the project, the Cash Flow approach is superior to accounting profit approach. In this section, the issues like the role of depreciation as a tax shield and different components of cash flow have been discussed.

7.7.1 Depreciation as a Tax Shield

A firm's non-cash expenses offer a tax shield on income and will reduce the amount of tax paid. When making Capital Budgeting Decisions, an important non-cash expense is the depreciation on equipment or other fixed assets. Depreciation is an accounting device that allows a firm to charge off a portion of the original cost of equipment as an expense over some period during the service life of the equipment. This depreciation appears as an expense (but does not involve any cash) on the firm's income statement. Since expenses reduce reported profits, they also reduce taxable income.

Student Note:

The Cash Flow approach is superior to accounting profit approach for measuring the future benefits of the project. If accounting profit is given, proper adjustment for the non-cash expenditure is done to calculate the actual Cash Inflow. Cash Flow will be 'net earnings after tax'. This figure will arrive after deducting the tax but adding back the amount of depreciation which was earlier deducted.

7.7.2 Component of Cash Flows

A typical investment will have three components of Cash Flows:

1. Initial investment
2. Annual Net Cash Flows/Interim incremental net cash flows
3. Terminal Cash Flows

Initial Investment

Initial investment is the net cash outlay in the period in which an asset is purchased or an investment is made. Cash Flow pattern for capital investment may be of two types, i.e. Conventional Cash Flows and Non-conventional Cash Flows. Conventional Cash Flows consist of an initial cash investment or outlay followed by a series of Cash Inflow or return. Non-conventional Cash Flow refers to the Cash Flow pattern in which an initial cash investment or outlay is not followed by a series of inflows or return.

A major element of the initial investment is gross outlay or original value (OV) of the asset, which comprises of its cost (including accessories and spare parts), freight, and installation charges. Original value is included in the existing block of assets for computing annual depreciation. Similar types of assets are included in one block of assets. Original value minus depreciation is the asset's book value (BK). When an asset is purchased for expanding revenues, it may require a lump sum investment in Net Working Capital also. Thus, initial investment will be equal to *gross investment plus increase in Net Working Capital*. Further, in case of replacement decisions, the existing asset will have to be sold if the new asset is acquired. The sale of the existing assets provides Cash Inflows. The cash proceeds from the sale of the existing assets should be subtracted to arrive at the initial investment. Miscellaneous capital expenditure includes expenditure on electrification, water supply, vehicles and fire fighting. Preliminary and preoperative expenses include legal and promotional expenses and brokerage and commission. These expenses may have to be incurred before the company's actual operations start. So, these expenditures are to be added to arrive at 'Initial Investment'.

Table 7.1 Calculation of Initial Cash Outflow/Investment

	Cost of New Asset(s)	***
+	Installation/Set up costs/Misc. Capital Expenditure	***
+(–)	Increase (Decrease) in Net Working Capital Level	***
–	Net Proceeds from sale of Old Asset (if it is a replacement situation)	***
+(–)	Taxes (tax saving) due to sale of Old Asset (if it is a replacement situation)	***
=	**Initial Cash Outflow/Investment**	***

Annual Net Cash Flows/Interim Incremental Net Cash Flows

An investment is expected to generate annual Cash Flows from operations after the initial cash outlay has been made. Cash Flows should always be estimated on an after tax basis. Net Cash Flow (NCF) is simply the difference between cash receipts and cash payments including taxes. NCF will mostly consist of annual Cash Flows occurring form the operation of an investment, but it is also affected by changes in Net Working Capital and capital expenditures during the life of the investment. To illustrate, we first take the simple case where Cash Flows occur only from operations. Let us assume that all revenues (sales) are received in cash and all expenses are paid in cash (obviously cash expenses will exclude depreciation since it is a non cash expense) [Refer to Table 7.2].

Impact of Net Working Capital

In reality, the actual cash receipts and cash payments will differ from revenues (sales) and expenses as given in the profit and loss account. This difference is caused by changes in Working Capital items, which include trade debtors (account receivable), trade creditors (account payable) and stock (inventory). Changes in Working Capital items should be taken

into account while computing net Cash Inflow from the profit and loss account. Instead of adjusting each items of Working Capital, we can simply adjust the change in Net Working Capital, viz, the difference between changes in Current Assets (e.g. receivable and inventory) and change in Current Liabilities (e.g. accounts payable) to profit. Increase in Net Working Capital should be subtracted from and decrease in Net Working Capital should be added to after tax Operating Profit.

Table 7.2 Calculation of Annual Net Cash Flows/Interim Incremental Cash Flow

	Net increase (decrease) in Operating Revenue	***
–(+)	Net increase (decrease) in Operating Expenses excluding depreciation	***
=	Net change in income before taxes	***
–(+)	Net increase (decrease) in taxes	***
=	Net change in income after taxes	***
+(–)	Net increase (decrease) in tax depreciation charges	***
=	**Incremental Net Cash Flow for the period**	***

Terminal Cash Flows

Terminal Cash Flow is the NCF in the terminal year of the project. For the purpose of *terminal year* we will first calculate the incremental Net Cash Flow for the period as calculated as above and further to it we will make adjustments in order to arrive at *Terminal Cash Flow*.

Salvage Value (SV) is the most common example of Terminal Cash Flows. SV may be defined as the market price of an investment at the time of its sale. The cash proceeds net of taxes from the sale of the assets will be treated as Cash Inflow in the terminal (last) year.

Table 7.3 Calculation of Terminal Cash Flow

	Incremental Net Cash Flow for the period	***
+(–)	Final Salvage Value (disposal costs) of asset	***
–(+)	Taxes (tax saving) due to sale or disposal of asset	***
+(–)	Decreased (increased) level of Net Working Capital	***
=	**Terminal Year Incremental Net Cash Flow**	***

Illustration 7.1

Problem

XYZ Ltd. is evaluating the purchase of a new project with a depreciable base of ₹2,00,000; expected economic life of 4 years and change in earnings before taxes and depreciation of ₹90,000 in Year 1,

₹60,000 in Year 2, ₹50,000 in Year 3 and ₹70,000 in Year 4. Assume straight-line depreciation and 20% tax rate. You are required to compute relevant cash flows.

Solution

Annual Depreciation = $\frac{2,00,000}{4} = ₹50,000$

Particulars	Year			
	1	2	3	4
Earning before tax and depreciation	90,000	60,000	50,000	70,000
Less: Depreciation	50,000	50,000	50,000	50,000
Earning before tax	40,000	10,000	0	20,000
Less: Tax @ 20%	8,000	2,000	0	4,000
PAT	32,000	8,000	0	16,000
Add: Depreciation	50,000	50,000	50,000	50,000
Net Cash Flow	82,000	58,000	50,000	66,000

7.8 BASIC PRINCIPLES FOR MEASURING PROJECT CASH FLOWS

For measuring the Project Cash Flows the following principles must be kept in mind.

7.8.1 Post-tax Principle

Cash flow should be measured after charging taxes. Tax payments like other payments must be properly deducted in deriving the Cash Flows, i.e., Cash Flows must be defined in post-tax terms. There are two types of tax rates i.e. average tax rate and marginal tax rate. The average tax rate is the total tax burden as proportion of the total income of the business. The marginal tax rate is the tax rate applicable to the income at margin—the next rupee of income. For estimating the tax liability of a project, the marginal tax rate of the firm is relevant rate.

7.8.2 Incremental Principle

The Cash Flows of a project must be measured in incremental terms. To ascertain a project's incremental Cash Flows, one has to look at what happens to the Cash Flows of the firm 'with the project and without the project', and not before the project and after the project as is sometimes done. The difference between the two reflects incremental Cash Flow attributable to the project.

Incremental Project Cash Flows for year T = Cash Flow for the firm with the project for year T – Cash Flow for the firm without the project for year T.

7.8.3 Exclusion of Financing Costs Principle

When Cash Flows relating to long-term funds are being defined, financing costs of long-term funds (interest on long-term debt and equity dividend) should be excluded from the analysis. The Weighted Average Cost of Capital used for evaluating the Cash Flows takes into account the cost of long-term funds. Put differently, the interest and dividend payments are reflected in the Weighted Average Cost of Capital. Hence, if interest on long-term debt and dividend on Equity Capital are deducted in defining the Cash Flows, the cost of long-term funds will be counted twice.

The exclusion of financing costs principle means that:

(a) The interest on long-term debt (or interest) is ignored while computing profits and taxes

(b) The expected dividends are deemed irrelevant in Cash Flow analysis.

While dividends pose no difficulty as they come only from profit after taxes, interest needs to be handled properly. Since interest is usually deducted in the process of arriving at profit after tax, an amount equal to interest (1 – tax rate) should be added back to the figure of profit after tax, i.e.,

Profit before interest and tax (1 – tax rate) = (Profit before tax + interest) (1 – tax rate)
= (Profit before tax) (1 – tax rate) +
(interest)(1 – tax rate)
= Profit after tax + interest (1 – tax rate)

So, either the tax rate is applied directly to the profit before interest and tax figure or the tax adjusted interest i.e. interest (1 – tax rate) is applied to profit after tax, the same result is obtained.

7.8.4 Long Term Funds Principles

It is generally recommended that a project may be evaluated from the point of view of long-term funds (which are provided by equity shareholders, preference share holder, debenture holders, and term lending institutions) because the principal focus of such evaluation is normally on the profitability of long-term funds.

7.9 TECHNIQUES OF DECISION MAKING

Capital Budgeting techniques are the method or techniques used for evaluating and setting the best or most profitable investment projects so as to maximise the return to the shareholders of the firm. Generally, a firm has more of investment opportunities than its financial resources, so proper care should be taken for evaluating and selecting any project. The techniques of evaluating the profitability of capital investment proposals are shown in Figure 7.1.

Under different situation different techniques are used for evaluating the project. The following section discusses in detail the concept, merits and demerits of each techniques.

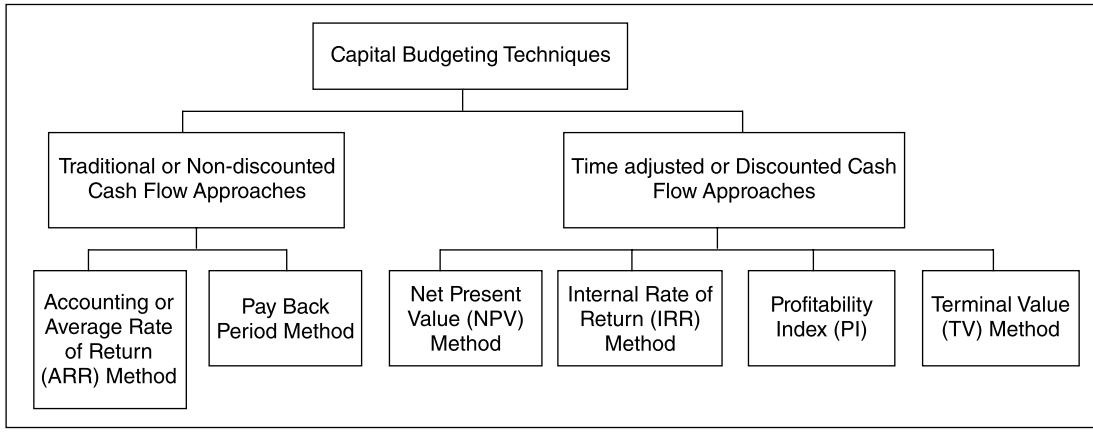


Figure 7.1 Various Capital Budgeting Techniques

7.9.1 Traditional or Non-Discounted Cash Flow Approaches

These methods are based on the principles to determine the desirability of an investment project on the basis of its useful life and expected returns. These methods depend upon the accounting information available from the books of accounts of the company. These will not take into account the concept of 'Time Value of Money' which is a significant factor to desirability of a project in terms of Present Value.

Accounting or Average Rate of Return Method

Accounting or Average Rate of Return (ARR) method measures the average annual Net Income out of the project (incremental income) as a percentage of the investment. After calculation of ARR it is compared with a predetermined or minimum required rate of return or cut-off rate set up by the firm. The project is accepted if the ARR is higher than the minimum desired ARR.

ARR can be calculated as follows:

$$\text{Accounting or Average Rate of Return (ARR)} = \frac{\text{Average Annual Profit after Tax}}{\text{Average Investment}} \times 100$$

where,

$$\text{Average annual profit after tax} = \frac{\text{Total profit after depreciation and tax of the whole life of the project}}{\text{Project Life (in years)}}$$

Average Investment = Additional Net Working Capital + Salvage Value + $\frac{1}{2}$(Initial Investment – Salvage Value)

In this formula, 'Additional Net Working Capital' has been taken as because the project may require additional Net Working Capital in the initial year which will remain blocked

throughout the project life and likely to be released only at the end of project's life. This method assumes that the firm is using straight line method of depreciation. Salvage value has been added as it remains blocked in the project throughout the life and will be recovered at the end of the project. Again the salvage value has been deducted to determine the depreciable value of the project.

Decision Rule

1. ***Single project:*** The computed ARR would be compared with the predetermined or a minimum required rate of return or cut-off rate. A project would qualify to be accepted if the actual ARR is higher than the minimum required rate, otherwise it is rejected.
2. ***Mutually exclusive projects:*** The management can also consider ranking method while taking the investment decision if alternatives investment proposals are there. The projects will be ranked in descending orders i.e. the project with highest ARR would be ranked first and the project with lowest ARR would be ranked last. Now, projects with higher ARR would be preferred to projects with lower ARR.

Illustration 7.2

Problem

A project require an investment of ₹5,00,000, yields profit after tax and depreciation as follows:

Years	Profit After Tax and Depreciation
1	25,000
2	37,500
3	62,500
4	65,000
5	**40,000**
	2,30,000

At the end of 5 years, the plant and machinery of the project can be sold for ₹40,000. Compute the accounting rate of return.

Solution

In this case the rate of return can be calculated as follows:

$$\text{ARR} = \frac{\text{Average Annual Profit after tax}}{\text{Average Investment}} \times 100$$

where,

Average annual profit after tax

$$= \frac{\text{Total profit after depreciation and tax of the whole life of the project}}{\text{Project life (in years)}}$$

or, Average Annual Profit after tax = $\frac{2,30,000}{5} = 46,000$

Average Investment

= Additional Net Working Capital + Salvage value + 1/2(Initial Investment - Salvage value)

= $0 + 40,000 + \left(\frac{5,00,000 - 40,000}{2}\right)$

= 40,000 + 2,30,000

= 2,70,000

Now, ARR = $\frac{\text{Average Annual Profit after tax}}{\text{Average Investment}} \times 100 = \frac{46,000}{2,70,000} \times 100 = 17.04\%$

Comment: This ARR rate is compared with the rate expected on other projects, had the same funds been invested alternatively in those projects. Sometimes, the management compares this rate with the minimum rate (called cut off rate) they may have in mind. For example, management may decide that they will undertake any project which has an average annual yield after tax more than 15%. In this case, the ARR is more than minimum required rate of 15%, so the project will be accepted.

Advantages of ARR

1. ***Easy to calculate:*** This method is easy to calculate and understand.
2. ***Based on profits:*** ARR is based on profits and not concerned on Cash Flows. The calculation of the ARR method considers all Net Incomes over the entire life of the project and provides a measure of the investment's profitability.
3. ***Readily available data:*** This technique uses readily available data that is routinely generated for financial reports and does not require any special procedure to generate data.
4. ***Consistency:*** This method is similar to the method used to evaluate performance on the operating result of an investment and management performance. Using the same procedure in both decision making and performance evaluation ensures consistency.
5. ***Consider all benefits:*** It considers all the benefits arising out of the project throughout its economic life.

Limitations of ARR

1. ***Time Value of Money:*** This method ignores the Time Value of Money and considers the value of all Cash Flows to be equal.
2. ***Not an indicator itself:*** The ARR is not an indicator of acceptance or rejection of any project, unless the rates are compared with the arbitrary management target.
3. ***Depreciation:*** This method assumes to use the Straight Line Method of Depreciation, so if there is a change in method ARR will not work practically.
4. ***Cash Flows are not considered:*** This method uses Net Income rather than Cash Flows, while Net Income is a useful measure of profitability; the Net Cash Flow is a better measure of an investment's performance.

Illustration 7.3

Problem

A company is evaluating a capital budgeting proposal. The following data are available in this regard:

(i) Cost of the plant: ₹12,00,000
(ii) Installation cost: ₹4,600
(iii) Economic life: 8 years
(iv) Scrap value: ₹50,000
(v) PBDIT: ₹3,50,000
(vi) Tax rate: 50%

Solution

Annual depreciation = $\frac{(12,00,000 + 4,600) - 50,000}{8}$ = ₹1,44,325

Hence, depreciation per annum charged to PBIT is ₹1,44,325.

Particulars	₹
Profit before depreciation and taxes	3,50,000
Less: Depreciation	1,44,325
Profit before tax (PBT)	2,05,675
Less: Tax @ 50%	1,02,837.5
Profit after tax (PAT)	1,02,837.5
Add: Depreciation	1,44,325
Annual Cash Flow	2,47,162.5

Illustration 7.4

Problem

The director of X Ltd. is contemplating the purchase of a new machine to replace a machine which has been in operation in the factory for the last 5 years. Ignoring interest but considering tax @ 50% on net earnings suggests which of the two alternatives should be preferred. The details are as follows:

Particulars	Old Machine	New Machine
Purchase price	₹40,000	₹60,000
Estimated life of machine	10 years	10 years
Machine running hours per annum	2,000	2,000
Units per hour	24	36

(Contd.)

Particulars	Old Machine	New Machine
Wages per running hour	3	5.25
Power per annum	2,000	4,500
Consumables stores per annum	6,000	7,500
All other charges per annum	8,000	9,000
Materials cost per unit	0.50	0.50
Selling price per unit	1.25	1.25

You may assume that the above information regarding sales and cost of sales will hold good throughout the economic life of each of the machines. Depreciation has to be charged according to straight-line method.

Solution

Appraisal of replacement decision under Average Rate of Return (ARR) Method:

Particulars		Existing Machine	New Machine
Cost of machine		40,000	60,000
Life of machine		10 years	10 years
Machine running hours		2,000	2,000
Depreciations [40,000/10], [60,000/10]		4,000	6,000
Production in units [2,000 × 24][2,000 × 36]		48,000	72,000
Sales [48,000 × 1.25][72,000 × 1.25]	**A**	60,000	90,000
Depreciation		4,000	6,000
Wages [2,000 × 3][2,000 × 5.25]		6,000	10,500
Power		2,000	4,500
Consumable		6,000	7,500
Other charges		8,000	9,000
Material		24,000	36,000
Total cost	**B**	50,000	73,500
Profit before tax	**(A – B)**	10,000	16,500
Less: Tax @ 50%		5,000	8,250
Profit after tax		5,000	8,250
Investment		40,000	60,000
Average rate of return (On investment) = Profit after tax/Original investment × 100		$\frac{5,000}{40,000} \times 100$	$\frac{8,250}{60,000} \times 100$
ARR		12.5%	13.75%

Comment: From the above computation, it is clear that new machine can be replaced in place of old machine because it has higher ARR.

Illustration 7.5

Problem

The cost of a plant is ₹60,000. The expected life of the plant is 3 years. It is expected to generate EBDIT (Earnings before depreciation, interest and taxes) ₹26,000, ₹30,000, and ₹34,000 respectively. Compute Accounting Rate of Return assuming 30% tax and Straight Line Method of Depreciation.

[C.U. B.Com (H), 2014]

Solution

$$\text{Accounting or Average Rate of Return (ARR)} = \frac{\text{Average Annual Profit after Tax}}{\text{Average Investment}} \times 100$$

Calculation of Average Annual Profit after Tax	₹
EBDIT [(26,000 + 30,000 + 34,000)/3]	30,000
Less: Depreciation (60,000/3)	20,000
EBIT	10,000
Less: Tax @ 30%	3,000
EAT	7,000

$$\text{Calculation of average investment} = \text{Additional Net Working Capital} + \text{Salvage Value} + \frac{1}{2}(\text{Initial Investment} - \text{Salvage Value})$$

$$= 0 + 0 + \frac{1}{2}(60{,}000 - 0) = ₹30{,}000$$

$$\text{ARR} = \frac{₹7{,}000}{₹30{,}000} \times 100$$

$$= 0.2333 \times 100$$

$$= 23.33\%$$

Payback Period Method

Payback Period is the period required by the firm to recover the original investment from the Net Cash Flows of an investment project. Payback Period is an application of the 'break-even' concept to investment. This method is widely used for evaluating the capital investment projects. According to Weston and Brigham, "The Payback Period is the number of years it takes for the firm to recover its original investment by net returns before depreciation, but after taxes."

It may be calculated in two different situations, namely, when annual Cash Inflows are uniform and when annual Cash Inflows are not uniform. These two situations are discussed as follows:

1. ***When annual Cash Inflows are uniform:*** Under this situation where the annual Cash Inflows accrues at an uniform or even rate Payback Period may be calculated by using the following formula:

$$\text{Payback Period} = \frac{\text{Cost of Initial Investment}}{\text{Uniform Annual Cash Inflow}}$$

Let us take a simple example.

Illustration 7.6

Problem

A project requires an initial investment of ₹3,00,000. It yields annual Cash Inflow of ₹60,000 for 8 years. You are required to find out the Payback Period of the project.

Solution

Payback Period may be calculated as under:

$$\text{Payback Period} = \frac{\text{Cost of initial investment}}{\text{Uniform annual cash inflow}}$$

$$= ₹3,00,000/₹60,000$$

$$= 5 \text{ years}$$

So, the initial investment of the project may be recovered within 5 years.

Illustration 7.7

Problem

Y Ltd. wants to invest in a project costing ₹40,00,000 which will yield a profit of ₹6,00,000 annually after depreciation @12.5% (straight line method) but before tax @ 50%. Compute the Payback Period.

Solution

The first step would be to calculate the Cash Inflow from this project. The Cash Inflow is calculated as follows:

Profit before tax	6,00,000
Less: Tax @ 50%	3,00,000
Profit after tax	3,00,000
Add: Depreciation written off (40,00,000 × 12.5%)	5,00,000
Total Cash Inflow	8,00,000

$$\text{Payback Period} = \frac{40,00,000}{8,00,000} = 5 \text{ years}$$

2. ***When the annual Cash Inflows are not uniform:*** When the annual Cash Inflows from the project are not uniform the Payback Period may be calculated by cumulating the annual Cash Inflow till the time when the cumulative Cash Inflows become equal to the initial investment. The best project would be that which has the shortest Payback Period. Let us take a simple example.

Illustration 7.8

Problem

XYZ Ltd. has two options for investment with the following Cash Flow pattern. As a finance manager you are required to the best project on the basis of Payback Period.

Particulars	Project 1 (₹)	Project 2 (₹)
Initial investment	50, 000	50, 000
Estimated annual Cash Inflows after tax:		
Year 1	5,000	6,000
Year 2	9,000	10,000
Year 3	14,000	15,000
Year 4	17,000	19,000
Year 5	20,000	24,000
Year 6	22,000	26,000

Solution

The cumulative Cash Inflows can be calculated as follows:

Year	Project 1		Project 2	
	Annual Cash Inflow (₹)	Cumulative Cash Inflow (₹)	Annual Cash Inflow (₹)	Cumulative Cash Inflow (₹)
1	5,000	5,000	6,000	6,000
2	9,000	14,000	10,000	16,000
3	14,000	28,000	15,000	31,000
4	17,000	45,000	19,000	50,000
5	20,000	65,000	24,000	74,000
6	22,000	87,000	26,000	1,00,000

From the above table we see that for Project 2 the initial investment can be recovered at the end of 4 years, which means that Payback Period is 4 years. But for Project 1 the Payback Period lies between 4th and 5th year, which is to be calculated by applying simple interpolation technique. Payback Period (say, x) is calculated as follows:

$$\frac{x-4}{5-4} = \frac{₹50,000 - ₹45,000 \text{ (Partial Difference)}}{₹65,000 - ₹45,000 \text{ (Total Difference)}}$$

$$\frac{x-4}{1} = \frac{5,000}{20,000}$$

$$x - 4 = 0.25$$

$$x = 4.25 \text{ years}$$

Project 2 (Payback Period 4 years) is to be selected over Project 1 (Payback Period 4.25 years) as it has a shorter Payback Period.

Decision Rule

1. ***Single project:*** The computed/actual payback period may be compared with the predetermined payback period set up by the management. If the computed/actual payback period is less than the predetermined payback, the project will be accepted, otherwise it would be rejected.
2. ***Mutually exclusive projects:*** If mutually exclusive projects are there, they may be ranked in ascending order according to the length of the payback period. In the ranking method, the project with shortest payback period will be ranked first and project with longest payback period will be ranked last. So, the projects with shorter payback period are accepted under this method.

Advantages of Payback Period Method

1. ***Easy to calculate:*** It is one of the easiest methods of evaluating the investment projects. It is simple to understand and easy to compute.
2. ***Knowledge:*** The knowledge of Payback Period is useful in decision-making, the shorter the period better the project.
3. ***Protection from loss due to obsolescence:*** This method is very suitable to such industries where mechanical and technical changes are routine practice and hence, shorter Payback Period practice avoids such losses.
4. ***Easy availability of information:*** It can be computed on the basis of accounting information, what is available from the books.

Limitations of Payback Period Method

However, the Payback Period method has certain demerits:

1. ***Failure in taking Cash Flows after Payback Period:*** This method is not taking into account the Cash Flows received by the company after the Payback Period.
2. ***Not considering the Time Value of Money:*** It does not take into account the Time Value of Money.
3. ***Non-considering of interest factor:*** It does not take into account the interest factor involved in the capital outlay.
4. ***Maximisation of market value not possible:*** It is not consistent with the objective of maximising the market value of share.

Some Improvements over Traditional Payback Period

1. ***Payback Profitability or Post Payback Profitability Method:*** Under traditional Payback Period method the Cash Inflows earned after the Payback Period is ignored so the true profitability of the project cannot be ascertained. This method to some extent overcame the above mentioned defect as it considers the Cash Inflows earned after the Payback Period.

(a) When the annual Cash Inflows are uniform then the following formula is used to calculate the post payback profitability:

Post Payback Profitability = Constant Cash Inflow per Annum
× Post Payback Period

(b) When the annual Cash Inflows are not uniform then post payback profitability can be calculated as under:

All expected Cash Inflows generated during the entire life of the project	***
Less: Initial investment of the project	***
Payback Profitability or Post Payback Profitability	***

Note: Refer to Additional Solved Problem 12 of Chapter 8.

2. ***Payback Reciprocal:*** It is the reciprocal of Payback Period. A major drawback of the Payback Period method is that it does not indicate any cut off period for the purpose of Investment Decision. The payback reciprocal is a helpful tool for quickly estimating the rate of return of a project. It is calculated as follows:

$$\text{Payback reciprocal} = \frac{\text{Average Annual Cash Flow}}{\text{Initial Investment}} \times 100$$

$$= \frac{1}{\text{Payback Period}} \times 100$$

Illustration 7.9

Problem

Z Ltd. is considering a project which requires an initial investment of ₹50,000 and it would give annual Cash Inflow of ₹5,000. The useful life of the project is estimated to be 5 years. Compute the Payback Reciprocal of the project.

Solution

$$\text{Payback Reciprocal} = \frac{\text{Average Annual Cash Flow}}{\text{Initial Investment}} \times 100$$

$$\text{Payback Reciprocal} = \frac{5{,}000 \times 100}{50{,}000} = 10\%$$

Illustration 7.10

Problem

You are requested to advise management about the purchase of a new machine on the basis of payback reciprocal of the following:

	Machine X	Machine Y
Initial outlay	₹2,00,000	₹3,00,000
Estimated life (years)	10	14
Annual Cash Inflow After Tax	₹25,000	₹30,000

Solution

$$\text{Payback Reciprocal} = \frac{\text{Average Annual Cash Flow}}{\text{Initial Investment}} \times 100$$

$$\text{For Machine X} = \frac{₹25,000}{₹2,00,000} \times 100 = 12.5\%$$

$$\text{For Machine Y} = \frac{₹30,000}{₹3,00,000} = 10\%$$

Here, Machine X is more profitable as it has higher payback reciprocal. Hence the management is advised to buy Machine X.

Note: For additional solved problems, please refer to chapter 8.

7.10 SUMMARY

- Capital budgeting is the decision-making process by which firms evaluate the purchase of major fixed assets, including buildings, machinery, and equipment or investment in any project or extension of existing capacity, etc.
- Capital budgeting decision is important to any firm as it involves large amount of investment for long time. This decision also affects the financing and dividend decisions of the firm and is irreversible in nature.
- The main objectives of capital budgeting decision are to select the right mix of profitable projects, control of capital expenditure and to determine the required quantum and the right source of funds for investment.
- Capital Budgeting process refers to the total process of generating, evaluating, selecting and following up on capital expenditure alternatives. The process involves planning or generation of project, evaluation of the project, selection of the project, execution of project, control and review.
- A firm invests in different types of project for successfully running its operations. The investment may be for replacement of existing machine and equipment, or expansion or diversification of its business or for improving the skill of the employee. A firm also takes projects to comply with statutory requirement and for research and development purpose.
- Different types of capital investment decisions are taken by the firm in different situations. Broadly, capital investment decisions may be classified in two ways. These are: on the basis of decision situation and on the basis of firm's long term strategy.
- There are mainly two types of capital budgeting techniques i.e. traditional or non-discounted cash flow techniques and time adjusted or discounted cash flow techniques.
- Accounting or Average Rate of Return (ARR) method measures the average annual net income out of the project (incremental income) as a percentage of the investment. After calculation of ARR it is compared with a predetermined or minimum required rate of

return or cut-off rate set up by the firm, the project is accepted if the ARR is higher than the minimum desired ARR.

- Accounting or Average Rate of Return (ARR) $= \frac{\text{Average annual profit after tax}}{\text{Average Investment}} \times 100$
- The payback period is the number of years it takes for the firm to recover its original investment by net returns before depreciation, but after taxes.
- Payback period may be calculated in two different situations, namely: when annual cash inflows are uniform and when annual cash inflows are not uniform.
- When annual cash inflows are uniform

$$\text{Payback Period} = \frac{\text{Cost of initial investment}}{\text{Uniform Annual Cash Inflow}}$$

- When the annual cash inflows from the project are not uniform the pay-back period may be calculated by cumulating the annual cash inflow till the time when the cumulative cash inflows become equal to the initial investment.

EXERCISES

A. Short-answer Type Questions **(5 Marks)**

1. Narrate the situations when a company needs to have capital budgeting decisions. *[C.U. B.Com. (H), 2009]*
2. State the significance of Capital Budgeting Decision. *[C.U. B.Com. (H), 2011]*
3. Why Payback Period method of project evaluation is considered to be conceptually unsound? *[C.U. B.Com. (H), 2008*
4. Write a short note on 'Types of Project'.
5. Mention briefly the process of capital budgeting.
6. Explain the main features, advantages and limitations of (i) Accounting Rate of Return and (ii) Payback Period.

B. Practical Problems

1. A project requires a machine. The cost of the machine is ₹10,000. Its useful life is 5 years. Depreciation is charged annually according to the straight-line depreciation method. Determine the ARR for the machine. **[Ans. ARR = 2.68%]**
2. XYZ Ltd. invests ₹40,000 in a new project with expected useful life of 6 years. The cash flows after tax are given for Years 1 through 6 are as follows. Calculate the payback period.

Year	*CFAT*
1	10,000
2	11,000
3	15,000
4	10,000
5	12,000
6	11,000

[Ans. Payback Period = 3.4 years]

3. X Ltd. Is considering investing in a project. The expected original investment in the project will be ₹2,00,000, the life of project will be 5 years with no salvage value. The expected net cash inflows after depreciation but before tax during the life of the project will be following:

Year	1	2	3	4	5
₹	85,000	1,00,000	80,000	80,000	40,000

The project will be depreciated at the rate of 20% on original cost. The company is subjected to 30% tax rate. You are required to calculate:

(i) Payback period

(ii) Accounting Rate of Return [*CA (Inter), 2008]*

[Ans. Payback Period = 1.91 years & ARR = 53.9%]

Note: For addition exercise please refer to chapter 8.

8 CHAPTER

Capital Expenditure Decision (II)

CHAPTER OUTLINE

8.1 Time Adjusted or Discounted Cash Flow Techniques
8.2 Capital Rationing
8.3 Additional Solved Problems
8.4 Summary

8.1 TIME ADJUSTED OR DISCOUNTED CASH FLOW TECHNIQUES

One of the major limitations of ARR or Payback Method of investment appraisal techniques is that they do not take into consideration Time Value of Money. As explained in *Chapter 2*, Time Value of Money refers to the phenomenon that money received now and the money that will be received in a future period cannot have the same worth because of a number of factors including uncertainty involved in future events, opportunity costs, deferment of present consumption, etc. Hence, benefits or costs in whatever form (profit or Cash Flow) belonging to two different time periods are never additive unless they are converted into similar parlance (either Future Value or Present Value). Unfortunately, the two appraisal methods mentioned above ignore such a conversion and hence may lead to misleading decisions most of the time.

In order to overcome the above possibilities, experts suggest time-adjusted or Discounted Cash Flow Techniques which essentially require discounting all future benefits and costs before aggregating them to arrive at any conclusion. Moreover, these proposed methods, unlike the earlier Payback Period Method, take into consideration the benefits and costs of any investment project over its entire lifespan and hence are far more acceptable than the traditional or non-Discounted Cash Flow methods.

The time-adjusted or Discounted Cash Flow Techniques are discussed as follows.

8.1.1 Net Present Value Method

As an investment appraisal technique, Net Present Value (NPV) Method is considered to be the most popular and widely acceptable.

Concept of NPV

Technically, NPV is defined as the excess of Present Value of Cash Inflows in any investment project over and above the Present Value of Cash Outflows in that project. In other words, NPV = PV of Cash Inflows – PV of Cash Outflows.

Since Present Values are obtained by discounting the variables by appropriate rate of discount, the concept can be symbolically represented as:

$$\text{NPV} = \sum_{t=1}^{n} \frac{\text{CI}_t}{(1+K)^t} - \sum_{t=1}^{n} \frac{\text{CO}_t}{(1+K)^t}$$

where,

CI_t = Cash Inflow for the period t
CO_t = Cash Outflow for the period t
K = Appropriate discounting rate

Thus, NPV basically signifies the profitability of the project in Present Value terms.

Steps in Calculation of NPV

In order to calculate the NPV of any project, the following steps must be considered:

1. Determine the periodic Cash Inflows and Cash Outflows associated with the investment project. Though most of the projects are found to have conventional Cash Flow structure (i.e. single Cash Outflow at the beginning followed by a series of Cash Inflows), projects may have a non-conventional Cash Flow structure (i.e. multiple periodic Cash Outflows along with multiple periodic Cash Inflows).
2. Identify an appropriate discounting rate. The appropriate rate must take into account—the operating risk associated with the project along with the financial risk. However, in the absence of any information regarding the operating risk premium, a weighted average Cost of Capital (K_0), which considers only the financial risk, can be used as an appropriate discounting rate.
3. Calculate the Present Value of all Cash Inflows over the entire lifespan of the project using the discounting rate identified above.
4. Calculate the Present Value of all Cash Outflows over the entire lifespan of the project using the discounting rate identified above. This is, however, relevant for projects with non-conventional Cash Flows only. In case of projects having conventional Cash Flow structure, the single Cash Flow at the outset of the project, known as initial investment (say I_0) is given.
5. Calculate NPV by subtracting the total Present Value of all Cash Outflows from the total Present Value of all Cash Inflows, in case of projects with non-conventional Cash Flow structure. Alternatively, in case of project with conventional Cash Flow structure, deduct the initial investment from the total Present Value of all Cash Inflows.

Table 8.1 summarises the steps.

Table 8.1 Calculation of NPV

Steps	Projects with Non-conventional Cash Flow Structure	Projects with Conventional Cash Flow Structure
1.	Determine the Cash Inflows and outflows associated with the project (CI and CO)	
2.	Identify the appropriate discounting rate (preferably the Cost of Capital)	
3.	Calculate the Present Value of all Cash Inflows, i.e. $\sum_{t=1}^{n} \frac{CI_t}{(1+K)^t}$	
4.	Calculate the Present Value of all Cash Outflows, i.e. $\sum_{t=1}^{n} \frac{CO_t}{(1+K)^t}$	Calculate the total Cash Outflow at the beginning of the project (CO_0, i.e. I_0)
5.	Determine NPV = Step 3 – Step 4	
	i.e. NPV = $\sum_{t=1}^{n} \frac{CI_t}{(1+K)^t} - \sum_{t=1}^{n} \frac{CO_t}{(1+K)^t}$	NPV = $\sum_{t=1}^{n} \frac{CI_t}{(1+K)^t} - I_0$

Illustration 8.1

Problem

X Ltd. is considering an investment project with an initial investment requirement of ₹1,50,000. The expected Cash Flows from the projects at the end of year 1, 2, 3, 4 and 5 are ₹60,000, ₹55,000, ₹48,000, ₹42,000 and ₹40,000. If the Cost of Capital is 10%, calculate the Net Present Value of the project.

Solution

Calculation for NPV of the Project

Year	Cash Inflows (₹)	PVIF @ 10%	PV of Cash Inflows (₹)
1	60,000	0.909	54,540
2	55,000	0.826	45,430
3	48,000	0.751	36,048
4	42,000	0.683	28,686
5	40,000	0.621	24,840
Total Present Value			**1,89,544**
Less. Initial Investment			**1,50,000**
Net Present Value			**39,544**

Decision Rule

1. ***Single project:*** Since, NPV basically denotes the time value-adjusted profitability of a project, a project is accepted if its NPV is positive and rejected if the NPV is negative. For a project with NPV equals to zero, the decision maker remains indifferent. For example, in illustration 8.1, the investment project is having a positive NPV of ₹39,544. Hence it may be accepted.
2. ***Mutually exclusive projects:*** In case of mutually exclusive projects (where one out of two or more projects is to be selected), the projects are first ranked based on their respective NPV and then the project with the highest NPV is selected.

   Consider the following illustration.

Illustration 8.2

Problem

Y Ltd. is planning to undertake any one of the following three mutually exclusive projects. The information relevant for this purpose is given as follows.

Projects	Annual Cash Flow (₹)	Initial Investment (₹)	Project Duration (Years)
P	15,000	56,000	10
Q	20,000	70,000	8
R	22,000	68,000	9

If Cost of Capital is 12%, advise the management regarding the selection of the best project.

[Given, Present Value of an Annuity of ₹1.00 at a discount rate of 12%:

Present Value interest factor of an Annuity (PVIFA) (12%, 10 years) = 5.65; PVIFA (12%, 8 years) = 4.97; PVIFA (12%, 9 years) = 5.33]

Solution

Calculation for NPV and Ranking

Projects (1)	Annual Cash Flow (₹) (2)	Initial Investment (₹) (3)	Project Duration (Years) (4)	PVIFA (5)	Total PV (6)	NPV (7)	Rank (8)
P	15,000	56,000	10	5.65	84,750	28,750	III
Q	20,000	70,000	8	4.97	99,400	29,400	I
R	22,000	88,000	9	5.33	1,17,260	29,260	II

Here project R with highest NPV gets rank I. Hence, the company should select project R.

Role of Depreciation in Project Selection under NPV Method

Depreciation often plays an important role in the process of project appraisal. This is because depreciation is tax-deductible and thus generates tax shield or tax savings. As a result Cash

Flow after tax increases by the same amount as that of the depreciation tax shield. Now, during the initial years of any project, when the Present Value factors at a given rate of discount are relatively higher, if depreciation is charged at a higher rate then it will create significant tax savings leading to higher Cash Flow after tax. Consequently, the total Present Value of Cash Flows will also be higher as compared to a method of charging same depreciation per year (i.e. Fixed Instalment Method) or progressively increasing depreciation per year (i.e. Diminishing Balance Method). This may sometimes make a project viable under NPV which was otherwise not acceptable. Such a method of claiming higher depreciation in initial years followed by relatively lower or no depreciation thereafter is called 'Accelerated Depreciation Method'.

Consider the following illustration.

Illustration 8.3

Problem

M Ltd. is the manufacturer of a low-end consumer durable N. In order to modernise the manufacturing facility, M Ltd. wants to buy a new machinery costing ₹10,00,000 at cash price. The annual Cash Flow before tax over the entire lifespan of the company is ₹3,00,000 p.a. The marginal rate of tax is 30% and Cost of Capital is 10% p.a. The scrap value at the end of the useful life of the machinery is negligible. The company is currently following a straight line method of charging depreciation on machineries. Do you think the project is financially viable?

The company has an alternative to charge accelerated depreciation at the rate of 30% of the depreciable amount each for the first 3 years and at the rate of 10% for the fourth year. Does it change your suggestion?

Solution

Computation of NPV (Under Straight Line Method of Depreciation)

Year (1)	CFBT (2)	Depreciation (3)	Taxable Profit (4) = (2) – (3)	Tax (5) = (4) × 30%	CFAT (6) = (4) – (5) + (3)	PVIF @10% (7)	PV (8) = (6) × (7)
1	3,00,000	2,00,000 (10,00,000/5)	1,00,000	40,000	2,60,000	0.909	2,36,340
2	3,00,000	2,00,000	1,00,000	40,000	2,60,000	0.826	2,14,760
3	3,00,000	2,00,000	1,00,000	40,000	2,60,000	0.751	1,95,260
4	3,00,000	2,00,000	1,00,000	40,000	2,60,000	0.683	1,77,580
5	3,00,000	2,00,000	1,00,000	40,000	2,60,000	0.621	1,61,460
						Total PV*	9,85,400
						Less. Initial investment	10,00,000
						NPV	(14,600)

Note: *Alternatively, Total PV = CFAT p.a. × PVIFA (10%, 5 Years) = ₹2,60,000 × 3.79 = ₹9,85,400. Since the NPV is negative, the decision of buying the machine is not viable.

Computation of NPV (Under Accelerated Method of Depreciation)

Year (1)	CFBT (2)	Depreciation (3)	Taxable Profit (4) = (2) – (3)	Tax (5) = (4) × 40%	CFAT (6) = (4) – (5) + (3)	PVIF @10% (7)	PV (8) = (6) × (7)
1	3,00,000	3,00,000 (10,00,000 × 30%)	0	0	3,00,000	0.909	2,72,700
2	3,00,000	3,00,000	0	0	3,00,000	0.826	2,47,800
3	3,00,000	3,00,000	0	0	3,00,000	0.751	2,25,300
4	3,00,000	1,00,000 (10,00,000 × 10%)	2,00,000	80,000	2,20,000	0.683	1,50,260
5	3,00,000	0	3,00,000	1,20,000	1,80,000	0.621	1,11,780
						Total PV	1,00,7840
						Less. Initial Investment	10,00,000
						NPV	7,840

Since the NPV is positive, the decision of buying the machine is viable.

Note: In the given illustration, charging higher depreciation during initial years has increased the CFATs during initial years (3 years). Since PVIFs were higher for initial years, PV of CFAT has increased resulting into a positive NPV.

Treatment of Scrap Value/Residual Value

At the end of the useful life of any asset or after completion of any project, a firm often realises scrap value or residual value. Such scrap value is considered as an element of Terminal Cash Flow from the project and hence is added to the Cash Flow after tax (and not Cash Flow before tax or profit before tax) while arriving at the last year's Cash Flow figure.

Note

One must, very carefully, consider the following points while treating the scrap value of any project.

(a) If the problem needs calculation of CFAT based on CFBT or PBT, depreciation should be determined based on the depreciable value of the asset, i.e. Cost – Scrap Value.

(b) Since scrap value is a capital receipt, it should be added to CFAT directly and not to CFBT or PBT.

Illustration 8.4

Problem

N Ltd. has under consideration a project which involves an initial outlay of ₹6,00,000 with a scrap value of ₹1,00,000 at the end of its useful life of 5 years. The profit before depreciation and tax

during these 5 years are ₹1,20,000, ₹1,60,000, ₹2,00,000, ₹2,40,000 and ₹2,80,000. Tax rate applicable for the company is 40%. Cost of Capital is 12%.

You are required to calculate the NPV of the project and comment on its viability.

Solution

Calculation for NPV of the Project

Year (1)	CFBT (2)	Depreciation (3)	Taxable Profit (4) = (2) – (3)	Tax (5)= (4) × 40%	CFAT (6) = (4) – (5) + (3)	PVIF @12% (7)	PV (8) = (6) × (7)
1	1,20,000	1,00,000 $\left(\frac{6,00,000-1,00,000}{5}\right)$	20,000	8,000	1,12,000	0.893	1,00,016
2	1,60,000	1,00,000	60,000	24,000	1,36,000	0.797	1,08,392
3	2,00,000	1,00,000	1,00,000	40,000	1,60,000	0.712	1,13,920
4	2,40,000	1,00,000	1,40,000	56,000	1,84,000	0.636	1,17,024
5	2,80,000	1,00,000	1,80,000	72,000	3,08,000*	0.567	1,17,936
						Total PV	6,13,988
						Less. Initial Investment	6,00,000
						NPV	13,988

Note: *₹3,08,000 = CFAT ₹2,08,000 + Scrap Value ₹1,00,000.

Since NPV of the project is positive, it is acceptable.

Since the problem is silent about taxation of STCG/STCL, it has been ignored.

Role of Working Capital in Project Selection

Investment projects often require a minimum amount of Working Capital in order to meet certain day to day expenditure. This Working Capital may be invested in the project along with the initial outlay (in case of conventional Cash Flow projects) or may be invested at any point of time during the project (in case of non-conventional Cash Flow project). Subsequently, it circulates during the remaining project life. However, at the end of the project life such Working Capital gets realised in full (under normal conditions). In other words, Working Capital has a dual nature—as a Cash Outflow at the point of investment and as a Cash Inflow at the completion of the project. As a result, the amount of Working Capital initially invested should be included in the initial outlay (in case of non-conventional Cash Flow projects, Cash Outflow in respect of Working Capital should be included in the total Present Value of Cash Outflow after proper discounting). Similarly the amount of Working Capital realised at the end of the project should be added to the CFAT.

Note: Working Capital realised is a capital receipt, not an income and hence it is directly added to CFAT and not added to CFBT or PBT.

Illustration 8.5

Problem

Q Ltd. is considering an investment proposal which will require an initial investment of ₹2,80,000 in fixed facilities and an additional ₹40,000 as Working Capital. The project is expected to generate Cash Flow before tax of ₹1,20,000, ₹1,00,000, ₹85,000, ₹95,000, ₹90,000 respectively over its 5 year lifetime. The estimated scrap value of the project is ₹25,000. Tax rate applicable for the company is 40% and Cost of Capital is 10% p.a. Calculate the Net Present Value of the project and advise the management on its acceptability.

Solution

Calculation of NPV of the Project

Year (1)	CFBT (2)	Depreciation (3)	Taxable Profit (4) = (2) – (3)	Tax (5) = (4) × 40%	CFAT (6) = (4) – (5) + (3)	PVIF @10% (7)	PV (8) = (6) × (7)
1	1,20,000	51,000 (2,80,000 – 25,000) ÷ 5	69,000	27,600	92,400	0.909	83,992
2	1,00,000	51,000	49,000	19,600	80,400	0.826	66,410
3	85,000	51,000	34,000	13,600	71,400	0.751	53,621
4	95,000	51,000	44,000	17,600	77,400	0.683	52,864
5	90,000	51,000	39,000	15,600	1,39,400*	0.621	86,567
						Total PV	3,43,455
						Less. Initial Investment (2,80,000 + 40,000)	3,20,000
						NPV	23,455

Note: *₹1,39,400 = CFAT of ₹74,400 + Scrap Value of ₹25,000 + Working Capital of ₹40,000.

Since NPV is positive, the project is acceptable.

Merits of NPV Method

The NPV method of project appraisal has a number of benefits as follows:

1. This method takes into consideration the Time Value of Money. As a result, decisions based on this method are far more rational.
2. Unlike Pay-Back Period Method, this method considers benefits (in form of Cash Flow) available from a project over its entire lifespan. So the decisions under this method are more accurate.
3. This method is consistent with the overall financial objective of the firm, i.e. wealth maximisation. A company accepting projects with only positive NPV, surely ensures higher risk and inflation-adjusted profitability and, thereby, improves the market value of shares and value or wealth of the shareholders.

Demerits of NPV Method

1. This method is relatively difficult to understand and apply as compared to the Payback Period Method or Accounting Rate of Return Method.
2. NPV is arrived at by discounting the Cash Flows at the Cost of Capital. Though, normally a firm uses its existing Cost of Capital for this purpose, it is doubtful whether appraising a project based on current Cost of Capital is at all acceptable. Rather, using the marginal Cost of Capital for the project could have been a better idea. However, it may be very difficult for a firm to determine the marginal Cost of Capital at times.
3. NPV is basically an absolute measure. Hence, in case of mutually exclusive projects, selecting a project based on the value of NPV may appear to be inappropriate. For example, in case of two projects having equal life but different initial investment, the project with higher NPV as well as higher initial investment may appear to be inferior if the PV per rupee of initial investment is higher for the other one.
4. This method may also prove to be inappropriate while appraising two projects with significant life difference. A project with longer lifespan may have higher Present Value of Cash Flow and consequently higher NPV than a project with shorter lifespan; still the firm may prefer the latter if it wants to recover its capital quickly.

8.1.2 Profitability Index Method

Concept of Profitability Index

As discussed above, Net Present Value, as a criterion for project appraisal, often becomes inappropriate when the competing projects have similar lifespan but significantly different initial outlay. This is because NPV is an absolute measure and hence does not recognise the size difference (difference in Cash Outflow) between two competing projects.

Thus, a refinement of NPV is suggested in the form of a new method, called Profitability Index (PI) Method. PI is defined as the ratio between the Present Value of Cash Inflow to the Present Value of Cash Outflow or investment.

That is to say, $\text{PI} = \dfrac{\text{Present Value of Cash Inflow}}{\text{Present Value of Cash Outflow}}$ (for non-conventional Cash Flow) or,

$= \dfrac{\text{Present Value of Cash Inflow}}{\text{Initial Outlay}}$ (for conventional Cash Flow)

Thus, basically PI calculates the Present Value of Cash Inflow or benefit per rupee of Present Value of Cash Outflow (or initial outlay) or cost. This is why it is also called Benefit-Cost Ratio.

Note

There are two versions of Profitability Index namely, Gross Profitability Index (GPI) or Gross Benefit–Cost Ratio (GBCR) and Net Profitability Index (NPI) or Net Benefit–Cost Ratio (NBCR).

$\text{GPI} = \dfrac{\text{Present Value of Cash Inflow}}{\text{Present Value of Cash Outflow}}$ (for non-conventional Cash Flow); or,

$$= \frac{\text{Present Value of Cash Inflow}}{\text{Initial Outlay}} \text{ (for conventional Cash Flow).}$$

$$\text{NPI} = \frac{\text{Net Present Value of Cash Inflow}}{\text{Present Value of Cash Outflow}} \text{ (for non-conventional Cash Flow); or,}$$

$$= \frac{\text{Net Present Value of Cash Inflow}}{\text{Initial Outlay}} \text{ (for conventional Cash Flow).}$$

Basically, NPI = GPI – 1.

In this chapter, however, we have used GPI and not NPI.

Illustration 8.6

Problem

P Ltd. is considering a new project with an initial outlay of ₹70,000. The project has a lifespan of 4 years with Cash Inflows of ₹25,000, ₹30,000, ₹18,000 and ₹16,000 for year 1, 2, 3 and 4, respectively. Calculate the Profitability Index for the project if the Cost of Capital is 10% p.a.

Solution

Calculation for PV of Cash Inflow

Year	CIAT (₹)	PVIF@ 10%	PV of CIAT (₹)
1	25,000	0.909	22,725
2	30,000	0.826	24,780
3	18,000	0.751	13,518
4	16,000	0.683	10,928
		Total PV of CIAT	71,951

So, $$\text{PI} = \frac{\text{Present Value of Cash Inflow}}{\text{Initial Outlay}} = \frac{71,951}{70,000} = 1.028$$

Decision Rule

1. ***Single project:*** Since, PI basically denotes the PV of Cash Inflow per rupee of initial investment (or PV of Cash Outflow), a PI of more than 1denotes net profitability in Present Value term. Accordingly, a project is accepted if its PI is more than 1and rejected if the PI is less than 1. For a project with PI equals to 1, the decision maker remains indifferent.

   For example, in illustration 8.6, the investment project is having a PI of 1.028. Hence the project may be accepted.
2. ***Mutually exclusive projects:*** In case of mutually exclusive projects, the projects are first ranked based on their respective PI and then the project with the highest PI is selected.

Consider the following illustration.

Illustration 8.7

Problem

A company provides you the following information relating to two mutually exclusive projects.

Particulars	Project M	Project N
PV of Cash Inflow (₹)	75,000	1,40,000
Initial Outlay (₹)	60,000	1,20,000
Life (Years)	5	5

Advise the company regarding the selection. Will NPV Method be appropriate in this case?

Solution

Calculation for PI and NPV and Respective Ranking

Particulars	Project M	Project N
PV of Cash Inflow (₹) Initial Outlay (₹) Life (Years)	75,000 60,000 5	1,40,000 1,20,000 5
$PI = \frac{\text{Present Value of Cash Inflow}}{\text{Initial Outlay}}$	1.25	1.17
Ranking based on PI	I	II
NPV = PV of Cash Inflow – Initial Outlay	15,000	20,000
Ranking based on NPV	II	I

Since PI is higher for Project M, it offers higher benefit per rupee of investment. Hence, it is recommended.

In this situation, NPV will not be appropriate as project N, though offers higher NPV, also has higher initial outlay. Hence, the absolute value of NPV is not comparable at all.

Merits of PI Method

1. PI Method of project appraisal overcomes the limitation of NPV Method in recognising the size (initial outlay) difference between projects by using a relative measure of benefits (i.e. PV of Cash Inflow) and costs (i.e. PV of Cash Outflow) of a project.
2. Since PI Method evaluates projects based on the benefits they offer per rupee of cost (i.e. investment), it is particularly useful in making decision in a situation of Capital Rationing. Under such circumstances, it recommends only that project which offers the best benefit (i.e. PV of Cash Inflow) per rupee of investment and, thereby, utilises the limited funds in the best possible way.

Demerits of PI Method

1. In a situation of Capital Rationing, PI Method offers appropriate selection only when the projects are divisible (i.e. they can be accepted in parts also). In such circumstances, a

company may go on accepting projects fully by following the ranking based on PI till the fund permits and then accept a project even in part in case the fund does not permit its acceptance in full. However, in case the projects are indivisible, an arbitrary combination based on a trial and error approach may still result into better aggregate NPV by using most of the funds, if not all.

8.1.3 Internal Rate of Return Method

NPV Method discounts the future Cash Inflows from a project at Cost of Capital, i.e. the minimum required rate of return to determine the surplus in absolute term and selects projects accordingly. However, each project necessarily has a rate of return and as an alternative to NPV, project selection can be made by comparing the rate of return against the Cost of Capital directly. This rate of return specific to a project is called Internal Rate of Return (IRR) and the concerned method is known as Internal Rate of Return Method. However, the same method is also used in other nomenclatures such as Time Adjusted Rate of Return, Marginal Efficiency of Capital, Marginal Productivity of Capital or Highest Opportunity Cost Method.

Concept of Internal Rate of Return

Internal Rate of Return is defined as the rate of return or discounting rate by which if the future project Cash Inflows are discounted, the aggregate Present Value of Cash Inflow will be exactly equal to the initial investment (in case of conventional Cash Flow projects) or the aggregate Present Value of Cash Outflow (in case of non-conventional Cash Flow projects).

Symbolically, if IRR is denoted as '*r*', then at '*r*':

(a) $\sum_{t=1}^{n} \frac{CI_t}{(1+r)^t} = I_0$ (in case of conventional Cash Flow projects); and

(b) $\sum_{t=1}^{n} \frac{CI_t}{(1+r)^t} = \sum_{t=1}^{n} \frac{CO_t}{(1+r)^t}$ (in case of non-conventional Cash Flow projects)

where,

CI_t = Cash Inflow from the project in period t

CO_t = Cash Inflow from the project in period t.

I_0 = Initial investment of the project

n = Life of the project

In other words, at IRR the NPV of the project is zero.

Method of Computation of IRR

Computation of IRR is merely a trial and error approach followed by simple interpolation technique. However, to smooth out the process, a few rules, may be suggested to find out the rate with which the Trial and Error Method may be initiated.

(i) When the project Cash Inflows are uniform over the life of the project

Here, IRR calculation involves the following steps:

(1) Calculate the payback period or quotient.

$$\text{Quotient} = \frac{\text{Initial Investment}}{\text{Annual Cash Inflow}}.$$

(2) Go across the 'n'th year (n = life of the project) row of the PVIFA (Present Value interest factor of an Annuity) table and search a value nearest to the value of the quotient.
(3) In case exact match is available, the corresponding rate is the IRR.
(4) In case exact match is not available consider two values—one higher than the quotient and the other lower than the quotient. IRR is expected to lie in between the two rates corresponding to the two values identified above.
(5) Apply simple interpolation technique to find out the exact IRR.

Illustration 8.8

Problem

A machine requires an initial investment of ₹80,000. The annual Cash Flow per annum is ₹30,000 for 5 years. Calculate the IRR.

Solution

$$\text{Here, Quotient} = \frac{\text{Initial Investment}}{\text{Annual Cash Inflow}} = \frac{80{,}000}{30{,}000} = 2.6667 \text{ (app.)}$$

From the 5th year row of the PVIFA table we find that two values nearest to the quotient are 2.635 for 26% and 2.689 for 25%. So, IRR is expected to fall between 25 and 26%.

We apply the simple interpolation technique as follows:

$$\frac{\text{IRR} - 2}{26 - 25} = \frac{2.6667 - 2.635}{2.689 - 2.635}$$

or $\quad \text{IRR} - 25 = 0.59$

or $\quad \text{IRR} = 25.59\%$

So, IRR of the project is 25.59%.

When the project Cash Inflows are non-uniform over the life of the project

Here, IRR calculation involves the following steps:

1. Calculate the modified or fake pay-back period by the following formula

$$\text{Fake payback period} = \frac{\text{Initial Investment}}{\text{Average Annual Cash Inflow}}.$$

2. Go across the 'n'th year (n = life of the project) row of the PVIFA (Present Value interest factor of an Annuity) table and search a value nearest to the value of the fake Payback Period.
3. Identify the rate corresponding to the value. This may be considered as the first trial rate.
4. Increase the trial rate if the NPV is positive and reduce the same if the NPV is negative. If at any trial rate NPV becomes zero, it is the IRR.

5. In case exact match is not available consider two rates (preferably with a gap of 1% only, in order to get better approximation) one with a positive value of NPV and the other with a negative value of NPV. IRR is expected to lie in between the two rates.
6. Apply simple interpolation technique to find out the exact IRR.

Illustration 8.9

Problem

M Ltd. is considering the following information in respect of a project: initial outlay, ₹11,000; project life 4 years and cash inflow from the project as:

Year	1	2	3	4
Cash Inflow (₹)	6,000	2,000	1,000	5,000

Calculate IRR of the project.

Solution

$$\text{Fake Payback Period} = \frac{\text{Initial Investment}}{\text{Average Annual Cash Inflow}} = \frac{11{,}000}{(6{,}000 + 2{,}000 + 1{,}000 + 5{,}000)/4}$$

$$= 3.14 \text{ years.}$$

From the 4th year row of the PVIFA table, we find that the value nearest to the fake pay-back period is 3.17 and the corresponding rate is 10%. So 10% should be the first trial rate.

Calculation for NPV at Alternative Rates

Year	**CIAT**	**PVIF@ 10%**	**PV of CIAT**	**PVIF @12%**	**PV of CIAT**	**PVIF @ 11%**	**PV of CIAT**
1	6,000	0.909	5,454	0.893	5,358	0.901	5,406
2	2,000	0.826	1,652	0.797	1,594	0.812	1,624
3	1,000	0.751	751	0.712	712	0.731	731
4	5,000	0.683	3415	0.636	3,180	0.659	3,295
Total Present Value			11,272		10,844		11,056
Less. Initial Investment			11,000		11,000		11,000
NPV			272		(–)156		56

From the rephrase table it is evident that IRR lies between 11 and 12% (as NPV at IRR = 0). Applying simple interpolation, we get,

$$\frac{\text{IRR} - 11}{12 - 11} = \frac{0 - 56}{-156 - 56}$$

or $\text{IRR} - 11 = 0.26$

or IRR = 11.26%

So, IRR of the project is 11.26%.

Multiple IRR

In case of a project with conventional Cash Flow pattern IRR appears to be a unique rate of return (i.e. single rate). Unfortunately, the same is not true in case of a project with non-conventional Cash Flow pattern where initial Cash Outflow is followed by a series of Cash Inflows as well as one or more major Cash Outflow. Hence, in such a case it is possible to obtain multiple IRRs for the same project.

Figure 8.1 shows that for a given project NPV has become zero at two different discounting rates (r_1 and r_2). Hence the project has two IRRs r_1 and r_2.

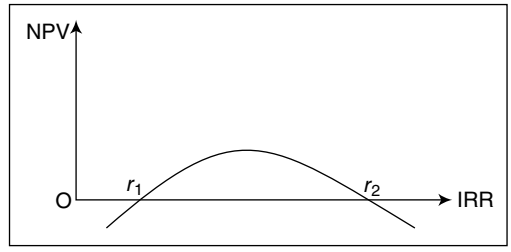


Figure 8.1 Multiple IRR

Consider the following Illustration.

Illustration 8.10

Problem

Calculate the IRR of a project having following Cash Flow structure over its 4 years lifespan.

Year	0	1	2	3	4
Cash Flow (₹)	–1,000	800	1,000	1,300	–2,200

Here negative Cash Flow in year 0 and 4 indicates initial and subsequent investment in the project.

Solution

In the given situation IRR can be calculated from the following equation,

$$\frac{-1,000}{(1+r)^0}+\frac{800}{(1+r)^1}+\frac{1,000}{(1+r)^2}+\frac{1,300}{(1+r)^3}+\frac{-2,200}{(1+r)^4}=0 \text{ where } r = \text{IRR}$$

Solving the equation, we get IRR = 6.6% and 36.55%.

Problem with Multiple IRR

Though mathematically both the above IRRs are possible, in practice, selecting projects with multiple IRRs may appear to be quite difficult. In case Cost of Capital is lower than the lower

IRR, the project is obviously acceptable as the project will generate positive NPV. Similarly, if the Cost of Capital is higher than the higher IRR, the project is obviously rejected as the NPV, in such a case, is bound to be negative. However, if the Cost of Capital falls in between the two IRRs, no choice can ultimately be made.

In such a case experts suggest to use Modified Internal Rate of Return (MIRR) Method which produces a single IRR even in case of a project with non-conventional Cash Flow pattern.

Note:

In the examination, PVIFA table may not be available. In such a situation, the following two alternatives may be useful.

(a) When Cost of Capital is given:

- Use Cost of Capital itself as the first trial rate and then go on adjusting the rates based on the value of NPV (whether to reduce or to increase).
- Now, consider two rates (preferably with a gap of 1% only, in order to get better approximation) one with a positive value of NPV and the other with a negative value of NPV.
- Apply simple interpolation technique to find out the exact IRR. (Refer to Illustration 8.11)

(b) When Cost of Capital is not given:

- Calculate a guide rate or cut-off rate by the following formula—

$$\text{Guide Rate or Cut-off Rate} = \frac{\text{Average Excess Cash Flow}}{\text{Average investment}}$$

$$\text{where Average excess Cash Flow} = \frac{(\text{Total cash flow} - \text{Initial Investment})}{\text{Project Life}}\text{; and}$$

$$\text{Average Investment} = \frac{(\text{Initial Investment} + \text{Scrap Value})}{\text{Project Life}}$$

- Use the guide rate as the first trial rate and then go on adjusting the rates based on the value of NPV (whether to reduce or to increase).
- Now, consider two rates (preferably with a gap of 1% only, in order to get better approximation) one with a positive value of NPV and the other with a negative value of NPV.
- Apply simple interpolation technique to find out the exact IRR.

Note

Alternatively student may also use the fake payback period as stated earlier (Illustration 8.9).

Decision Rule

1. ***Single project:*** Since, IRR is a rate of return, an IRR higher than the Cost of Capital denotes that the project returns are adequate to cover its cost and hence the project is

profitable and acceptable. Accordingly, a project is accepted if its IRR is greater than the Cost of Capital and rejected if IRR is lower than the Cost of Capital. For a project with IRR equals to Cost of Capital, the decision maker remains indifferent.

Illustration 8.11

Problem

K Ltd. is contemplating to invest in the following project: initial outlay is ₹20,000; project life is 4 years; cost of capital is 10% p.a.

Cash Inflow from the Project

Year	1	2	3	4
Cash Inflow (₹)	5,000	8,000	10,000	4,000

Calculate IRR of the project and comment on its viability.

Solution

Since Cost of Capital is given, let us use the same as the first trial rate because acceptability of a project will arise only when its IRR > Cost of Capital.

Calculation for IRR

Year	**CIAT**	**PVIF@ 10%**	**PV of CIAT**	**PVIF @ 14%**	**PV of CIAT**	**PVIF @13%**	**PV of CIAT**
1	5,000	0.909	4,545	0.877	4,385	0.885	4,425
2	8,000	0.826	6,608	0.769	6,152	0.783	6,264
3	10,000	0.751	7,510	0.675	6,750	0.693	6,930
4	4,000	0.683	2,732	0.592	2,368	0.613	2,452
		Total PV	21,395		19,655		20,071
		Less. Initial Investment	20,000		20,000		20,000
		NPV	1,395		(–)345		71

From the above table, it is clear that IRR (with zero NPV) must lie between 13 and 14%.

We apply simple interpolation to get,

$$\frac{IRR - 13}{14 - 13} = \frac{0 - 71}{-345 - 71}$$

or $IRR - 13 = 0.17$

or $IRR = 13.17\%$

Since the IRR of the project is higher than the Cost of Capital, the project should be accepted.

2. ***Mutually exclusive projects:*** In case of mutually exclusive projects, the projects are first ranked based on their respective IRR and then the project with the highest IRR is selected.

Illustration 8.12

Problem

P Ltd. is considering two mutually exclusive projects X and Y. Following details are available to you (₹ in lakhs).

Particulars	Project X (₹)	Project Y (₹)
Initial Investment	700	700
Cash Inflows:		
Year 1	100	500
Year 2	200	400
Year 3	300	200
Year 4	450	100
Year 5	600	100

Assume no residual value at the end of fifth year. Calculate IRR of the projects and advise the management on the project to be selected.

Solution

For Project X:

$$\text{Fake Payback Period} = \frac{\text{Initial Investment}}{\text{Average Annual Cash Inflow}} = \frac{700}{(100 + 200 + 300 + 450 + 600) \div 5} = 2.121$$

From the PVIFA table, we find that the factor nearest to 2.121 for 5 years row is 2.143 at 37%. So let us consider 37% as the initial trial rate and proceed to calculate IRR.

Applying trial and error approach, we find that IRR of project X is 27.2%.

For Project Y:

$$\text{Fake Payback Period} = \frac{\text{Initial Investment}}{\text{Average Annual Cash Inflow}} = \frac{700}{(500 + 400 + 200 + 100 + 100) \div 5} = 2.692$$

From the PVIFA table, we find that the factor nearest to 2.692 for 5 years row is 2.689 at 25%. So let us consider 25% as the initial trial rate and proceed to calculate IRR.

Applying trial and error approach, we find that IRR of project X is 37.6%.

Since IRR of project Y is higher than that of X, it is recommended.

Merits of IRR Method

1. IRR Method considers the Time Value of Money and hence is superior to methods like Accounting Rate of Return and Payback Period.
2. It considers Cash Flow over the entire lifespan of the project.
3. This method accepts only those projects that cover the Cost of Capital and hence generate surplus. Therefore, it is in conformity with the wealth maximisation objective of the firm.
4. This method does not use any pre-determined minimum required rate of return (i.e. Cost of Capital) to discount the future Cash Flows. Thus, in that sense, it is more reliable.

Demerits of IRR Method

1. This method involves tedious calculation as it requires a trial and error approach to arrive at the accurate IRR.
2. As stated earlier, in case of non-conventional Cash Flow projects, there can be multiple IRRs instead of a single IRR.
3. This method assumes that the future Cash Flows of a project will be reinvested at its own IRR for the rest of the life of the project. However this hardly holds good in reality. Moreover, assuming separate reinvestment rates while evaluating mutually exclusive projects may mislead the decision maker altogether. On the contrary, NPV Method assumes the same minimum required rates of return to appraise the mutually exclusive projects, which is more a logical and unbiased approach.
4. While evaluating mutually exclusive projects, the results under this method may not be consistent with the results under NPV Method if the projects under consideration differ with respect to their (i) life expectancy, (ii) investment size and (iii) timing of Cash Flow.
5. This method fails to provide complete guidance for evaluating mutually exclusive projects because selection of projects based on higher IRR may not always be profitable for company.

Similarities Between NPV and IRR Method

NPV and IRR method share the following similarities:

1. Both the methods use Discounted Cash Flow technique while appraising the projects. Hence both of them consider Time Value of Money.
2. Both the methods consider Cash Flows during the entire lifespan of the *projects.*

Differences Between NPV and IRR Method

1. NPV is an absolute measure whereas IRR is a relative measure.
2. NPV assumes that intermediate Cash Flows are re-invested at firm's Cost of Capital whereas IRR assumes that intermediate Cash Inflows are reinvested at the internal rate of the project.
3. In case of non-conventional Cash Flow projects, IRR produces multiple rates. However, even in this case NPV is unique.
4. The results of IRR Method may be inconsistent compared to NPV Method if the projects differ in their (a) expected lives or (b) investment or (c) timing of Cash Inflow.

Relationship Between NPV and IRR

Agreement Between NPV and IRR

Since both the NPV and IRR Method are Discounted Cash Flow-based approach and consider Project Cash Flows in their entirety, they produce similar results while appraising a single or independent project. In such a case, a project which is accepted under NPV Method due to having positive NPV obviously has an IRR higher than the Cost of Capital. Similarly projects

having negative NPV necessarily have IRR less than the Cost of Capital and, hence, are rejected under both the methods.

This can be explained with the help of the following example.

Initial Investment required for the project ₹90,000

Estimated life span 5 Years

Year	1	2	3	4	5
Cash Inflow (₹)	25,000	30,000	35,000	40,000	30,000

The IRR of the project can be computed as 21.55%.

Now NPV profile of the project at alternative discount rates will be as follows:

Discount Rate	NPV (₹)
0%	70,000
5%	47,690
10%	29,740
20%	3,250
21.55% (IRR)	0
25%	(–)6,640

It can be seen from the NPV profile that below IRR, NPV is positive for all the discounting rates. Hence at any Cost of Capital below 21.55%, the project is acceptable under NPV. Again since in such a case Cost of Capital is lower than the IRR, the project is acceptable under IRR also. Similarly, at all discounting rate above the IRR (21.55%), NPV is negative and hence the project is rejected. Now for any Cost of Capital higher than the IRR, the project is also rejected under IRR Method. At 21.55%, i.e. IRR the project has zero NPV. This is shown in Figure 8.2.

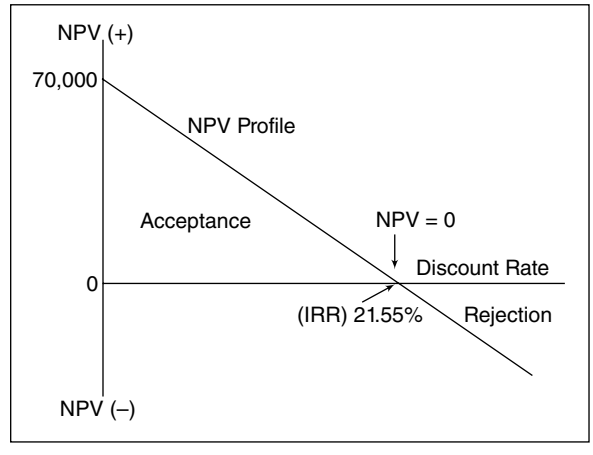


Figure 8.2 NPV Profile at Alternative Discount Rates

Conflict between NPV and IRR Methods

Though in case of a single project both NPV and IRR always choose the same project, while evaluating mutually exclusive projects, NPV and IRR sometimes lead to conflicting results. In other words, the project which is acceptable under NPV may not be so under IRR and vice-versa. Consider the following example.

Illustration 8.13

Problem

The following information is available for two mutually exclusive projects X and Y.

Particulars	Project X	Project Y
Initial Investment (₹)	1,68,000	1,68,000
Life of the Project (Years)	3	3
Net Cash Flow (₹)		
Year 1	1,40,000	14,000
Year 2	70,000	84,000
Year 3	14,000	1,51,000

Cost of capital 9% p.a. Evaluate the projects under NPV and IRR and recommend the project to be selected.

Solution

Calculation for NPV and IRR

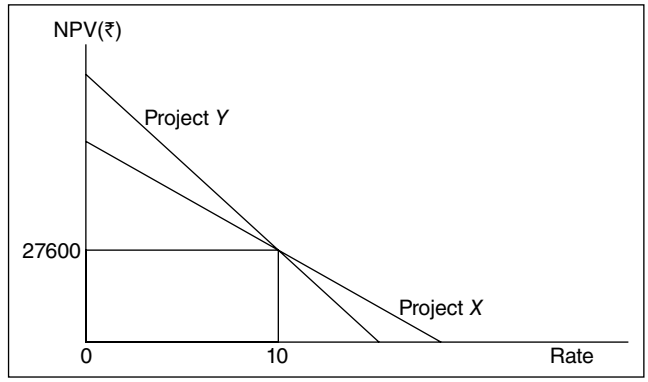
Particulars	Project X	Project Y
Initail Investment (₹)	1,68,000	1,68,000
Life of the Project (Years)	3	3
Net Cash Flow (₹)		
Year 1	1,40,000	14,000
Year 2	70,000	84,000
Year 3	14,000	1,51,000
IRR (app.)	23%	17%
NPV at 9% cost of capital	30,128	32,138
Ranking based on IRR	1	2
Ranking based on NPV	2	1

Thus there arises conflict between the results of NPV and IRR.

Let us now consider the NPV profile of the two projects.

Discounting Rate (%)	Net Present Value	
	Project X	**Project Y**
0	56,000	81,000
5	40,866	51,980
9	30,128	32,138
10	27,600	27,600
15	15,932	7,042

The above information can be shown in the following graph



Here, the NPV of the two projects are approximately equal at 10%. Hence when cost of capital is above 10%, both NPV and IRR leads to similar decisions. However, when the discounting rate is lower than 10%, project X yields lower NPV and conflict arises.

Now the question that arises is which method to use and which project to consider?

In case of situations similar to above, projects may ultimately be selected based on NPV method as NPV is considered to be superior to IRR on the following grounds.

(a) The assumption regarding re-investment rate is more realistic under NPV than under IRR method.

(b) NPV method helps in achieving the value maximisation objective of the firm.

Thus, in the given case, project Y should ultimately be selected.

Note

However, the above conclusion is too oversimplified and there are methods to overcome the conflict.

8.1.4 Modified Internal Rate of Return

As mentioned in our earlier discussion, traditional IRR suffers from two important limitations. These are as follows:

1. IRR assumes that the future Project Cash Flows will be reinvested at IRR itself for the remaining life of the project. This assumption is not at all justified. Rather, in practice, it may be more logical to assume that intermediate Cash Flows are reinvested at a rate close to the minimum expected rate of return, i.e. Cost of Capital. As a result of its faulty assumption regarding the reinvestment rate, IRR produces too much optimistic result for any project.
2. In case of non-conventional Cash Flow projects, i.e. projects with Cash Outflow in multiple periods, there may be more than one IRR. Such a result may create confusion in making any decision.

   In order to avoid the above two limitations, experts suggest a new method known as Modified Internal Rate of Return (MIRR) Method. MIRR is defined as the rate of discount which equates the Present Value of the aggregate Future Value of all Cash Inflows compounded at the Cost of Capital with the initial investment or Present Value of all Cash Outflow.

   The steps under MIRR are as follows:

   (i) Calculate the Future Value of each Cash Inflow from the project by using Cost of Capital as the compounding rate.
   (ii) Calculate the aggregate Future Value (may be called terminal value)
   (iii) Calculate initial investment (in case of conventional Cash Flow project) or Present Value of all Cash Outflow (in case of non-conventional Cash Flow project).
   (iv) Determine the discounting rate that equates the Present Value of the aggregate Future Value with the initial investment or Present Value of all Cash Outflow. Such rate will be the MIRR.

A direct formula for MIRR can be obtained as follows:

$$\text{Aggregate PV of Cash Outflow or Initial Investment} = \frac{\text{Aggregate FV of Cash Inflow}}{(1+\text{MIRR})^n}$$ (Here, n = project life).

$$\text{Therefore, MIRR} = \sqrt[n]{\frac{\text{Aggregate Future Value of Cash Inflow}}{\text{Aggregate Present Value of Cash Outflow}}} - 1 \text{ (For Non-conventional Cash Flow)}$$

$$\text{or,} \quad \text{MIRR} = \sqrt[n]{\frac{\text{Aggregate Future Value of Cash Inflow}}{\text{Initial Investment}}} - 1 \text{ (For conventional Cash Flow).}$$

Illustration 8.14

Problem

From the following information calculate the MIRR of the project.
Initial Outlay is ₹50,000 and Cost of Capital is 12% p.a. Life of the project is 5 years.
Cash Inflows from the project are ₹10,000, ₹15,000, ₹20,000, ₹25,000 and ₹15,000.

Solution

Calculation of Aggregate Future Value

Year	CIAT	Years for Investment	FVIF @ 12%	FV
1	10,000	4	1.5735	15,735
2	15,000	3	1.4049	21,073.5
3	20,000	2	1.2544	25,088
4	25,000	1	1.12	28,000
5	15,000	0	1	15,000
				1,04,896.5

Now, $\text{MIRR} = \sqrt[n]{\frac{\text{Aggregate Future Value of Cash Inflow}}{\text{Initial Investment}}} - 1$

or $\text{MIRR} = \sqrt[5]{\frac{1,04,896.50}{50,000}} - 1$

or $\text{MIRR} = \sqrt[5]{2.098} - 1$

or MIRR = 1.15979 – 1 (applying scientific but non-programmable calculator)

or MIRR = 0.15979 i.e. 15.98%

8.1.5 Terminal Value Method

Concept

Both NPV and IRR methods are often criticised due to the assumption of a constant reinvestment rate. While NPV Method assumes that future Cash Flows will be reinvested at the minimum required rate of return, i.e. Cost of Capital, IRR Method assumes that they will be reinvested at IRR itself. However, in practice it is hardly possible to reinvest future Cash Flows at an agreed upon rate as reinvestment rates are always subject to change. In order to overcome such limitation, a new method is suggested which combines the benefits of NPV Method and yet offers a realistic assumption regarding the reinvestment rate. This method is known as Terminal Value Method. Under this method, future Cash Flows are first compounded at the estimated reinvestment rate for the rest of the life of the project. The aggregate Future Value of all Cash Inflows are then discounted at an appropriate rate of return (generally Cost of

Capital) to determine the Present Value. Finally this Present Value is compared against the initial outlay (for conventional Cash Flow projects) or the Present Value of Cash Outflows (for non-conventional Cash Flow projects) for final selection.

The steps to be followed under Terminal Value approach are:

1. Calculate the Future Value of each Cash Inflow by compounding them at the estimated reinvestment rate for the remaining lifespan of the project.
2. Calculate the aggregate of all Future Values thus obtained. This is called terminal value.
3. Calculate the Present Value of terminal value obtained above by using an appropriate discounting rate, preferably the Cost of Capital.
4. Compare the Present Value as obtained above with the initial outlay or Present Value of Cash Outflow of the project for final selection based on the surplus available, if any.

Consider the following illustration.

Illustration 8.15

Problem

A company is contemplating an investment project of 4 years with an initial outlay of ₹60,000. The Cash Inflows estimated from the project are ₹15,000, ₹20,000, ₹15,000 and ₹18,000. The estimated rates at which the above Cash Flows will be reinvested are as follows:

Year End	1	2	3	4
Reinvestment Rate	8	9	10	9

The Cost of Capital is 10% p.a. Analyse the viability of the project under Terminal Value Method.

Solution

Calculation for Terminal Value

Year	**Cash Inflows**	**Re-investment Rate**	**Years of Reinvestment**	**FVIF**	**Future Value**
1	15,000	8%	3	1.26	18,900
2	20,000	9%	2	1.881	37,620
3	15,000	10%	1	1.1	16,500
4	18,000	9%	0	1	18,000
				Terminal Value	91,020

So, Present Value of Terminal Value = Terminal Value × PVIF (Cost of Capital, Years)

= ₹91,020 × PVIF (10%, 4)

= ₹91,020 × 0.683

= ₹62,167

Since the Present Value of Terminal Value (₹62,167) is higher than the initial outlay of ₹60,000, the project is advisable.

Decision Rule

1. ***Single project:*** Under Terminal Value Method a project is accepted if the Present Value of aggregate Future Value of Cash Inflows (or terminal value) is more than the initial outlay or Present Value of Cash Outflows and viceversa. For a project with above two parameters equal to each other, the decision maker remains in different. For example, in Illustration 8.15, the investment project is having a Present Value of terminal value more than the initial outlay. Hence the project may be accepted.
2. ***Mutually exclusive projects:*** In case of mutually exclusive projects, the project that offers the highest surplus of PV of terminal value over the initial outlay or PV of Cash Outflow, is ultimately selected.

Merits of Terminal Value Method

1. This method overcomes the limitations of NPV as well as IRR Method by assuming reinvestment rates separate from Cost of Capital or IRR. The reinvestment rates used in Terminal Value Method are more realistic and precisely estimated.
2. Terminal Value approach uses Cost of Capital, i.e. the minimum required rate of return to discount the aggregate Future Value of Cash Inflows. Hence, in that sense it is consistent with the value maximisation objective of the firm. Eventually, when the same minimum required rate of return is used for compounding and then discounting, both terminal value and NPV Method produces the same results.

Demerits of Terminal Value Method

The supremacy of terminal value rests upon the reinvestment rates. But in practice it is very difficult to accurately estimate the reinvestment rates, especially for projects with longer lifespan.

8.1.6 Discounted Payback Period Method

Concept of Discounted Paybackback Period

As discussed in our earlier chapter, traditional Paybackback Period Method, which selects projects based on the time period needed to recover the investment in the project, carefully handles the risk associated with the recovery of capital. However it is criticised on the ground that it fails to consider the Time Value of Money, as a result of which, even if the nominal investment is recovered within the Payback Period, it falls short of the interest cost of fund invested. In order to overcome this limitation a slightly refined measure is proposed. It is known as Discounted Payback Period (DPBP) Method.

DPBP is defined as the time period within which the initial investment in the project is received back along with the interest cost of fund. Hence, the time value of invested capital is maintained intact.

Steps in DPBP Method

1. Calculate the Cash Inflow available each year.

2. Calculate the Present Value of each Cash Inflow by multiplying the Cash Inflows by respective Present Value factors based on Cost of Capital.
3. Calculate the cumulative PV of Cash Inflow.
4. Apply simple interpolation method to determine the period to recover the initial investment.

Illustration 8.16

Problem

X Ltd. is considering a project with following Cash Flow pattern.

Year	1	2	3	4	5
CIAT (₹)	10,000	15,000	20,000	25,000	20,000

Initial investment of the project is ₹60,000 and Cost of Capital is 10% p.a. Calculate DPBP.

Solution

Calculation for DPBP

Year	**CIAT (₹)**	**PVIF @ 10%**	**PV of CIAT**	**Cumulative PV**
1	10,000	0.909	9,090	9,090
2	15,000	0.826	12,390	21,480
3	20,000	0.751	15,020	36,500
4	25,000	0.683	17,075	53,575
5	20,000	0.621	12,420	65,995

From the table, it appears that initial investment of ₹60,000 is recovered along with the interest cost of fund in between 4^{th} and 5^{th} year.

We apply simple interpolation to get

$$\frac{\text{DPBP} - 4}{5 - 4} = \frac{60{,}000 - 53{,}575}{65{,}995 - 53{,}575}$$

or DPBP – 4 = 0.52

or DPBP = 4.52 yrs

Decision Rule

1. ***Single project:*** Under DPBP Method, a project is accepted only if the DPBP is lower than the DPBP target set by the management. In case the project DPBP is higher than the management expectation, the project is outrightly rejected. However, for projects with DPBP just equal to the same expected by the management, the decision maker will be indifferent.
2. ***Mutually exclusive projects:*** In case of mutually exclusive projects, the project that offers the least DPBP is selected as it recovers the invested funds faster than all other projects.

Merits of DPBP

1. It is easy to understand and calculate.
2. It is based on Discounted Cash Flow approach. Thus, it considers Time Value of Money.
3. It considers recovery of initial investment along with the interest or opportunity cost of fund. Thus, it is more rational.
4. Since recovery of capital is given the most importance, it considers the risk aspect of the project.

Demerits of DPBP

It does not consider the Project Cash Flows over the entire lifespan of the project and hence post-payback profitability is ignored.

8.1.7 Capital Budgeting Decisions in case of Projects with Unequal Lives

NPV method of project selection is often preferred by the decision makers over all the other methods. This is because maximisation of NPV leads to maximisation of the value of the firm. Even then, the method seems to be inadequate to solve the problem of selecting mutually exclusive projects having different lifespan. This is because:

1. Early receipt of cash flows in case of a project with shorter lifespan may result into higher present value; and
2. If reinvestment opportunity exists, the project with shorter lifespan can even be repeated.

As a result, though the project with longer lifespan may generate higher overall NPV, a firm may still prefer the one with shorter lifespan to avoid its capital being blocked for long.

In order to cater to such problem, an improvised method namely Equivalent Annuity Method (EAM) of selecting mutually exclusive projects with unequal life is suggested. Under this technique one needs to calculate the Equivalent Annuity i.e. the annualised net benefit of a project by dividing its NPV with the Present Value Interest Factor Annuity (PVIFA) at an appropriate discount rate for the tenure of the project and then select the project that offers the highest EAM.

Steps in Equivalent Annuity Method:

1. Calculate the NPV of the Projects.
2. Calculate the PVIFA (Cost of capital, Life of the project).
3. Calculate Equivalent Annuity = $\frac{\text{NPV of the Project}}{\text{PVIFA}}$
4. Select the Project with the highest Equivalent Annuity.

Consider the following illustration.

Illustration 8.17

Problem

A firm is considering two projects with the following details.

Particulars	Project A	Project B
Life of the Project (Years)	5	7
NPV(₹)	60,000	80,000

The cost of capital of the firm is 10% p.a.
Recommend which project the firm should accept.

Solution

Calculation of Equivalent Annuity of Projects.

Particulars	Project A	Project B
Life of the Project (Years)	5	7
PVIFA (10%, Life of the project)	3.79	4.867
NPV (₹)	60,000	70,000
Equivalent Annuity (₹)	15,831	14,382

Since Project A has higher equivalent annuity, the net benefit of Project A per year is higher than that of Project B. Hence, Project A is recommended.

8.2 CAPITAL RATIONING

Capital Budgeting Decisions are often characterised by limited availability of financial resources or fund constraint. As a result, even if all the available projects have positive NPV, a firm may have to forego a few of them just because of non-availability of fund. The firm, in such a case, selects projects to maximise the overall NPV subject to the fund constraint and thereby ensures maximum return to the wealth of shareholders. This type of Capital Budgeting Decision is known as Capital Rationing.

8.2.1 Types of Capital Rationing Decisions

Capital Rationing Decisions can be studied under the following two situations:

1. **Situation 1: When projects are divisible**

   A project is considered to be divisible if it can be accepted in part also. In such a situation the principle of Capital Rationing can be applied through the following steps:

   (i) Calculate the Profitability Index (PI) for each project.
   (ii) Rank the projects in descending order of PI.
   (iii) Go on accepting the projects based on the above ranking until the funds are fully exhausted.
   (iv) In case the available fund is inadequate to accept the next project fully, accept it to the extent of fund available, i.e. proportionately.
   (v) Aggregate of NPV of projects thus selected will be the maximum NPV subject to the fund constraint.

Illustration 8.18

Problem

X Ltd. has ₹20,00,000 allocated for Capital Budgeting purposes. The following proposals are available.

Projects	Initial Outlay (₹)	Total PV (₹)
A	6,00,000	7,32,000
B	3,00,000	2,85,000
C	7,00,000	8,40,000
D	9,00,000	10,62,000
E	4,00,000	4,80,000
F	8,00,000	8,40,000

Which of the above investments should be undertaken? Assume that the projects are divisible.

Solution

Calculation for NPV, Profitability Index and Ranking

Projects (1)	Initial Outlay (2)	Total PV (3)	PI (4) = (3)/(2)	Ranking (5)	NPV (6) = (3) – (2)
A	6,00,000	7,32,000	1.22	2	1,32,000
B	3,00,000	2,85,000	0.95	6	–15,000
C	6,00,000	8,40,000	1.4	1	2,40,000
D	9,00,000	10,62,000	1.18	4	1,62,000
E	4,00,000	4,80,000	1.2	3	80,000
F	8,00,000	8,40,000	1.05	5	40,000

Selection of the Projects Based on PI Ranking

Ranking	Projects	Initial Outlay (₹)	Cumulative Initial Outlay (₹)	NPV (₹)
1	C	6,00,000	6,00,000	2,40,000
2	A	6,00,000	12,00,000	1,32,000
3	E	4,00,000	16,00,000	80,000
4	D	4,00,000	20,00,000	72,000* $\left(1,62,000 \times \frac{4,00,000}{9,00,000}\right)$
Total		20,00,000		5,24,000

**Note:* Project D has been accepted in part as the funds available after accepting project E is not sufficient to accept D in full. NPV has been calculated proportionately.

2. Situation 2: When projects are not divisible

A project is considered to be indivisible if it cannot be accepted in part, i.e. either to accept it in full or to reject it. In such a situation, the principle of Capital Rationing can be applied through the following steps.

(i) Make a list of the possible combinations of available projects that can be taken up with the available funds.

(ii) Calculate the total outlay and aggregate NPV of each combination.

(iii) The combination that yields the highest aggregate NPV is considered the best.

Illustration 8.19

Without features such as exclusivity, synergy and cost of unutilised funds

Problem

In a Capital Rationing situation (investment limit ₹25 lakh), suggest the most desirable feasible combination on the basis of the following data. (All figures in ₹ in lakhs)

Project	Initial Outlay (₹)	NPV (₹)
A	15	6
B	10	4.5
C	7.5	3.6
D	6	3

Assume that the projects are indivisible.

Solution

In the given situation, theoretically there are 15 possible combinations, though all may not qualify the fund constraint. These are evaluated as follows:

Combinations	Initial Outlay (₹ in lakhs)	NPV (₹ in lakhs)
A	15	6.0
B	10	4.5
C	7.5	3.6
D	6	3.0
A & B	25	10.5
A & C	22.5	9.6
A & D	21	9.0
B & C	17.5	8.1
B & D	16	7.5
C & D	13.5	6.6
A & B & C	32.5 (exceed the limit)	N.A
A & B & D	31 (exceed the limit)	N.A
A & C & D	28.5 (exceed the limit)	N.A
B & C & D	23.5	11.1
A & B & C & D	38.5 (exceed the limit)	N.A

Since total NPV is the highest for the combination (B & C & D), the projects to be selected are B, C and D. The resulting aggregate NPV will be ₹11.1 lakh with total initial outlay of ₹23.5 lakhs.

Note: In the above solution, the combinations that exceed the fund limit may not at all be shown. Similarly, combinations having too much unutilised funds (single combinations) may also be excluded from the very beginning.

Illustration 8.20

Problem

BGR Limited is considering a number of plant improvement projects with an allocable fund of ₹10,00,000. The following projects are under consideration.

Projects	Outlay (₹)	Present Value (₹)
A	6,00,000	7,25,000
B	5,00,000	6,00,000
C	4,00,000	5,00,000
D	3,00,000	4,00,000
E	2,00,000	2,75,000
F	50,000	75,000

Projects A and B are mutually exclusive. If project A is undertaken, the initial cost of project C is reduced by ₹50,000 (without affecting its benefits). If project B is undertaken the initial cost of D is reduced by ₹50,000 (without affecting the benefits). The benefit cost ratio of unutilised fund is 0.90. Which projects should be chosen?

Solution

Calculation of NPV of the Projects

Projects	Outlay (₹)	Present Value (₹)	NPV (₹)
A	6,00,000	7,25,000	1,25,000
B	5,00,000	6,00,000	1,00,000
C	4,00,000	5,00,000	1,00,000
D	3,00,000	4,00,000	1,00,000
E	2,00,000	2,75,000	75,000
F	50,000	75,000	25,000

Let us assume that the term 'benefit' means the Present Value of Cash Flow and not NPV.

Then, the revised initial outlay of project C if combined with project A = ₹(4,00,000 – 50,000) = ₹3,50,000 and that of project D if combined with project B = ₹(3,00,000 – 50,000) = ₹2,50,000.

Similarly, the revised NPV of project C if combined with A = ₹(5,00,000 – 3,50,000) = ₹1,50,000 and that of project D if combined with B = ₹(4,00,000 – 2,50,000) = ₹1,50,000.

Evaluation of Feasible Combination

Combinations	Initial Outlay (₹)	NPV (₹)
A, C, F	10,00,000 (6,00,000 + 3,50,000 + 50,000)	3,00,000 (1,25,000 + 1,50,000 + 25,000)
B, D, E, F	10,00,000 (5,00,000 + 2,50,000 + 2,00,000 + 50,000)	3,50,000 (1,00,000 + 1,50,000 + 75,000 + 25,000)
A, D, F	9,50,000 (6,00,000 + 3,00,000 + 50,000)	2,45,000* (1,25,000 + 1,00,000 + 25,000 − 50,000 × 0.10)
B, C, F	9,50,000 (5,00,000 + 4,00,000 + 50,000)	2,20,000* (1,00,000 + 1,00,000 + 25,000 − 50,000 × 0.10)
C, D, E, F	9,50,000 (4,00,000 + 3,00,000 + 2,00,000 + 50,000)	2,95,000* (1,00,000 + 1,00,000 + 75,000 + 25,000 − 50,000 × 0.10)

*Here, ₹(50,000 × 0.10) = ₹5,000 is the loss due to unutilised investment.

Since NPV is the highest for the combination (B, D, E, F), the projects to be selected are B, D, E and F.

8.3 ADDITIONAL SOLVED PROBLEMS

1. A company is considering two mutually exclusive project with the following details:

Particulars	Project E	Project F
Life of the project (years)	4	5
Initial Investment (₹)	22,000	27,000
Net Cash Flow (₹)		
Year 1	11,000	18,000
Year 2	14,000	16,000
Year 3	17,000	16,000
Year 4	19,000	12,000
Year 5	-	10,000

Cost of capital of the company is 10%.

Calculate NPV of the projects and recommend the projects that can be accepted.

Solution

Calculation of NPV

Year	Project E	Project F	PVIF @ 10%	Project E	Project F
1	11,000	18,000	0.909	9,999	16,362
2	14,000	16,000	0.826	11,564	13,216
3	17,000	16,000	0.751	12,767	12,016
4	19,000	12,000	0.683	12,977	8,196
5	—	10,000	0.621	0	6,210
Total PV of Cash flow				47,307	56,000
(–) Initial Investment				22,000	27,000
NPV				25,307	29,000

Since NPV is higher for Project F, it is acceptable.

2. M Ltd. has an investment budget of ₹100 lakhs for 2009–10. It has short listed two projects A and B after completing the market and technical appraisals. The management wants to complete the financial appraisal before making the investment. Further particulars regarding the two projects are given below:

		(₹ lakhs)
Particulars	**X**	**Y**
Investment required	100	90
Average annual cash inflow before depreciation and tax (estimate)	28	24

Salvage value: Nil for both projects. Estimate life – 10 years for both projects.
The company follows straight line method of charging depreciation. Its tax rate is 50%.
You are required to calculate the NPV for the 2 projects with a cost of Capital of 13%.
Note: P.V of an annuity of ₹1 for ten years at different discount rate is given below:

Rate %	10	11	12	13	14	15
Annuity Value of Return	6.1446	5.8992	5.6502	5.462	5.2161	5.01

Solution

Calculation of NPV of the two projects

Particulars	Project X	Project Y
Av. Annual cash inflow before depreciation and tax	28	24
Less: Depreciation	10	9
EBT	18	15

(Contd.)

Particulars	Project X	Project Y
Less: Tax @ 50%	9	7.5
PAT	9	7.5
Add: Depreciation	10	9
Cash inflow after tax	19	16.5
NPV at 13% cost of capital	19 × 5.462 = 103.778	16.5 × 5.462 = 90.123
Less: Initial investment	100.000	90.000
Net present Value	3.778	0.123
As Project X has more NPV than Project Y so, accept the Project X.		

3. A firm proposes to market a cheaper variety of its existing brand to be sold for ₹20 per unit, estimated product-life being five years. The sales volume for the five years has been estimated to be 30,000 units for the first year, 40,000 units for each of the next two years and 20,000 units for each of the last two years. The variable cost p.u is ₹10. Production of the cheapest brand will entail an initial expenditure of ₹4,50,000 in purchasing and installing a new plant with estimated economic life of five years and scrap value of ₹50,000. The fixed cost of ₹2,00,000 per annum including depreciation on the plant on straight-line basis will be needed for producing and marketing the cheaper brand. Introduction of this cheaper variety is also likely to have an adverse impact on the demand of the existing dearer brand resulting in loss of contribution estimated at ₹20,000 per annum.

   Assuming cost of Capital to be 10% and marginal tax rate to be 40%, you are required to evaluate proposal and give your reasoned recommendation as to its acceptance or rejection. The PV factors at 10% for five years are 0.909, 0.826, 0.751, 0.683 and 0.62.

   [C.U. M.Com., 1998]

Solution

Calculation of Cash Flow before Depreciation and Tax (CBDT)

Year	Sales (Units)	Sales @ ₹20 p.u (₹)	Variable Cost @ ₹10 p.u (₹)	Fixed Cost excluding Depreciation (₹)	CBDT (₹)
1	30,000	6,00,000	3,00,000	1,20,000	1,80,000
2	40,000	8,00,000	4,00,000	1,20,000	2,80,000
3	40,000	8,00,000	4,00,000	1,20,000	2,80,000
4	20,000	4,00,000	2,00,000	1,20,000	80,000
5	20,000	4,00,000	2,00,000	1,20,000	80,000

Note: Depreciation = ₹(4,50,000 – 50,000) ÷ 5 = ₹80,000 p.a.
Fixed cost excluding depreciation = ₹(2,00,000 – 80,000) = ₹1,20,000

Calculation of Cash Flow After Tax (CFAT)

Year	CBDT (₹)	Depreciation	Taxable Profit (₹)	Tax (₹)	CFAT excluding Loss of Contribution	Loss of Contribution (₹)	CFAT (₹)
(1)	(2)	(3)	(4)	(5)	(6) = (2) – (5)	(7)	(8) = (6) + (7)
1	1,80,000	80,000	1,00,000	40,000	1,40,000	20,000	1,20,000
2	2,80,000	80,000	2,00,000	80,000	2,00,000	20,000	1,80,000
3	2,80,000	80,000	2,00,000	80,000	2,00,000	20,000	1,80,000
4	80,000	80,000	Nil	Nil	80,000	20,000	60,000
5	80,000	80,000	Nil	Nil	80,000	20,000	1,10,000*

*Note: The cash flow of fifth year includes ₹50,000 scrap value.

Calculation of NPV

Year	CFAT(₹)	PVIF @ 10%	PV of CF
1	1,20,000	0.909	1,09,080
2	1,80,000	0.826	1,48,680
3	1,80,000	0.751	1,35,180
4	60,000	0.683	40,980
5	1,10,000*	0.621	68,310
Total PV			5,02,230
(–) Initial Investment			4,50,000
NPV			52230

Since NPV of the project is positive, it may be recommended.

4. A project, requiring initial investment of ₹5,00,000 in creating a fixed facility, ensures net incremental inflow of ₹1,50,000 per annum before deduction of depreciation and tax. The fixed facility is likely to have economic life of five years with scrap value of ₹1,00,000 at the end. Depreciation is allowed on straight-line basis and marginal tax rate is 40%. You are required to estimate the highest opportunity cost that the project can bear.

[C.U. M.Com., 2000]

Solution

Here the highest opportunity cost that the project can bear is the internal rate of return.

Calculation for CFAT

Year	CBDT(₹)	Depreciation (₹)	PBT	Tax@40%	CFAT
1	1,50,000	$80{,}000\left(\frac{5{,}00{,}000-1{,}00{,}000}{5}\right)$	70,000	28,000	1,22,000
2	1,50,000	80,000	70,000	28,000	1,22,000
3	1,50,000	80,000	70,000	28,000	1,22,000
4	1,50,000	80,000	70,000	28,000	1,22,000
5	1,50,000	80,000	70,000	28,000	2,22,000#

#Note: The cash flow of 5th year also includes the scrap value.

We apply trial and error approach to calculate the IRR.

$$\text{Fake Payback Period} = \frac{\text{Initial Investment}}{\text{Average Annual Cash Inflow}} = \frac{5{,}00{,}000}{1{,}42{,}000} = 3.52 \text{ years.}$$

From the 5th year row of the PVIFA table we find that the value nearest to the fake payback period is 3.52 and the corresponding rate is 13%. So 13% should be the first trial rate.

Calculation for NPV at Alternative Rates

Year	CFAT	PVIF 13%	PV of CF	PVIF 11%	PV of CF	PVIF 12%	PV of CF
1	1,22,000	0.885	1,07,970	0.901	1,09,922	0.893	1,08,946
2	1,22,000	0.783	95,526	0.812	99,064	0.797	97,234
3	1,22,000	0.693	84,546	0.731	89,182	0.712	86,864
4	1,22,000	0.613	74,786	0.659	80,398	0.636	77,592
5	2,22,000	0.543	1,20,546	0.593	1,31,646	0.567	1,25,874
Total PV			4,83,374		5,10,212		4,96,510
(–) Initial Investment			5,00,000		5,00,000		5,00,000
NPV			–16,626		10,212		–3,490

From the above table it is evident that IRR lies between 12% and 11% (as NPV at IRR = 0). Applying simple interpolation, we get,

$$\frac{\text{IRR}-11}{12-11} = \frac{0-10{,}212}{-3{,}490-10{,}212}$$

$$\text{IRR} - 11 = 0.75$$

$$\text{IRR} = 11.75\%$$

IRR of the project is 11.75%.

5. From the particulars given below calculate the IRR of the project.
   (i) Net cash flow after tax over the four years of the project life.

Year	1	2	3	4
CFAT (₹)	5,000	8,000	10,000	4,000

   (ii) Initial outlay is ₹20,000, Salvage value at the end of the project life is Nil
   (iii) Present value of ₹1 receivable at the end of year 1,2,3 and 4

12%	0.892	0.797	0.712	0.636
13%	0.885	0.783	0.693	0.613
14%	0.877	0.770	0.675	0.592
15%	0.867	0.756	0.658	0.572
16%	0.862	0.743	0.641	0.552

[C.U. M.Com., 1994]

Solution

We apply trial and error approach to calculate the IRR.

$$\text{Fake Payback Period} = \frac{\text{Initial Investment}}{\text{Average Annual Cash Inflow}}$$

$$= \frac{20{,}000}{(5{,}000 + 8{,}000 + 10{,}000 + 4{,}000)/4} = 2.963 \text{ years.}$$

From the 4th year row of the PVIFA table we find that the value nearest to the fake payback period is 2.963 and the corresponding rate is 13%. So 13% should be the first trial rate.

Calculation for NPV at Alternative Rates

Year	**CFAT**	**PVIF@ 13%**	**PV of CIAT**	**PVIF @14%**	**PV of CIAT**
1	5,000	0.885	4,425	0.877	4,385
2	8,000	0.783	6,264	0.770	6,160
3	10,000	0.693	6,930	0.675	6,750
4	4,000	0.613	2,452	0.592	2,368
Total Present Value			20,071		19,663
Less. Initial Investment			20,000		20,000
NPV			71		(–)337

From the above table it is evident that IRR lies between 13% and 14% (as NPV at IRR = 0).

Applying simple interpolation, we get,

$$\frac{IRR - 13}{14 - 13} = \frac{0 - 71}{-337 - 71}$$

IRR – 13 = 0.17

IRR = 13.17%

IRR of the project is 13.17%.

6. From the following information calculate the MIRR of the project.
Initial Outlay ₹80,000, cost of capital 12% p.a. Life of the project 5 years.
Cash inflows from the project are ₹12,000, ₹18,000, ₹25,000, ₹23,000 and ₹14,000.

Solution

Calculation of Aggregate Future Value

Year	CIAT	Years for Investment	FVIF@12%	FV
1	12,000	4	1.5735	18,882
2	18,000	3	1.4049	25,288
3	25,000	2	1.2544	31,360
4	23,000	1	1.12	25,760
5	14,000	0	1	14,000
				1,15,290

Now, $$MIRR = \sqrt[n]{\frac{\text{Aggregate future Value of Cash Inflow}}{\text{Initial Investment}}} - 1$$

$$MIRR = \sqrt[5]{\frac{1,15,290}{80,000}} - 1$$

$$MIRR = \sqrt[5]{1.441} - 1$$

MIRR = 1.0758 – 1 (applying scientific but non programmable calculator)

MIRR = 0. 0758 i.e. 7.58%

7. Y Ltd. is considering a project which requires an initial investment of ₹80,000 and a further investment of ₹20,000 at the end of first year. The project has an effective life of 5 years. The project is likely to generate cash flow of ₹50,000 at the end of second year and ₹40,000, ₹30,000 and ₹30,000 at the end of third, fourth and fifth year respectively. The cost of Capital is 10%. Calculate the MIRR.

Solution

We know that, $MIRR = \sqrt[n]{\frac{\text{Aggregate future Value of Cash Inflow}}{\text{Initial Investment}}} - 1$

However, as additional investment has been made at the end of second year, instead of initial investment we must consider the PV of cash outflow.

Thus the formula is revised as, $MIRR = \sqrt[n]{\frac{\text{Aggregate future Value of Cash Inflow}}{\text{PV of Cash Outflow}}} - 1$

Here, PV of cash outflow = $80,000 + \frac{20,000}{(1+0.10)^1}$ = ₹98,180

Calculation of Aggregate Future Value

Year	CIAT	Years for Investment	FVIF@10%	FV
2	50,000	3	1.331	66,550
3	40,000	2	1.21	48,400
4	30,000	1	1.1	33,000
5	30,000	0	1	30,000
				1,77,950

$$MIRR = \sqrt[5]{\frac{1,77,950}{98,180}} - 1$$

$$MIRR = \sqrt[5]{1.812} - 1$$

MIRR = 1.1262 – 1 (applying scientific but non programmable calculator)

MIRR = 0.1262 i.e. 12.62%

8. An investor facing two mutually exclusive projects having life span of four years each provides you the following particulars.

Particulars	Proposal X	Proposal Y
Life of the project (years)	4	4
Initial Investment (₹)	1,60,000	48,000
Net Cash Flow (₹)		
Year 1	56,000	19,600
Year 2	56,000	19,600
Year 3	56,000	19,600
Year 4	56,000	19,600

Rank the two proposals under NPV and IRR method assuming a cost of capital of 10% p.a. Is there any conflict in ranking? If so, how will you resolve the same?

[C.U. M.Com., 2002 (adapted)]

Solution

Calculation for NPV of the Proposals

Year	Proposal X	Proposal Y	PVIF @ 10%	Proposal X	Proposal Y
1	56,000	19,600	0.909	50,904	17,816
2	56,000	19,600	0.826	46,256	16,190
3	56,000	19,600	0.751	42,056	14,720
4	56,000	19,600	0.683	38,248	13,386
Total PV of Cash flow				1,77,464	62,112
(–) Initial Investment				1,60,000	48,000
NPV				17,464	14,112
Rank				1	2

Calculation for IRR of the proposals

Proposal X:

Here fake payback period = $\frac{\text{Initial Investment}}{\text{Annual Cash Flow}} = \frac{1,60,000}{56,000} = 2.857$

From the PV table we find that the value nearest to 2.857 for 4 years is 2.855 for 15%. So 15% can be taken (approximately) as the IRR.

Proposal Y:

Here fake payback period = $\frac{\text{Initial Investment}}{\text{Annual Cash Flow}} = \frac{48,000}{19,600} = 2.4490$

From the PV table we find that the value nearest to 2.449 for 4 years is 2.448 for 23%. So 23% can be taken (approximately) as the IRR.

So, ranking based on IRR is:

Proposal X = Rank 2

Proposal Y = Rank 1

Thus there appears a conflict between the proposals as regards to their ranking under the two methods.

Final Selection:

Between NPV and IRR, NPV method is always a better approach because –

(a) NPV method attempts maximization of the benefits from any project in terms of present value. Therefore this is in line with the corporate objective of value maximization of the firm.

(b) NPV is based on more rational assumption regarding the re-investment rate than that of IRR.

Thus finally we adopt NPV method and select proposal X having higher NPV.

9. A company is confronted with two mutually exclusive projects having the following cash flows:

Proposal A – Initial Outlay ₹1,00,000; NCF ₹25,000 for 1st year and ₹1,25,000 for the 2nd year.

Proposal B – Initial Outlay ₹1,00,670; NCF ₹95,000 for 1st year and ₹45,000 for the 2nd year.

Rank the proposals under NPV and IRR method given cost of capital of 10% p.a.

Discuss with reasons which of the two methods you would rely upon in arriving at your final choice.

The PV Factors

Rate	10%	24%	25%	26%	27%	28%	29%	30%
Year 1	0.909	0.806	0.800	0.794	0.787	0.781	0.775	0.769
Year 2	0.826	0.650	0.640	0.630	0.620	0.610	0.601	0.592

Solution

Calculation for NPV of the Proposals

Year	Proposal A	Proposal B	PVIF @ 10%	Proposal A	Proposal B
1	25,000	95,000	0.909	22,725	86,355
2	1,25,000	45,000	0.826	1,03,250	37,170
Total PV of Cash flow				1,25,795	1,23,525
(–) Initial Investment				1,00,000	1,00,670
NPV				25,795	23,855
Rank				1	2

Calculation of IRR of the proposals

Based on trial and error method using the discounting rates given in the problem, we find that the IRR of Proposal A is 25% and that of B is 29%.

So, ranking based on IRR is:

Proposal A = Rank 2

Proposal B = Rank 1

Thus there appears a conflict between the proposals as regards to their ranking under the two methods.

Final Selection:

Between NPV and IRR, NPV method is always a better approach because –

(c) NPV method attempts maximization of the benefits from any project in terms of present value. Therefore this is in line with the corporate objective of value maximization of the firm.

(d) NPV is based on more rational assumption regarding the re-investment rate than that of IRR.

Thus finally we adopt NPV method and select proposal X having higher NPV.

10. A firm whose cost of capital is 10% is considering two mutually exclusive projects, *X* and *Y*, the details of which are:

	Project X ₹	Project Y ₹
Investment	70,000	70,000
Net Cash flow:		
Year		
1	10,000	50,000
2	20,000	40,000
3	30,000	20,000
4	45,000	10,000
5	60,000	10,000
	1,65,000	1,30,000

Compute Net Present Value and Profitability index for the two projects and comment on the result. *[C.U. M.Com., 2007]*

Solution

Calculation for NPV and PI of Projects

Year	NCF		PVIF @ 10%	PV of CF	
	Project X	Project Y		Project X	Project Y
1	10,000	50,000	0.909	9,090	45,450
2	20,000	40,000	0.826	16,520	33,040
3	30,000	20,000	0.751	22,530	15,020
4	45,000	10,000	0.683	30,735	6,830
5	60,000	10,000	0.621	37,260	6,210
Total PV of Cash flow				1,16,135	1,06,550
(–) Initial Investment				70,000	70,000
NPV				46,135	36,550
PI = $\frac{\text{Total PV of CF}}{\text{Initial Investment}}$				1.659	1.522

Thus under both the methods project X should be accepted

11. Which of the following competing projects would you recommend using (a) Payback Period, (b) Payback Profitability and (c) Net Present Value Methods?

	Project I	Project II
Initial outlay (₹)	20,000	25,000
Estimated life (years)	5	7
Estimated Net Cash flow (₹)		
End of year 1	5,000	5,000
2	6,000	5,000
3	4,000	5,000
4	4,000	5,000
5	6,000	5,000
6	—	5,000
7	—	5,000
Estimated scrap value	Nil	Nil

Discounting rate may be taken at 10% p.a. and the P.V. of ₹1 to be received at the end of each year at 10% is given below:

Year	1	2	3	4	5	6	7
P.V. (₹)	0.909	0.826	0.751	0.683	0.621	0.564	0.513

How would you rationalize conflicting results, if any, in the present case?

[C.U. M.Com., 2006]

Solution

(a) Evaluation of Projects under Payback Period method.

Project I

Year	NCF (₹)	Cumulative NCF (₹)
1	5,000	5,000
2	6,000	11,000
3	4,000	15,000
4	4,000	19,000
5	6,000	25,000

Thus PBP of the project lies between 4^{th} and 5^{th} year which can be calculated using simple interpolation method as follows:

$$\frac{\text{PBP} - 4}{5 - 4} = \frac{20{,}000 - 19{,}000}{25{,}000 - 19{,}000}$$

Or, PBP = 4.17 years

Project II:

$$\text{PBP} = \frac{\text{Initial Investment}}{\text{Annual NCF}} = \frac{25{,}000}{5{,}000} = 5 \text{ years}$$

Thus Project I with lower PBP is acceptable.

(b) Evaluation of Projects under Payback Profitability method:

Payback Profitability of Project I = Total NCF – Initial Investment = 25,000 – 20,000 = ₹5,000

Payback Profitability of Project II = (Project Life – PBP) × Annual NCF = (7 – 5) × 5,000 = ₹10,000.

So, Project II with higher profit should be accepted.

(c) Evaluation of Projects under Net Present Value method.

Project I

Year	NCF	PVIF @10%	PV of CF
1	5,000	0.909	4,545
2	6,000	0.826	4,956
3	4,000	0.751	3,004
4	4,000	0.683	2,732
5	6,000	0.621	3,726
Total PV			18,963
(–) Initial Investment			20,000
NPV			–1,037

Project II

Particulars	₹
Total PV = Annual NCF * PVIFA(10%, 7 years) = 5,000 × 4.868	24,340
(–) Initial Investment	25,000
NPV	(–)660

Thus under NPV method Project II with lower loss should be selected.

Note: Here Payback Period and Payback Profitability results contradicts one another. Thus ultimately we can accept Project II under NPV method.

12. A Company can make either of two investments at the beginning of 2003. Assuming a required rate of return of 10% p.a., evaluate the investment proposals under (i) Payback

Profitability, (ii) Discounted Payback Period and (iii) Profitability Index. The particulars relating to the projects are given below:

	Project E	Project F
Initial outlay (₹)	20,000	28,000
Estimated life (years)	5	5
Scrap value (₹)	Nil	Nil
Net Cash Flow (₹)		
End of 2003	4,000	7,500
2004	5,000	8,750
2005	6,000	7,500
2006	9,000	7,500
2007	5,000	7,500

It is estimated that each of the alternative proposals will require an additional working capital of ₹2,000 which will be received back in full after the expiry of each project life. The present value of ₹1, to be received at the end of each year, at 10% p.a. is given below:

Year	1	2	3	4	5
P.V. Factor (₹)	0.909	0.827	0.751	0.683	0.621

[C.U. M.Com., 2003]

Solution

(i) Evaluation of Projects under Payback Profitability

Year	Project E NCF (₹)	Project F NCF (₹)
1	4,000	7,500
2	5,000	8,750
3	6,000	7,500
4	9,000	7,500
5	7,000(5,000 + 2,000)	9,500(7,500 + 2,000)
Total NCF	31,000	40,750
(–) Initial Investment	22,000(20,000 + 2,000)	30,000(28,000 + 2,000)
Payback Profitability	9,000	10,750

Under Payback Profitability method Project F with higher payback profit is acceptable.

(ii) Evaluation of projects under Discounted Payback Period (DPBP) method

Year	NCF		PVIF @ 10%	PV of CF		Cumulative CF	
	Project E	Project F		Project E	Project F	Project E	Project F
1	4,000	7,500	0.909	3,636	6,817.5	3,636	6,817.5
2	5,000	8,750	0.826	4,130	7,227.5	7,766	14,045
3	6,000	7,500	0.751	4,506	5,632.5	12,272	19,677.5
4	9,000	7,500	0.683	6,147	5,122.5	18,419	24,800
5	7,000	9,500	0.621	4,347	5,899.5	22,766	30,699.5

We apply simple interpolation method to calculate DPBP as follows –
For Project E

$$\frac{DPBP - 4}{5 - 4} = \frac{22,000 - 18,419}{22,766 - 18,419}$$

Or, DPBP = 4.82 years

Similarly, for Project F

$$\frac{DPBP - 4}{5 - 4} = \frac{30,000 - 24,800}{30,699.5 - 24,800}$$

Or, DPBP = 4.88 years

Thus Project E with lower DPBP is acceptable.

(iii) Evaluation of projects under PI method.

$$\text{PI for Project E} = \frac{\text{Total PV}}{\text{Initial Investment}} = \frac{22,766}{22,000} = 1.035$$

$$\text{PI for Project F} = \frac{\text{Total PV}}{\text{Initial Investment}} = \frac{30,699.5}{30,000} = 1.023$$

Since PI is higher for Project E, it is acceptable.

13. A company can make either of the two investments at the beginning of 2010. Assuming a required rate of return of 10% p.a., evaluate the investment proposals under (i) Payback Profitability (without considering P.V factor, (ii) Discounted Payback Period, (iii) Profitability Index. The particulars relating to the projects are given below:

	Project X	Project Y
Initial Investment (₹)	40,000	56,000
Estimated life (Years)	5	5
Scrap Value (₹)	Nil	Nil
Net Cash Flow after Depreciation and Tax (₹)		
End of 2010	8,000	15,000
End of 2011	10,000	16,000
End of 2012	12,000	15,000
End of 2013	16,000	15,000
End of 2014	10,000	15,000
Method of Depreciation	S.L. Method	S.L. Method

It is estimated that each of the alternative proposals will require an additional working capital of ₹4,000 which will be received back in full after expiry of each project life. The present value of ₹1.00 to be received at the end of each year at 10% p.a. is given below:

Year	1	2	3	4	5
P.V Factor (₹)	0.909	0.826	0.751	0.683	0.621

[C.U. M.Com., 2010]

Solution

(i) Evaluation of Projects under Payback Profitability

Year	Project X NCF (₹)	Project Y NCF (₹)
1	8,000	15,000
2	10,000	16,000
3	12,000	15,000
4	16,000	15,000
5	14,000(10,000 + 4,000)	19,000 (15,000 + 4,000)
Total NCF	60,000	80,000
(–) Initial Investment	44,000(40,000 + 4,000)	60,000(56,000 + 4,000)
Payback Profitability	16,000	20,000

Under Payback Profitability method Project Y with higher payback profit is acceptable.

(ii) Evaluation of projects under Discounted Payback Period (DPBP) method

Year	Project X	Project Y	PVIF @ 10%	Project X	Project Y	Project X	Project Y
1	8,000	15,000	0.909	7,272	13,635	7,272	13,635
2	10,000	16,000	0.826	8,260	13,216	15,532	26,851
3	12,000	15,000	0.751	9,012	11,265	24,544	38,116
4	16,000	15,000	0.683	10,928	10,245	35,472	48,361
5	14,000	19,000	0.621	8,694	11,799	44,166	60,160
Total PV of Cash flow				44,166	60,160		

We apply simple interpolation method to calculate DPBP as follows –
For Project X

$$\frac{\text{DPBP} - 4}{5 - 4} = \frac{44{,}000 - 35{,}472}{44{,}416 - 35{,}472}$$

Or, DPBP = 4.95 years

Similarly, for Project Y

$$\frac{\text{DPBP} - 4}{5 - 4} = \frac{60{,}000 - 48{,}361}{60{,}160 - 48{,}361}$$

Or, DPBP = 4.99 years

Thus Project X with lower DPBP is acceptable.

(iii) Evaluation of projects under PI method.

$$\text{PI for Project X} = \frac{\text{Total PV}}{\text{Initial Investment}} = \frac{44{,}166}{44{,}000} = 1.004$$

$$\text{PI for Project Y} = \frac{\text{Total PV}}{\text{Initial Investment}} = \frac{60{,}160}{60{,}000} = 1.003$$

Since PI is higher for Project Y, it is acceptable.

14. A limited Company is considering investing a project requiring a capital outlay of ₹2,00,000. Forecast for annual income after depreciation but before tax is as follows:

Year	₹
1	1,00,000
2	1,00,000
3	80,000
4	80,000
5	40,000

Depreciation may be taken as 20% on original cost and taxation at 50% of net income. You are required to evaluate the project according to each of the following methods:

(i) Payback method
(ii) Rate of return on original investment method
(iii) Rate of return on average investment method
(iv) Discounted cash flow method taking cost of capital as 10%
(v) NPV

Year	Profit Before Tax	Profit After Tax @50%	Cash Inflows After Tax [PAT + Dep]	Cumulative Cash Inflows	Discount Factor @ 10%	Present Value
1	1,00,000	50,000	90,000	90,000	0.9091	81,819
2	1,00,000	50,000	90,000	1,80,000	0.8264	74,376
3	80,000	40,000	80,000	2,60,000	0.7513	60,104
4	80,000	40,000	80,000	3,40,000	0.6830	54,640
5	40,000	20,000	60,000	4,00,000	0.6209	37,254
						3,08,193

(i) **Pay Back Method:**
Pay back period = 2 + 20,000/80,000 = 2.25 years (or) 2 years 3 months

(ii) **Rate of Return on Original Investment Method**. ARR = Average Profit after Tax / Investment × 100
= 40,000 / 2,00,000 × 100 = 20%

(iii) **Rate of Return on Average Investment Method**
ARR = Average Profit after tax / Average investment × 100 = 40,000 / [(2,00,000 + 0)/2] × 100 = 40%

(iv) **Discounted Cash Flow Method taking Cost of Capital as 10%**

Present value of cash inflows after tax	3,08,193
Less: Outflow	2,00,000
Net Present Value	1,08,193

15. Following are the data on a capital project being evaluated by the management of X Ltd.

Project M

Annual cost savings	₹40,000
Useful life	4 years
IRR	15%
Profitability Index	1.064

(Contd.)

NPV	?
Cost of capital	?
Cost of Project	?
Payback	?

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

Discount Rate	15%	14%	13%	12%
1st year	0.869	0.877	0.885	0.893
2nd year	0.756	0.769	0.783	0.797
3rd year	0.658	0.675	0.693	0.712
4th year	0.572	0.592	0.613	0.636
	2.855	2.913	2.974	3.038

Solution

Calculation of Cost of the Project i.e. Initial Outlay:

Annual cost savings = ₹40,000

Useful life = 4 years

IRR = 15%. At IRR the total PV is equal to the Initial Investment.

Total PV at 15% for 4 years = 40,000 × 2.855 = ₹1,14,200

Project cost is ₹1,14,200.

Calculation of Payback Period:

Payback Period = Initial Investment ÷ Annual cost savings = 1,14,200 ÷ 40,000 = 2.855 years.

Calculation of cost of capital:

$$PI = \frac{\text{Total PV of Cash flow}}{\text{Initial Investment}} = 1.064$$

$$\frac{\text{Total PV of Cash flow}}{114200} = 1.064$$

Total PV of Cash flow = ₹1,21,509

So, cumulative discounting factor = $\frac{\text{Total PV of Cash flow}}{\text{Initial Investment}} = \frac{1,21,509}{40,000} = 3.038$

Looking at the present Value table at PVIFA factor for 4 years we find that discounting rate for 4 years at 12% is nearest to 3.038. So cost of capital is 12%.

NPV = Total Pv of cash flow – Initial Investment = 1,21,509 – 1,14,200 = ₹7,309.

16. A project requires an initial investment of ₹32,000. Its estimated economic life is 5 years. The projected annual cash inflows have been estimated at ₹10,000 p.a. The firm's cost of capital is 10% and the expected interest rates at which the annual cash inflows can be re-invested in a public sector bank are as follows:

Year	1	2	3	4	5
Rate of Interest	8.25%	8.50%	9%	9.5%	10%

Advise the management whether the project should be accepted or rejected (Use Terminal Value Method). *[C.U. M.Com., 2013]*

Solution

Calculation for Terminal Value

Year	**Cash Inflows**	**Re-investment Rate**	**Years of Reinvestment**	**FVIF**	**Future Value**
1	10,000	8.25%	4	1.373	13,730
2	10,000	8.50%	3	1.277	12,770
3	10,000	9%	2	1.188	11,880
4	10,000	9.5%	1	1.095	10,950
5	10,000	10%	0	1	10,000
Terminal Value					59,330

So, Present Value of Terminal Value = Terminal Value × PVIF (Cost of capital, Years)

= ₹59,330 × PVIF (10%, 5)

= ₹59,330 × 0.621

= ₹36,844

Since the Present Value of Terminal Value (₹36,844) is higher than the initial outlay of ₹32,000, the project is advisable.

15. A project requires an initial investment of ₹25,000. Its estimated economic life is 5 years. The projected annual cash inflows have been estimated at ₹8,000 p.a. The firm's cost of capital is 10% and the expected interest rates at which the annual cash inflows can be re-invested in a public sector bank are as follows:

Year	1	2	3	4	5
Rate of Interest	8%	8%	9%	10%	12%

Advise the management whether the project should be accepted or rejected (Use Terminal Value Method). *[C.U. M.Com., 2011]*

Solution

Calculation for Terminal Value

Year	Cash Inflows	Re-investment Rate	Years of Reinvestment	FVIF	Future Value
1	8,000	8%	4	1.36	10,880
2	8,000	8%	3	1.26	10,080
3	8,000	9%	2	1.1881	9,505
4	8,000	10%	1	1.10	8,800
5	8,000	12%	0	1	8,000
Terminal Value					47,265

So, Present Value of Terminal Value = Terminal Value × PVIF (Cost of capital, Years)

= ₹47,265 × PVIF (10%, 5)

= ₹47,265 × 0.621

= ₹29,352

Since the Present Value of Terminal Value (₹29,352) is higher than the initial outlay of ₹25,000, the project is advisable.

16. The following investment proposals are competing for selection. The Profitability Index (PI) of each of the proposals is as follows:

	1	2	3	4
Initial outlay (₹'000)	50	70	80	60
PI	1.13	1.11	1.15	1.08

If the budgeted fund is ₹1,20,000, select the most profitable project-mix to maximize net present value. *[C.U. M.Com., 2005]*

Solution

Assumption: Here it has been assumed that the projects are divisible.

Calculation for NPV

Particulars	1	2	3	4
Initial outlay (₹'000)	50	70	80	60
PI	1.13	1.11	1.15	1.08
Total PV	56.5	77.7	92	64.8
NPV	6.5	7.7	12	4.8
Ranking based on PI	II	III	I	IV

Project Selection under Capital Rationing

Project as per ranking	Initial Outlay (₹ in '000)	NPV (₹ in '000)
3	80	12
1	40	5.2 (6.5*40/50)
Total	120	17.2

17. Z Co. Ltd is evaluating the following indivisible projects. The company has a capital expenditure ceiling of ₹150 lakh. You are required to indicate which projects to be accepted, if project P and Q are mutually exclusive and any unspent amount will result in a negative NPV of 5% of the unspent amount.

Project	Cash Outlay (₹ in lakh)	NPV (₹ in lakh)
O	10	1.8
P	50	8.0
Q	20	4.0
R	60	3.6
S	100	25.0
T	80	18.0

[C.U. M.Com., 2010]

Solution

Evaluation of Feasible Combination

Combinations	Initial Outlay (₹)	NPV (₹)
S,O,Q	130 (100 + 10 + 30)	29.8 (25 + 1.8 + 4 – 20*.05)
S,P	150 (100 + 50)	33 (25 + 8)
T,R,O	150 (80 + 60 + 10)	23.4 (18 + 3.6 + 1.8)
T,O,P	140 (80 + 10 + 50)	27.3 (18 + 1.8 + 8 – 10*.05)

Note: Here deduction from NPV represents loss due to unspent amount.

19. NC Ltd. Is considering a number of capital investment projects for which ₹2,00,000 have been allocated. The following projects are under consideration.

Project	Investment (₹)	NPV (₹)
A	1,20,000	25,000
B	1,00,000	20,000
C	80,000	20,000

(Contd.)

Project	Investment (₹)	NPV (₹)
D	60,000	20,000
E	40,000	15,000
F	10,000	5,000

Project A and B are mutually exclusive. If project A is undertaken, the initial cost of C is reduced by ₹10,000 (without affecting its benefits), If project B is undertaken the initial cost of D is reduced by ₹10,000 (without affecting its benefits). The benefit-cost ratio of unutilized funds is 0.90.

What projects should be chosen?

Solution

Calculation of NPV of the Projects

Projects	Outlay (₹)	NPV (₹)	Total PV(₹)
A	1,20,000	25,000	1,45,000
B	1,00,000	20,000	1,20,000
C	80,000	20,000	1,00,000
D	60,000	20,000	80,000
E	40,000	15,000	55,000
F	10,000	5,000	15,000

Let us assume that the term 'benefit' means the Present Value of cash flow and not NPV. Then, the revised initial outlay of project C if combined with project A = ₹(80,000-10,000) = ₹70,000 and that of project D if combined with project B = ₹(60,000 – 10,000) = ₹50,000. Similarly, the revised NPV of project C if combined with A = ₹(1,00,000 – 70,000) = ₹30,000 and that of project D if combined with B = ₹(80,000 – 50,000) = ₹30,000.

Evaluation of Feasible Combination

Combinations	Initial Outlay (₹)	NPV (₹)
A,C, F	2,00,000 (1,20,000 + 70,000 + 10,000)	60,000 (25,000 + 30,000 + 5,000)
B, D, E, F	2,00,000 (1,00,000 + 50,000 + 40,000 + 10,000)	70,000 (20,000 + 30,000 + 15,000 + 5,000)
A, D, F	1,90,000 (1,20,000 + 60,000 + 10,000)	49,000* (25,000 + 20,000 + 5,000 – 10,000 × 0.10)
B, C, F	1,90,000 (1,00,000 + 80,000 + 10,000)	44,000* (20,000 + 20,000 + 5,000 – 10,000 × 0.10)
C, D, E, F	9,50,000 (80,000 + 60,000 + 40,000 + 10,000)	59,000* (20,000 + 20,000 + 15,000 + 5,000 – 10,000 × 0.10)

*Here, ₹(10,000 × 0.10) = ₹1,000 is the loss due to unutilized investment.

Since NPV is the highest for the combination (B, D, E, F), the projects to be selected are - B, D, E and F.

20. A firm is considering two projects with the following details.

Particulars	Project X	Project Y
Life of the Project (Years)	6	8
NPV(₹)	65,120	78,576

The cost of capital of the firm is 11% p.a.
Recommend which project the firm should accept.

Solution

Calculation of Equivalent Annuity of Projects.

Particulars	Project X	Project Y
Life of the Project (Years)	6	8
PVIFA (10%, Life of the project)	4.231	5.146
NPV (₹)	65,120	78,576
Equivalent Annuity (₹)	15,391	15,269

Since Project A has higher equivalent annuity, the net benefit of Project A per year is higher than that of Project B. Hence Project A is recommended.

21. Company X is forced to choose between machines A and B. The two machines are designed differently but have identical capacity and do exactly similar job. Machine A costs ₹1,50,000 and will last for 3 years. It costs ₹40,000 per year to run. Machine B costs ₹1,00,000 and will last for 2 years. It costs ₹60,000 per year to run. These are real cash flows. The costs are forecasted in rupees of constant purchasing power. Ignore tax. Opportunity cost of capital is 10%. Which machine X should buy? *[C.A Final May 2000]*

Solution

In the given situation the machines differ in their effective life. Hence the decision must take into account such difference. Therefore though the purchase decision is primarily based on the PV of cash outflow, here we need to calculate the equivalent annual cash flow.

PVIFA at 10% for 3 years = 2.486

PV of running cost of machine A for 3 years = ₹40,000 × 2.486 = ₹99,440

PVIFA at 10% for 2 years = 1.735

PV of running cost of machine B for 2 years = ₹60,000 × 1.735 = ₹1,04,100

Calculation for Equivalent Annuity

Particulars	Machine A	Machine B
Cost of Purchase	1,50,000	1,00,000
PV of running cost	99,440	1,04,100
Total PV	2,49,440	2,04,100
Equivalent Annuity = Total PV ÷ PVIFA	1,00,338	1,17,637

Since the equivalent annuity is lower for machine A, it should be purchased.

22. X Ltd. is determining the cash flow for a project involving replacement of an old machine by a new machine. The old machine bought a few years ago has a book value of ₹12,00,000 and it can be sold to realise a post tax salvage value of ₹8,00,000.

It has a remaining life of four years after which its net salvage value is expected to be ₹5,00,000. It is being depreciated annually at a rate of 20 percent the WDV method. The working capital associated with this machine is ₹7,00,000.

The new machine costs ₹50,00,000. It is expected to fetch a net salvage value of ₹25,00,000 after four years. The depreciation rate applicable to it is 20 percent under the WDV method. The new machine is expected to bring a saving of ₹8,00,000 annually in manufacturing costs (other than depreciation).The incremental working capital associated with the new machine is ₹2,00,000. The tax rate applicable to the firm is 34 percent.

(a) Estimate the cash flow associated with the replacement project.
(b) What is the NPV of the replacement project if the cost of capital is 15 percent?

Solution

(a) A. Initial outlay

i.	Cost of new machine	₹50,00,000
ii.	Salvage value of old machine	₹8,00,000
iii.	Incremental working capital requirement	₹2,00,000
iv.	Total net investment (i – ii + iii)	₹49,00,000

B. Operating cash flow (years 1 through 4)

	Year	*1*	*2*	*3*	*4*
i.	Post-tax savings in manufacturing costs [8,00,000 * (1 – 0.34)]	5,28,000	5,28,000	5,28,000	5,28,000
ii.	Incremental depreciation	7,60,000	6,08,000	4,86,400	3,89,120
iii.	Tax shield on incremental dep. @34%	2,58,400	2,06,720	1,65,376	1,32,301
iv.	Operating cash flow (i + iii)	7,86,400	7,34,720	6,93,376	6,60,301

C. Terminal cash flow (year 4)

i.	Salvage value of new machine	₹25,00,000
ii.	Salvage value of old machine	5,00,000
iii.	Recovery of incremental working capital	2,00,000
iv.	Terminal cash flow (i – ii + iii)	22,00,000

D. Net cash flows associated with the replacement project (in ₹)

Year	1	2	3	4
NCF	7,86,400	7,34,720	6,93,376	28,60,301

(b) Calculation for NPV

Year	NCF(₹)	PVIF 15%	PV of CF
1	7,86,400	0.870	6,84,168
2	7,34,720	0.756	5,55,448
3	6,93,376	0.658	4,56,241
4	28,60,301	0.572	16,36,092
Total PV			33,31,949
(–) Initial Investment			49,00,000
NPV			(–) 15,68,050

Thus the new project should not be undertaken.

23. W Ltd. is faced with a decision to purchase or acquire on lease a car. The price of the car is ₹2,52,000. The car can be obtained on lease by paying 5 advance equal lease rentals of ₹60,500 annually. W Ltd. Can also obtain car loan at a rate of 15% p.a. and the loan will be paid in five annual equal installments exclusive of interest. Interest is payable annually on reducing balance of loan. The effective tax rate is 40%. As per Income Tax Act, depreciation allowable on Motor Car is 20% on W.D.V. basis. Cost of capital is 9% which of the two alternatives do you recommend? Use the following discount factor.

Discount Rate	Year				
	1	2	3	4	5
9%	0.92	0.84	0.77	0.71	0.65

Solution

Evaluation of Lease Option

Particulars	₹
Total Present Value of Lease Rentals = 60,500*PVIFA(9%, 5 years) = 60,500 * 3.89	2,35,345
(–) Tax Shield on Lease Rental = 60,500 * 40% * PVIFA(9%, % years) = 24,200 * 3.89	94,138
Total PV of Cash Outflow	1,41,207

Evaluation of Loan Option

Year	Loan Outstanding at the beginning	Interest payable at the end @15%	w.d.v of car at the beginning	Depreciation charge	Interest tax shield = Interest * Tax rate	Depreciation tax shield	Principal plus Interest
1	2,52,000	37,800	2,52,000	50,400	15,120	20,160	88,200
2	2,01,600	30,240	2,01,600	40,320	12,096	16,128	80,640
3	1,51,200	22,680	1,61,280	32,256	9,072	12,902	73,080
4	1,00,800	15,120	1,29,024	25,805	6,048	10,322	65,520
5	50,400	7,560	1,03,219	20,644	3,024	8,258	57,960

Note: Balance of loan is reduced by ₹(2,52,000/5) = ₹50,400 each year.

Calculation of PV of Cash Outflow

Year	Interest plus Principal	Interest Tax Shield	Depreciation tax Shield	PVIF @ 9%	Present Value		
					Interest plus Principal	Interest Tax Shield	Depreciation tax Shield
1	88,200	15,120	20,160	0.92	81,144	13,910.4	18,547.2
2	80,640	12,096	16,128	0.84	67,737.6	10,160.6	13,547.5
3	73,080	9,072	12,902	0.77	56,271.6	6,985.44	9,934.54
4	65,520	6,048	10,322	0.71	46,519.2	4,294.08	7,328.62
5	57,960	3,024	8,258	0.65	37,674	1,965.6	5,367.7
					2,89,346	37,316.2	54,725.6

So, Total PV of cash outflow = 2,89,346 – 37,316.2 – 54,725.6 = 1,97,304.20

Since total PV of cash outflow is lower in case of lease option, it is acceptable.

24. In order to achieve significant economy in operating costs, a manufacturer proposes to replace a manual operation by an automatic one. The automatic device which will cost ₹60,000 is likely to have economic life of five years with net realizable scrap value of ₹10,000 at the end. The device, if installed, will reduce operating costs by ₹15,000 per annum, quality and quantity of output currently produced and sold remaining unchanged. The device will be entitled to straight line depreciation for tax purposes. Marginal tax rate is 40% and cost of capital has been estimated to be 8%.

    Evaluate the proposal and give your recommendation as to its acceptance or rejection. What happens to your recommendation if tax laws permit depreciation at accelerated rates of 40% in each of the first two years and 20% in the third year, other things remaining unchanged? Explain the genesis of the change, if any. *[C.U M.Com., 2001]*

Solution

(a) PV of Cash Outflow = Cost of the automatic machine = ₹60,000

(b) Calculation of annual CFAT

Particulars	₹
Savings in operating cost	15,000
(–) Depreciation [(60,000 – 10,000)/5]	10,000
Net Savings before tax	5,000
(–) Tax @ 40%	2,000
PAT	3,000
(+) Depreciation	10,000
CFAT	13,000

(c) Calculation for NPV

Particulars	₹
PV of CFAT (13000 × PVIFA(8%, 5 years) = 13,000 × 3.993	51,909
PV of scrap value (10000 × PVIF(8%, 5 years) = 10,000 × 0.681	6,810
Total PV of Cash inflow	58,719
(–) PV of Cash outflow	60,000
NPV	(–)1281

Since NPV is negative, the manual operation should not be replaced.

(e) Evaluation of the proposal when accelerated depreciation is permissible.

Year	Savings (₹)	Depre-ciation (₹)	EBT	Tax	EAT	CFAT	PVIF at 8%	PV of CF
1	15,000	24,000	(9,000)	Nil	(9,000)	15,000	0.926	13,890
2	15,000	24,000	(9,000)	Nil	(9,000)	15,000	0.857	12,855
3	15,000	12,000	3,000	1,200	1,800	13,800	0.794	10,957
4	15,000	Nil	15,000	6,000	9,000	9,000	0.735	6,615
5	15,000	Nil	15,000	6,000	9,000	9,000*	0.681	6,129
Total PV of Cash Inflow								50,446
(–) PV of Cash outflow								60,000
NPV								(–)9,554

Since the NPV is negative, the replacement should not be made.

25. The directors of B Limited are contemplating the purchase of a new machine to replace a machine which has been in operation in the factory for the last 5 years.
Ignoring interest but considering tax at 30% of net earnings, suggest which of the two alternatives should be preferred. The following are the details:

Particulars	Existing Machine	New Machine
Purchase price	₹1,40,000	₹2,10,000
Estimated life of machine	10 years	10 years
Machine running hours per annum	2,000	2,000
Units per hour	12	18
Wages per running hour	3	5.25
Power per annum	2,000	4,500
Consumables stores per annum	6,000	7,500
All other charges per annum	8,000	9,000
Materials cost per unit	1.00	1.00
Selling price per unit	2.50	2.50

You may assume that the above information regarding sales and cost of sales will hold good throughout the economic life of each of the machines. Depreciation has to be charged according to straight-line method.

Solution

Decision based on Calculation of Profit

Particulars	Existing Machine	New Machine
Cost of Machine (₹)	₹1,40,000	₹2,10,000
Life of Machine	10 Years	10 Years
Machine running hours	2,000	2,000
Depreciation– [1,40,000/10] [2,10,000/10](₹)	14,000	21,000
Production in units – [2,000 × 12] [2000 × 18]	24,000	36,000

		(₹)
Sales - [24,000 × 2.50]; [36,000 × 2.50] [A]	**60,000**	**90,000**
Cost of sales:		
Depreciation	14,000	21,000
Wages [2000 × 3] [2000 × 5.25]	6.000	10,500
Power	2,000	4,500

(Contd.)

Consumables	6,000	7,500
Other charges	8,000	9,000
Material [24,000 × 1.00] [36,000 × 1.00]	24,000	36,000
Total Cost [B]	**60,000**	**88,500**
Profit Before Tax [A-B]	—	1,500
Less: Tax at 50%	—	450
Profit after tax	—	1,050

Comment: From the above computation, it is clear that new machine can be replaced in place of old machine because it has profit is ₹1,050.

26. XYZ Ltd. is considering two mutually-exclusive projects. Both require an initial cash outlay ₹10,000 each for machinery and have a life of 5 Years. The Company's required rate of return is 10% and it pays tax at 30%. The projects will be depreciated on a straight-line basis. The net cash flows (before taxes) expected to be generated by the projects and the present value (PV) factor (at 10%) are as follows:

Year	1	2	3	4	5
	₹	₹	₹	₹	₹
Project 1	4,000	4,000	4,000	4,000	4,000
Project 2	6,000	3,000	2,000	5,000	5,000
PV factor (at 10%)	0.909	0.826	0.751	0.683	0.621

You are required to calculate

I. The Pay Back Period of each project;
II. The NPV and the profitability index of each project.

Solution

Calculation of net income and net cash flow after taxes:

Project 1

Year	Cash Flow before Tax (₹)	Depreciation (₹)	Income before Tax (₹)	Tax (₹)	Net Income (₹)	Net Cash Flow after Tax (₹)
1	4,000	2,000	2,000	600	1,400	3,400
2	4,000	2,000	2,000	600	1,400	3,400
3	4,000	2,000	2,000	600	1,400	3,400
4	4,000	2,000	2,000	600	1,400	3,400
5	4,000	2,000	2,000	600	1,400	3,400

Note: Net CFAT = Net Income + Depreciation

Project 2

Year	Cash Flow before Tax (₹)	Depreciation (₹)	Income before Tax (₹)	Tax (₹)	Net Income (₹)	Net Cash Flow after Tax (₹)
1	6,000	2,000	4,000	1,200	2,800	4,800
2	3,000	2,000	1,000	300	700	2,700
3	2,000	2,000	—	—	—	2,000
4	5,000	2,000	3,000	900	2,100	4,100
5	5,000	2,000	3,000	900	2,100	4,100

I. Pay Back Period:

PROJECT 1

Cash outlay ₹10,000

Cash flow p.a. ₹3,400

Payback period: 10,000/3,400 = 2.94 years

PROJECT 2

Cash inflows: ₹(4,800 + 2,700 + 2,000) = ₹9,500 in 3rd Years.

4^{th} Year Balance - ₹500.

Therefore, 500/2,000 = 0.25 Years

Payback period = 3 Years + 0.25 Years = 3.25 years.

II. Pay Back Period:

PROJECT 1:

Present value = 3,400 × 3.790 = ₹12,886 [PVIFA (10%, 5 years) = 3.79]

Less: Initial cash outlay = ₹10,000

Net Present value (NVP) = ₹2,886

Profitability index = 12,886/10,000 = 1.289

PROJECT 2:

Net Cash Flow After Tax (₹)	PV Factor	Present Value (₹)
4,800	0.909	4,363.20
2,700	0.826	2,230.20
2,000	0.751	1,502.00
4,100	0.683	2,800.30
4,100	0.621	2,546.10
		13,441.80
Less: Initial cash outlay		10,000.00
Net Present value (NPV)		3,441.80

Profitability Index = 13,441.8/10,000 = 1.344

8.4 SUMMARY

Method	Formulae
1. NPV Method	NPV = $\sum_{t=1}^{n} \frac{CI_t}{(1+K)^t} - \sum_{t=1}^{n} \frac{CO_t}{(1+K)^t}$ (non-conventional Cash Flow) NPV = $\sum_{t=1}^{n} \frac{CI_t}{(1+K)^t} - I_0$ (conventional Cash Flow)
2. PI Method	PI = $\frac{\text{Present Value of Cash Inflow}}{\text{Present Value of Cash Outflow}}$ (for non-conventional cash flow) or, PI = $\frac{\text{Present Value of Cash Inflow}}{\text{Initial Outlay}}$ (for conventional Cash Flow)
3. IRR Method	If IRR is denoted as '*r*', then at '*r*' (a) $\sum_{t=1}^{n} \frac{CI_t}{(1+r)^t} = I_0$ (in case of conventional Cash Flow projects); and (b) $\sum_{t=1}^{n} \frac{CI_t}{(1+r)^t} = \sum_{t=1}^{n} \frac{CO_t}{(1+r)^t}$ (in case of non-conventional Cash Flow projects).
4. MIRR Method	MIRR = $\sqrt[n]{\frac{\text{Aggregate Future Value of Cash Inflow}}{\text{Aggregate Present Value of Cash Outflow}}} - 1$ (For Non-conventional Cash Flow) or, MIRR = $\sqrt[n]{\frac{\text{Aggregate Future Value of Cash Inflow}}{\text{Initial Investment}}} - 1$ (For conventional Cash Flow).

EXERCISES

A. Short-answer Type Questions (5 Marks)

1. Name the various time adjusted techniques of capital budgeting.
2. Write a short note on Net Present Value method of project selection.
3. What is capital rationing?
4. Write a short note on Internal Rate of Return method of project selection.
5. What is Modified Internal Rate of Return method? When is it applied?
6. Write a short note on Discounted Payback method of project selection.

[C.U. B.Com (H), 2008]

7. Write a short note on Terminal Value method of project selection.

B. Essay Type Questions **(10 Marks)**

1. What do you mean by Net Present Value of a project? How is it calculated?
2. Discuss the merits and demerits of Net Present Value method of project selection.
3. What is the Internal Rate of Return of Return of a project? How can be calculated?
4. Discuss the merits and demerits of Internal Rate of Return of Return method of project selection. *[C.U. B.Com. (H), 1999]*
5. What is Profitability Index? How it is superior to NPV? *[C.U. B.Com. (H), 2007]*
6. Discuss the merits and demerits of Profitability Index method of project selection.
7. What is Discounted Payback method of project selection? How is it superior to Traditional Payback Period method?
8. Discuss the merits and demerits of Discounted Payback method of project selection.
9. What is Terminal Value method of project selection? How will you calculate the terminal value of any project?
10. Distinguish between NPV and IRR.
11. How will you resolve the conflict between the ranking of two projects under NPV and IRR?
12. Discuss the relevance of Modified Internal Rate of Return method.
13. How will you overcome the shortcomings of NPV method while dealing with the project with unequal lives?
14. What is capital rationing? How will you select projects in a situation of capital rationing when (a) the projects are divisible and (b) projects are not divisible?

C. Practical Problems

1. X Ltd. is considering an investment project with an initial investment requirement of ₹3,00,000. The expected cash flows from the projects at the end of year 1, 2, 3, 4, and 5 are ₹1,20,000, ₹1,10,000, ₹96,000, ₹84,000 and ₹80,000. If the cost of capital is 10%, calculate the Net present Value of the project.

[Ans. NPV = ₹79,088]

2. Y Ltd. is planning to undertake any one of the following three mutually exclusive projects. The information relevant for this purpose is given below.

Projects	Annual Cash Flow (₹)	Initial Investment (₹)	Project Duration (Years)
P	30,000	1,60,000	10
Q	40,000	1,40,000	8
R	44,000	1,36,000	9

If cost of capital is 12%, advise the management regarding the selection of the best project.

[Given, present value of an annuity of ₹1.00 at a discount rate of 12%:
PVIFA (12%, 10 years) = 5.65; PVIFA (12%, 8 years) = 4.97; PVIFA (12%, 9 years) = 5.33]

[Ans. NPVs are ₹57,500, ₹58,800, ₹58,520]

3. National Electronic Ltd. an electronic goods manufacturing company, is producing a large range of electronic goods. It has under consideration two projects X and Y, each costing ₹120 lakhs.

   The projects are mutually exclusive and the company is considering the question of selecting one of the two. Cash flows before depreciation and tax have been worked out for both the projects and the details are given below. X has a life of 8 years and Y has a life of 6 years. Both will have zero salvage value at the end of their operational lives. The company is already making profits and its tax rate is 50%. The cost of capital is 15%.

   (₹ in lakhs)

Year	Project X	Project Y	PVIF @ 15%
1	25	40	0.870
2	35	60	0.756
3	45	80	0.685
4	65	50	0.572
5	65	30	0.497
6	55	20	0.432
7	35	-	0.376
8	15	-	0.327

   The company follows straight line method of depreciating assets. Advise the company regarding the selection of the project. *[ICWA Inter June 1996]*

   [Ans. NPV of Project X = ₹8.23; NPV of Project Y = ₹10.33]

4. P Ltd. is considering a new project with an initial outlay of ₹1,40,000. The project has a lifespan of four years with cash inflows of ₹50,000, ₹60,000, ₹36,000 and ₹32,000 for year 1, 2, 3 and 4 respectively. Calculate the profitability index for the project if the cost of capital is 10% p.a. **[Ans. PI = 1.028]**

5. A company provides you the following information relating to two mutually exclusive projects.

Particulars	Project M	Project N
PV of Cash Inflow (₹)	1,50,000	2,80,000
Initial Outlay (₹)	1,20,000	2,40,000
Life (Years)	5	5

Advise the company regarding the selection. Will NPV method be appropriate in this case? **[Ans. PI for M = 1.25; PI for N = 1.17]**

6. M Ltd. is considering the following information in respect of a project:
Initial Outlay ₹22,000. Project Life 4 years.

Cash Inflow from the Project

Year	1	2	3	4
Cash Inflow (₹)	12,000	4,000	2,000	10,000

Calculate IRR of the project. **[Ans. 11.26%]**

7. P Ltd. is considering two mutually exclusive projects X and Y. following details are available to you: (₹ in lakhs)

Particulars	**Project X (₹)**	**Project Y (₹)**
Initial Investment	1,400	1,400
Cash Inflows:		
Year 1	200	1,000
Year 2	400	800
Year 3	600	400
Year 4	900	200
Year 5	1,200	200

Assume no residual value at the end of fifth year. Calculate IRR of the projects and advise the management on the project to be selected.

[Ans. IRR of X = 27.2%; IRR of Y = 37.6%]

8. A company is considering two mutually exclusive projects I and II. Following details are available to you: (₹ in lakhs)

Particulars	**Project I (₹)**	**Project II (₹)**
Initial Investment	4,00,000	5,00,000
Estimated Life	4 Years	5 Years
EBIT(₹):		
Year 1	1,20,000	1,40,000
Year 2	1,40,000	1,60,000
Year 3	1,60,000	1,80,000
Year 4	2,20,000	2,20,000
Year 5	Nil	2,00,000

If the corporate tax rate is 40% and cut off rate is 10%. Calculate IRR of the projects and advise the management on the project to be selected.

[Ans. IRR of I = 31.66%; IRR of Y = 29.26%]

[C.U. M.Com 2000 (Adapted)]

9. From the following information calculate the MIRR of the project.
   Initial Outlay ₹25,000, cost of capital 12% p.a. Life of the project 5 years.
   Cash inflows from the project are ₹5,000, ₹7,500, ₹10,000, ₹12,500 and ₹7,500.
   [Ans. 15.98%]
10. Z Ltd. is considering a project which requires an initial investment of ₹1,60,000 and a further investment of ₹40,000 at the end of first year. The project has an effective life of 5 years. The project is likely to generate cash flow of ₹1,00,000 at the end of second year and ₹80,000, ₹60,000 and ₹60,000 at the end of third, fourth and fifth year respectively. The cost of Capital is 10%. Calculate the MIRR.
    [Ans. 12.62%]
11. A company is contemplating an investment project of 4 years with an initial outlay of ₹30,000. The cash inflows estimated from the project are ₹7,500, ₹10,000, ₹7,500, and ₹9,000. The estimated rates at which the above cash flows will be reinvested are:

Year End	1	2	3	4
Reinvestment Rate (%)	8	9	10	9

    The cost of capital is 10% p.a. Analyze the viability of the project under terminal value method. **[Ans. PV of Terminal Value 31,084]**
12. A project requires an initial investment of ₹64,000. Its estimated economic life is 5 years. The projected annual cash inflows have been estimated at ₹20,000 p.a. The firm's cost of capital is 10% and the expected interest rates at which the annual cash inflows can be re-invested in a public sector bank are as follows:

Year	1	2	3	4	5
Rate of Interest	8.25%	8.50%	9%	9.5%	10%

    Advise the management whether the project should be accepted or rejected (Use Terminal Value Method). **[Ans. ₹73,688]**
13. A project requires an initial investment of ₹2,50,000. Its estimated economic life is 5 years. The projected annual cash inflows have been estimated at ₹80,000 p.a. The firm's cost of capital is 10% and the expected interest rates at which the annual cash inflows can be re-invested in a public sector bank are as follows:

Year	1	2	3	4	5
Rate of Interest	8%	8%	9%	10%	12%

    Advise the management whether the project should be accepted or rejected (Use Terminal Value Method).
    [Ans. PV of Terminal Value = ₹2,93,520]

14. X Ltd. has ₹10,00,000 allocated for capital budgeting purposes. The following proposals are available:

Projects	Initial Outlay (₹)	Total PV (₹)
A	3,00,000	3,66,000
B	1,50,000	1,42,500
C	3,50,000	4,20,000
D	4,50,000	5,31,000
E	2,00,000	2,40,000
F	4,00,000	4,20,000

Which of the above investments should be undertaken? Assume that the projects are divisible. **[Ans. C, A, E (in full) and D (in part i.e. ₹2,00,000]**

15. ABC Ltd. Is considering a number of capital investment projects for which ₹2,00,000 have been allocated. The following projects are under consideration.

Project	Investment (₹)	NPV (₹)
A	2,40,000	50,000
B	2,00,000	40,000
C	1,60,000	40,000
D	1,20,000	40,000
E	80,000	30,000
F	20,000	10,000

Project A and B are mutually exclusive. If project A is undertaken, the initial cost of C is reduced by ₹20,000 (without affecting its benefits), If project B is undertaken the initial cost of D is reduced by ₹20,000 (without affecting its benefits). The benefit-cost ratio of unutilized funds is 0.90.

What projects should be chosen? **[Ans. B, D, E, F are to be selected.]**

16. A firm is considering two projects with the following details.

Particulars	Project A	Project B
Life of the Project (Years)	5	7
NPV(₹)	1,20,000	1,60,000

The cost of capital of the firm is 10% p.a.

Recommend which project the firm should accept.

[Ans. Equivalent Annuity: A ₹31,662, B ₹28,764]

17. Company X is forced to choose between machines A and B. The two machines are designed differently but have identical capacity and do exactly similar job. Machine A costs ₹3,00,000 and will last for 3 years. It costs ₹80,000 per year to run. Machine B costs ₹2,00,000 and will last for 2 years. It costs ₹1,20,000 per year to run. These are real cash flows. The costs are forecasted in rupees of constant purchasing power. Ignore tax. Opportunity cost of capital is 10%. Which machine X should buy?

[C.A Final May 2000 (Adapted)]

[Ans. Equivalent Annual Cash flow for A: ₹2,00,676 and for B: ₹2,35,274]

18. A machine purchased six years ago for ₹1,50,000 has been depreciated to a book value of ₹90,000. It originally had a projected life of 15 years with no salvage value. There is a proposal to replace the machine. A new machine will cost ₹2,50,000 and result in reduction of operating cost by ₹30,000 p.a. for the next nine years. The existing machine can now be scrapped away for ₹50,000. The new machine will also be depreciated over 9 years as per S.L.M with salvage of ₹25,000. Find out whether the existing machine be replaced given that the tax rate applicable is 50% and cost of capital is 10% (profit or loss on sale of asset is to be ignored for tax purpose). *[C.S Final June 1995]*

[Ans. NPV: (–) ₹59,822]

19. Satya Corporation is toying with the idea of replacing its existing machine. The following are the relevant data:

Existing Machine:

Purchased 2 years ago

Remaining Life 6 years

Salvage value ₹500

Current book value ₹2,600 and realisable value ₹3,000

Annual depreciation ₹350

New Machine:

Capital cost ₹8,000

Estimated useful life 6 years

Estimated salvage value ₹800

The replaced machine would permit an output expansion. As a result, sales is expected to rise by ₹1,000 per year, operating expenses would decline by ₹1,500 per year. It would require an additional inventory of ₹2,000 and would cause an increase in accounts payable by ₹500.

Assuming a corporate tax rate of 40% and cost of capital of 15%, advise the company.

[ICWA Final Dec 1998]

[Ans. NPV ₹1,297, so replacement is profitable.]

20. XY Ltd. wants to install a new machine in the place of an existing old machine which has become obsolete. The company made extensive enquiries and from the replies received short listed two offers. The two models differ in cost, output and anticipated

net revenue. The estimated life of both the machines is five years. There will be only negligible salvage at the end of the fifth year. Further details are as follows:

(₹ in lakhs)

Machine	Cost (₹)	Anticipated after Tax Cash Flow (₹)				
		Year 1	Year 2	Year 3	Year 4	Year 5
A	25	-	5	20	14	6
B	40	10	14	16	17	8

The company's cost of capital is 16%. You are required to make an appraisal of the two offers and advise the firm by using the following: (i) Payback period; (ii) NPV Method, (iii) PI and (iv) IRR. *[ICWA Final June 1999]*

[Ans. (i) 3 years, 3 years; (ii)₹ 2.119, ₹2.470; (iii) 1.085, 1.062; (iv) 18.88%, 18.59%]

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

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

Indicate which machine would be profitable using the following methods of ranking investment proposals: (i) Payback Method; (ii) NPV Method (III) PI Method and (iv) Average Rate of Return method. *[C.S. Final June 1998]*

[Ans. (i) 2 years 7.2 months, 3 years 4 months; (ii) ₹1.53, ₹1.48; (iii) 1.306, 1.296; (iv) 14%, 16%]

22. ABC Ltd. is considering purchase of a machine in replacement of an old one. Two models viz. MOLIN and SKODA are offered at prices of ₹22.50 Lakhs and ₹30 Lakhs respectively. Further particulars regarding these models are given below: (₹in lakhs)

Particulars		MOLIN	SKODA
Economic Life (years)		5	6
Scrap value at the end of economic life		2	2.5

(Contd.)

Particulars		MOLIN	SKODA
After tax annual cash inflows	Year		
	1	5.00	6.00
	2	7.50	8.00
	3	10.00	10.00
	4	9.00	12.00
	5	8.50	10.50
	6	—	9.50

Evaluate the two proposals under (i) Payback period (ii) NPV method. Which model would you recommend and why? *[ICWA Inter June 2000]*

[Ans. (i) 3 years, 3.5 years; (ii) ₹6.740, ₹8.523]

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

Year	1	2	3	4	5
Estimated CBDT (₹ in lakhs)	4	6	8	8	10

You are required to determine the (i) Payback period; (ii) Average rate of return (iii) NPV at cost of capital of 10%, (iv) Benefit-cost ratio. *[ICWA Final June 2000]*

[Ans. (i) 3 years 10 months; (ii) 16% (iii) ₹0.717; (iv)1.036]

24. The cash flows of two mutually exclusive projects are as under:

Year	0	1	2	3	4	5	6
Project P(₹)	(40,000)	13,000	8,000	14,000	12,000	11,000	15,000
Project Q (₹)	(20,000)	7,000	1,300	12,000	—	—	—

Required:

(i) Estimate the NPV using 15% as the cost of capital.
(ii) Estimate the IRR.
(iii) Why there is a conflict in the project choice using NPV and IRR?
(iv) Which criteria will you use in such a situation? Make the final choice.

[Ans. (i) NPV: ₹5,374, ₹3,806; (ii) IRR: 19.75%, 25.31%; (iv) Project P]

25. A Company can make either of two investments at the beginning of 2010. Assuming a required rate of return of 10% p.a., evaluate the investment proposals under (i) NPV (ii) Profitability Index. The particulars relating to the projects are given below:

	Project I	Project II
Initial outlay (₹)	40,000	56,000
Estimated life (years)	4	5
Scrap value (₹)	Nil	Nil
Net Cash Flow (₹)		
End of 1	11,000	11,200
2	14,000	18,000
3	17,000	18,000
4	15,000	18,000
5	Nil	18,000

It is estimated that each of the alternative proposals will require an additional working capital of ₹4,000 which will be received back in full after the expiry of each project life. The present value of ₹1, to be received at the end of each year, at 10% p.a. is given below:

Year	1	2	3	4	5
P.V. Factor (₹)	0.909	0.827	0.751	0.683	0.621

[Ans. NPV: ₹3,300, ₹4,512 and PI: 1.075,1.0752]

26. A firm whose cost of capital is 20% is considering two mutually exclusive projects, X and Y, the details of which are:

	Project X ₹	**Project Y** ₹
Capital Investment	1,00,000	80,000
Net Cash flow:		
Year		
1	30,000	40,000
2	30,000	35,000
3	30,000	30,000
4	30,000	25,000
5	30,000	10,000

Compute Net Present Value for the two projects and comment on the result.

[ICWA Final Dec. 1994]

[Ans. NPV for A: (–) ₹10,300; NPV for B: ₹11,050]

27. A company has an investment opportunity costing ₹40,000 with the following expected net cash flow (i.e. after tax before depreciation):

Year	NCF (₹)
1	14,000
2	14,000
3	14,000
4	14,000
5	14,000
6	16,000
7	20,000
8	30,000
9	20,000
10	8,000

Using 10% as the cost of capital, determine the following:

(a) Payback Period
(b) NPV at 10% discounting factor
(c) Profitability Index at 10% discounting factor
(d) Internal rate of Return *[C.A Final (Adapted)]*

[Ans. (a) 5.625 years, (b) ₹17,922: (C) ₹1.224, (d) 14.7%]

28. Y Ltd, an engineering company is considering buying one of the following two machines:
Machine A: Buy a machine that requires an initial investment outlay of ₹1,00,000 and will generate the CFAT of ₹30,000 p.a. for 5 years.
Machine B: Buy a machine that requires an initial investment outlay of ₹1,25,000 and will generate the CFAT of ₹27,000 p.a. for 8 years.
Which machine should be bought/ The company uses a cost of capital of 10% p.a.
[C.S Final Dec. 2001]

[Ans. Equivalent Annuity: Machine A: ₹3,622, Machine B: ₹3,570]

9 CHAPTER Dividend Decisions

CHAPTER OUTLINE

9.1 Introduction
9.2 Concept of Dividend
9.3 Nature of Dividend
9.4 Types of Dividend
9.5 Determinants of Dividend
9.6 Dividend Theories
9.7 Additional Solved Problems
9.8 Summary

9.1 INTRODUCTION

In a corporate organisation, retained earnings are considered one of the most important sources of finance available internally. These retained earnings are nothing but the earnings or profits available to the firm for distribution among the shareholders, though not actually distributed as dividends. Now, retaining profits internally and distributing profits among shareholders—both have their own implications, which in most of the cases are conflicting in nature. Hence, a well thought out dividend decision becomes extremely essential to strike a balance between the consequences of these two policies.

9.2 CONCEPT OF DIVIDEND

Out of the revenue streams generated through its operations, an organisation also must meet various expenses, operating and non-operating, including the interest on Debt Capital. The surplus thus generated is known as the earnings or profits available for shareholders or, in short, divisible profits.

Dividend is the part of divisible profit which is distributed among the shareholders as a return on their investment in the company in form of share capital.

9.3 NATURE OF DIVIDEND

While paying dividend among the shareholders a company may follow either a stable policy or a residual one. Accordingly, dividends can also be either stable or residual.

1. ***Stable dividend:*** When dividends are paid systematically following a fixed and predetermined trend, it is called stable dividend. However, stability does not necessarily mean stability of the amount of dividend, but it refers to the stability of the process of determining the dividend payable. Hence, stable dividend can be any of the following three types.
   - ***Constant dividend per share:*** Under this approach a company pays a fixed sum of money as dividend over the years. Thus, shareholders get similar amount of dividend per share even if there is significant fall in earnings per share. However, this does not necessarily mean a constant dividend throughout the lifetime of the company but over a few years. In case the company is successful in achieving significant growth of business it revises the Dividend per Share (DPS) at a higher level to share the benefits with shareholders (See Figure 9.1).

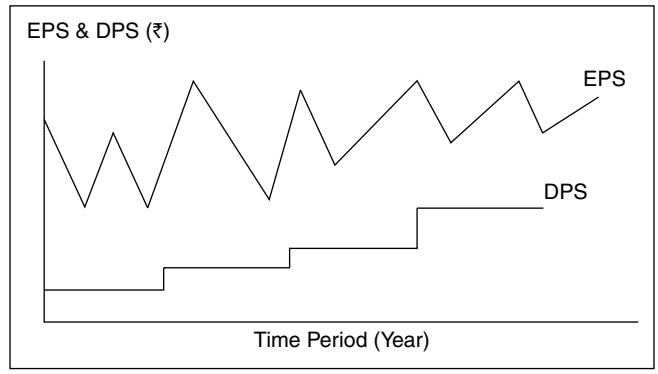


Figure 9.1 Constant Dividend per Share

   - ***Constant percentage of dividend:*** A company may also follow a stable dividend policy of paying a fixed percentage of earnings per share as dividend. Thus, unlike the previous policy of constant DPS, here dividend payout ratio remains unchanged over time and DPS varies proportionately with Earnings per Share (EPS). The basic objective of this policy is to share the fluctuation in earnings proportionately with the shareholders (See Figure 9.2).
   - ***Small constant dividend per share plus extra dividend:*** Under this policy companies pay a small constant dividend per share over a period along with additional dividends based on increase in earnings. Thus, here total DPS comprises a fixed part as well as a variable part. This policy is generally considered to be superior to the previous two policies for companies with fluctuating earnings in the sense that in one hand it removes the fixed burden for paying high constant DPS and on the other hand encourages the shareholders by paying additional dividend over the minimum in the years of high earnings (See Figure 9.3).

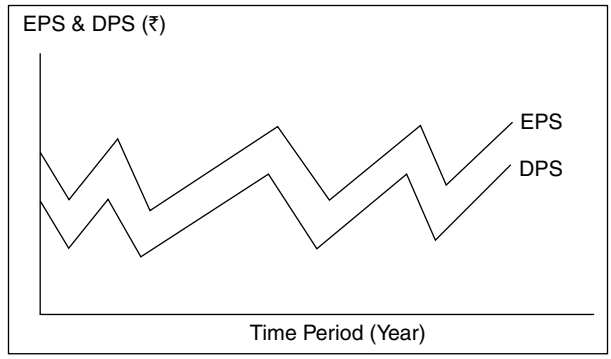


Figure 9.2 Constant Percentage of Dividend

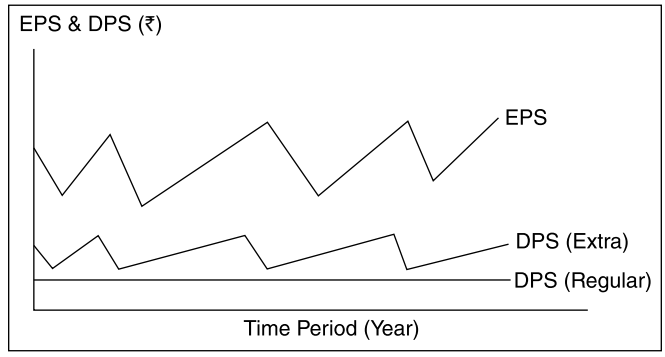


Figure 9.3 Small Constant Dividend per Share Plus Extra Dividend

2. ***Residual dividend:*** The basic notion behind a residual dividend policy is that a firm must always prioritize its investment needs. In case the firm has profitable investment opportunities, it must reinvest its earnings to finance these projects. Any earnings left after meeting the investment needs can be used for distribution as dividend. Thus, dividend in such a case is a mere residual.

Illustration 9.1

Problem

XY Ltd. has made the following estimation of its earnings available for shareholders and external financing needs for the next five years.

Year	1	2	3	4	5
Earnings (₹)	2,00,000	4,20,000	3,90,000	5,30,000	4,10,000
External Financing Needs (₹)	1,50,000	2,50,000	2,40,000	3,50,000	2,60,000

The company currently has 50,000 equity shares of ₹10 each. You are required to determine the dividend per share and additional external financing needs of the company under the following circumstances:

(i) The company decides to pay a fixed dividend per share of ₹4 per share.
(ii) The company decides to maintain a dividend payout ratio of 60%.

(iii) The company decides to pay a fixed dividend per share of ₹1 per share along with an additional dividend of 40% of earnings.

(iv) The company follows a residual dividend policy.

Solution

(i) In this case, the company will first pay dividend @ ₹4 per share on 50,000 shares and any earnings remaining thereafter will be utilised for external financing.

Year (1)	Earnings (₹) (2)	External Financing Needs (₹) (3)	DPS (₹) (4)	Total Dividend Paid (₹) (5) = 50,000 × (4)	Additional External Finance Required (6) = (3) – [(2) – (5)]
1	2,00,000	1,50,000	4	2,00,000	1,50,000
2	4,20,000	2,50,000	4	2,00,000	30,000
3	3,90,000	2,40,000	4	2,00,000	50,000
4	5,30,000	3,50,000	4	2,00,000	20,000
5	4,10,000	2,60,000	4	2,00,000	50,000

(ii) In this case, the company will first pay dividend @ 60% of earnings on 50,000 shares and any earnings remaining thereafter will be utilised for external financing.

Year (1)	Earnings (₹) (2)	External Financing Needs (₹) (3)	Total Dividend Paid (₹) (4) = (2) × 60%	DPS (₹) (5) = (4)/50,000	Additional External Finance Required (₹) (3) – [(2) – (4)]
1	2,00,000	1,50,000	1,20,000	2.40	70,000
2	4,20,000	2,50,000	2,52,000	5.04	82,000
3	3,90,000	2,40,000	2,34,000	4.68	84,000
4	5,30,000	3,50,000	3,18,000	6.36	1,31,000
5	4,10,000	2,60,000	2,46,000	4.92	96,000

(iii) In this case, the company will first pay fixed dividend @ ₹1 per share along with another 60% of earnings on 50,000 shares and any earnings remaining thereafter will be utilised for external financing.

Year (1)	Earnings (₹) (2)	External Financing Needs (₹) (3)	Total Dividend Paid (₹) (4)	DPS (₹) (5) = (4)/50,000	Additional External Finance Required (₹) (3) – [(2) – (4)]
1	2,00,000	1,50,000	1,30,000	2.6	80,000
2	4,20,000	2,50,000	2,18,000	4.36	48,000
3	3,90,000	2,40,000	2,06,000	4.12	56,000
4	5,30,000	3,50,000	2,62,000	5.24	82,000
5	4,10,000	2,60,000	2,14,000	4.28	64,000

Note: Here total dividend paid = (₹1 × 50,000) + Earnings × 40%

(iv) In this case, the company will first meet the external financing need out of the earnings available and then anything leftover will be distributed as dividend.

Year (1)	Earnings (₹) (2)	External Financing Needs (₹) (3)	Earnings Available after External Financing (₹) (4)	DPS (₹) (5) = (4)/ 50,000	Additional External Finance Required (₹) (6)
1	2,00,000	1,50,000	50,000	1.00	Nil
2	4,20,000	2,50,000	1,70,000	3.40	Nil
3	3,90,000	2,40,000	1,50,000	3.00	Nil
4	5,30,000	3,50,000	1,80,000	3.60	Nil
5	4,10,000	2,60,000	1,50,000	3.00	Nil

9.4 TYPES OF DIVIDEND

Though dividend must necessarily be a part of the profits earned by an organisation, it can be distributed among the shareholders through different means. These different types of dividends are discussed below.

1. ***Cash dividend:*** When dividend is paid in terms of cash it is called cash dividend. Though shareholders always prefer cash dividend, a company needs to consider a number of factors before paying dividends in cash. These include Working Capital position of the company, immediate need for liquid cash, etc. Cash dividend reduces both total asset and shareholders' fund and hence has immediate impact on the balance sheet.
2. ***Bonus dividend:*** When a company issues any securities to the shareholders instead of paying cash dividend, it is called bonus dividend. Normally, it is paid in form of additional shares proportionately to the shareholders. Bonus dividend does not have any immediate impact on the balance sheet as total shareholders' fund remains the same only the composition is changed. Therefore, it is also called capitalisation of reserves. Bonus dividend is particularly helpful for cash starved companies as it saves much liquid cash. However, it is relatively costly to administer.
3. ***Bond Dividend:*** When a company pays dividend by issuing long-term debt securities among the shareholders it is called Bond Dividend. Bond Dividends are not very popular as they not only create a fixed charge on profits in form of regular interest on debt but also create a long-term liability for redemption of the bond.
4. ***Property dividend:*** When a company distributes its surplus assets other than cash among the shareholders in form of dividend, it is called property dividend. Here property may include any financial assets like shares or debentures of investee company or even products produced (i.e. stock) by the company.
5. ***Composite dividend:*** When dividends include partly cash and partly any other asset or security they are referred as composite dividend.

6. ***Interim dividend:*** When a company pays dividend on an interim basis, i.e. before the finalisation of annual accounts, it is called interim dividend. A company generally pays interim dividend if it is certain to earn sufficient profits during the financial year. Interim dividend acts as a good motivation for the investors to associate with the company for a longer term. However, it is not an additional dividend and hence is deducted from the total dividend declared for a financial year before payment of the final installment.
7. ***Final dividend:*** The dividend which is paid after finalisation of annual accounts is called final dividend. It is basically the remaining part of the total dividend that a company decides to pay for a certain financial year after payment of any interim dividend.

9.5 DETERMINANTS OF DIVIDEND

While formulating a dividend policy a firm needs to consider a number of factors. These can be broadly classified into two groups—financial factors and legal factors. These are discussed as follows:

1. ***Financial factors:*** Financial factors have some financial implications from the viewpoint of shareholders, the company or the government either in the short term or in the long term. These include:
   - ***Desire of the shareholders:*** Since in case of payment of dividends shareholders are the target group, their desires must be given due consideration while framing the dividend policy. Many shareholders prefer dividend over capital gain as it serves their current income needs, relieves them from future uncertainty of losing their money due to poor future performance of the company and provides an indication that the company is safe in the hands of the current management. So for them long non-payment of dividend may be frustrating enough to disassociate themselves from the company. Considering this at least some amount of dividend payment is always recommended for every company with consistent performance.
   - ***Stability of dividend:*** The dividend policy should be so designed that the company can maintain it consistently overtime without much worry. Any policy of rewarding high dividends at times followed by non-payment or no payment of dividend may create long-term impact on shareholders. Rather low but stable dividend is always welcome. In order to maintain a steady dividend the company may create a dividend equalisation fund and thereby smooth out the process over time.
   - ***Investment needs of the firm:*** The amount available for distribution of dividend may alternatively be used to finance future investment opportunities. Hence, the firms which are still on the growth trajectory and have profitable investment opportunities will be prudent to pay no dividend or very low dividend and channelize the funds for new projects. Therefore, while formulating dividend policy, a firm must consider the availability of profitable investment opportunities.
   - ***Working Capital position of the firm:*** Distribution of cash dividend requires huge outflow of cash and thus weakens the Working Capital position for at least a certain

period. This may lead to serious consequences as the company may find it difficult to meet day-to-day requirements. As an alternative, the firm may procure loans to pay dividends but this will again limit the firm's power to obtain further debt in need. Thus, Working Capital position should also be considered in formulating the dividend policy.

- ***Position of primary market:*** Primary market may not remain vibrant always. At times it becomes quite difficult for firms to issue new securities in market. In such a situation a firm has no other option but to finance its investment requirements through internal funds. Hence, distribution of dividends in such cases becomes less important for the firms. Alternatively, when primary market position is quite conducive it becomes easy for the firm to first pay dividend and then again issue new securities to procure additional finance.
- ***Availability of Debt Capital:*** The cost of Debt Capital is relatively cheaper than Equity Capital or retained earnings. However, the debt covenants may not be always favourable for the firm. Hence, in these situations the firm has to depend heavily on internal funds and may be forced to curtail dividend distribution. Thus, availability of Debt Capital also affects the dividend policy of the firm.
- ***Management's attitude towards control:*** Dividend policy of a firm also depends on the attitude of the management towards control. High dividend payout forces the management to issue new shares. This dilutes the control of existing shareholders over the company. Therefore, a firm where concentration of control is preferred generally avoids high payouts.
- ***Magnitude of current and expected earnings:*** Since dividends are paid out of profits, higher payouts generally follow higher earnings. However, expectation of earnings also plays a significant part in the decision as it is not prudent to increase dividends abruptly in years of high earnings which cannot be sustained in the long run.
- ***Age of the firm:*** This is also an important factor in determining the Dividend Decisions. Generally, a newly established firm sets aside higher portion of the profits into reserves to finance growth. Hence, for them dividend payout ratio remains at a low level. On the other hand, established firms are more liberal in sharing the earnings with the shareholders in form of dividends.
- ***Contractual restrictions:*** Sometimes long-term debt agreements contain conditions that restrict firms from paying dividends as per their wish. The conditions may either debar the company from paying dividends at all or may restrict it from paying dividend over a certain percentage. Therefore, such long covenants must be given due considerations while determining the dividend policy.
- ***Tax policy of the government:*** This is another important factor that affects the dividend policy. A high percentage of corporate tax leaves little in the hands of the company to pay dividend. On the other hand, a relatively low rate of tax increases the capacity of the company to pay high dividends even after transferring a healthy

sum to the reserves. Similarly, corporate dividend tax which is required to be paid by the company while paying dividends to the shareholders further limits the capacity to pay dividends.

- ***State of the economy:*** The general state of the economy is also a determining factor of dividend policy of a company. For example, during economic depression a firm does not expect substantial improvement in its earning potential and may want to retain more to finance its future obligations. Again during economic prosperity, a company may also follow a conservative dividend policy to finance future investments out of retained earnings.

2. ***Legal Factors:*** Companies are legal entities and their functions are regulated by different laws in force. Therefore, apart from financial factors, a firm also needs to consider different legal provisions while distributing dividends among its shareholders. For example, in India, dividend payments are regulated by provisions of Companies Act 2013 and Companies (Declaration and Payment of Dividend) Amendment Rules 2014. The provisions are as follows:
   - Dividends can be paid out of current profit, past reserves created out of profits or credit balance of Profit and Loss brought forward or from money received from Central or State Government [Section 123(1)].
   - Before declaration of dividend a company must make provision for depreciation. Here depreciation shall imply current year's depreciation and also any arrear depreciation [Section 123(1)].
   - No company shall declare dividend out of profits without setting off any past losses [Companies (Declaration and Payment of Dividend) Amendment Rules 2014].
   - Before declaring dividends a company may transfer such percentage of profit as it may consider appropriate to the reserves of the company.
   - Dividend can also be declared out of past reserves in accordance with the rules framed by the Central Government in this respect [Section 123(1)].
   - Dividend can be paid either electronically or through the other traditional modes [Section 123(5)].
   - As per Section 123(6) of 2013 Act, if a company fails to comply with the provisions of Sections 73 and 74 regarding acceptance and repayment of deposits it shall not declare any dividend on equity shares so long such failure continues [Section 123(6)].

In India, every company must pay due consideration to the above factors while formulating its dividend policy.

9.6 DIVIDEND THEORIES

Dividend theories attempt to explain the relationship between dividend payment and market price of shares. In other words, they explain whether payment of dividend can affect the market price of share of the company in any way. However, experts have different views reading the

same. Hence, these approaches can broadly be divided into two groups—relevance approach and irrelevance approach.

1. ***Relevance approach*** argues that dividend payment has significant bearing on share price and hence dividend policy should be designed to maximise the share price. Under relevance approach we have theories like Walter's Model and Gordon's Model.
2. ***Irrelevance approach*** suggests that dividend payment has no effect on share price and hence companies need not design dividend policies keeping in mind its possible impact on share price. Under irrelevance approach we have Modigliani-Miller Hypothesis on dividend.

In addition to this, we have Residual Theory of Dividend.

9.6.1 Walter's Model on Dividend

According to Professor James E. Walter, the dividend policy of a firm should be so designed as to maximize the shareholders' value or market capitalisation. This is required as the choice of dividend policies has significant bearing on determining the market price of shares.

Assumptions

Walter's Model on Dividend is based on certain assumptions. These are as follows:

1. The firm does not issue any new share or debt.
2. It makes additional financing only through retained earnings.
3. The firm either distributes its entire earnings as dividend or re-invests immediately as additional capital into the business.
4. Its Internal Rate of Return (r) and Cost of Capital (k) remain constant so that the business risk is unchanged with additional investment proposals.
5. Firms beginning EPS and DPS are constant and given.
6. The firm has a perpetual life.

Substance/Main Theme

According to Walter, dividend policy of a firm should always be based on the availability of profitable investment opportunities. In other words, when a firm finds profitable investment plans it should use its earnings to finance those projects instead paying cash dividend. However, when the investment proposals fall short of the return expectations and hence funds are not at all needed for financing all earnings should be distributed to the shareholders in form of dividend. To put it differently, reinvestment of earnings should always be given priority over dividend payment in situations when investments are rewarding and the market recognizes that by placing higher value to the firm. However, for situations in between these two extremes, the dividend payout ratio can be anything between 0% and 100%. In short, Walter's Model can be summed up as follows:

1. ***Rate of Return (r) > Cost of Capital (k):*** This is the situation for growth firms. These firms generally have investment proposals which are profitable, i.e. which can surely

earn returns higher than the cost of funding them. Since higher profits are translated into higher market price for shares, a firm maximizes the share price by simply investing entire retained earnings into such projects. Hence, optimal dividend payout ratio turns out to be nil, i.e. zero.

2. ***Rate of Return (r) < Cost of Capital (k):*** This is the situation for declining firms. These firms generally have investment proposals which are not profitable, i.e. which can barely earn returns to recoup the cost of funding them. In such a situation it would be wise for the firm to distribute its entire earnings as dividends as that may enable shareholders to earn higher returns from investments elsewhere. Thus, for a declining firm, market value will increase as the dividend payout is more. Consequently, optimum payout ratio will be 100%.
3. ***Rate of Return (r) = Cost of Capital (k):*** This is the situation for normal firms. Since the firms can just break even at this situation they will be indifferent towards the acceptance or rejection of any investment proposal. Thus, market price will also become insensitive to the payout ratio. Hence, for a normal firm, dividend policy will become completely irrelevant.

Computation Formula

Walter explained his propositions by means of a mathematical model. According to Walter, the share price of a firm can be determined by the following formula:

$$P = \frac{D + \frac{r}{k}(E - D)}{k} \tag{9.3}$$

where, P = Market price per share; D = Dividend per share; E = Earnings per share; r = Rate of Return on Investment; and k = Cost of Capital

Since in this model r and k are likely to remain fixed for a given category of firms, varying values of D, keeping E fixed can easily show how market price of share is maximised.

Illustration 9.2

Problem

From the following information compute the value per share of each of the companies under Walter's Dividend Model assuming dividend payout ratios of 0%, 25%, 50%, 75% and 100%.

Particulars	X Ltd.	Y Ltd.	Z Ltd.
Earnings per share (E)	₹10	₹10	₹10
Rate of Return on Investment (r)	18%	10%	8%
Cost of Capital (k)	10%	10%	10%

Also comment on the optimal dividend policy to be followed by individual firms.

Solution

According to Walter Dividend Model, the value per share can be determined by the formula:

$$P = \frac{D + \frac{r}{k}(E - D)}{k}$$

where, P = Market price per share; D = Dividend per share; E = Earnings per share; r = Rate of Return on Investment; and k = Cost of Capital.

Statement Showing Computation of Market Price per Share

Particulars	**X Ltd. (where $r > k$)**	**Y Ltd. (where $r = k$)**	**Z Ltd. (where $r < k$)**
Given	E = ₹10 r = 18% or 0.18 k = 10% or 0.10	E = ₹10 r = 10% or 0.10 k = 10% or 0.10	E = ₹10 r = 8% or 0.08 k = 10% or 0.10
Where dividend payout ratio = 0	$D = E \times$ Payout ratio $= 10 \times 0 = 0$ Hence, $P = \frac{0 + \frac{0.18}{0.10}(10 - 0)}{0.10}$ $= 180$	$D = E \times$ Payout ratio $= 10 \times 0 = 0$ Hence, $P = \frac{0 + \frac{0.10}{0.10}(10 - 0)}{0.10}$ $= 100$	$D = E \times$ Payout ratio $= 10 \times 0 = 0$ Hence, $P = \frac{0 + \frac{0.08}{0.10}(10 - 0)}{0.10}$ $= 80$
Where dividend payout ratio = 25%	$D = E \times$ Payout ratio $= 10 \times 0.25 = 2.50$ Hence, $P = \frac{2.50 + \frac{0.18}{0.10}(10 - 2.50)}{0.10}$ $= 160$	$D = E \times$ Payout ratio $= 10 \times 0.25 = 2.50$ Hence, $P = \frac{2.50 + \frac{0.10}{0.10}(10 - 2.50)}{0.10}$ $= 100$	$D = E \times$ Payout ratio $= 10 \times 0.25 = 2.50$ Hence, $P = \frac{2.50 + \frac{0.08}{0.10}(10 - 2.50)}{0.10}$ $= 85$
Where dividend payout ratio = 50%	$D = E \times$ Payout ratio $= 10 \times 0.50 = 5$ Hence, $P = \frac{5 + \frac{0.18}{0.10}(10 - 5)}{0.10}$ $= 140$	$D = E \times$ Payout ratio $= 10 \times 0.50 = 5$ Hence, $P = \frac{5 + \frac{0.10}{0.10}(10 - 5)}{0.10}$ $= 100$	$D = E \times$ Payout ratio $= 10 \times 0.50 = 5$ Hence, $P = \frac{5 + \frac{0.08}{0.10}(10 - 5)}{0.10}$ $= 90$
Where dividend payout ratio = 75%	$D = E \times$ Payout ratio $= 10 \times 0.75 = 7.50$ Hence, $P = \frac{7.50 + \frac{0.18}{0.10}(10 - 7.50)}{0.10}$ $= 120$	$D = E \times$ Payout ratio $= 10 \times 0.75 = 7.50$ Hence, $P = \frac{7.50 + \frac{0.10}{0.10}(10 - 7.50)}{0.10}$ $= 100$	$D = E \times$ Payout ratio $= 10 \times 0.75 = 7.50$ Hence, $P = \frac{7.50 + \frac{0.08}{0.10}(10 - 7.50)}{0.10}$ $= 95$

(Contd.)

Particulars	X Ltd. (where $r > k$)	Y Ltd. (where $r = k$)	Z Ltd. (where $r < k$)
Where dividend payout ratio = 100%	$D = E \times$ Payout ratio $= 10 \times 1.00 = 10$ Hence, $P = \frac{10 + \frac{0.18}{0.10}(10 - 10)}{0.10}$ $= 100$	$D = E \times$ Payout ratio $= 10 \times 1.00 = 10$ Hence, $P = \frac{10 + \frac{0.10}{0.10}(10 - 10)}{0.10}$ $= 100$	$D = E \times$ Payout ratio $= 10 \times 1.00 = 10$ Hence, $P = \frac{10 + \frac{0.08}{0.10}(10 - 10)}{0.10}$ $= 100$

In case of X Ltd., Rate of Return (r) is higher than the Cost of Capital (k). Hence, it is a growth firm. It can be observed here that as X Ltd. increases the dividend payout ratio value per share decreases. Value per share is the maximum when dividend payout ratio is zero. Therefore, optimal dividend payout ratio for X Ltd. is zero. In other words, it should retain its entire earnings and should not pay any dividend.

In case of Z Ltd., Rate of Return (r) is lower than the Cost of Capital (k). Hence, it is a declining firm. It can be observed here that as Z Ltd. increases the dividend payout ratio value per share also increases. Value per share is the maximum when dividend payout ratio is 100%. Therefore, optimal dividend payout ratio for X Ltd. is 100%. In other words, it should retain nothing and should distribute all earnings as dividend.

In case of Y Ltd., Rate of Return (r) is exactly equal to the Cost of Capital (k). Hence, it is a normal firm. It can be observed here, in spite of change in the dividend payout ratio, value per share has remained unaltered. In other words, value per share has been indifferent to the dividend policy adopted by the firm. Hence, there exists no single dividend policy for the firm. Dividend payout can be anything between 0% and 100%.

Criticism of the Model

Walter's Model has been highly criticized by various experts mainly because of its assumptions which are far from reality in most of the cases. The main points of criticism are as follows:

1. The model assumes that additional financing will be sourced from retained earnings only and no new share or debt will be issued. However, judicious use of Debt Capital helps a firm to enjoy higher returns due to Trading on Equity. Thus, the model deliberately ignores the benefits of optimum Capital Structure by restricting retained earnings as the only source for additional financing.
2. The model also assumes that Rate of Return on Investment will remain unchanged throughout. This assumption is also not realistic because as more and more investment proposals are taken up, Internal Rate of Return generally declines. Moreover, the internal productivity of retained earnings, i.e. r is also not precisely quantifiable always.
3. The assumption that Cost of Capital will remain constant may not hold good in reality. As more and more investment proposals are taken up, operating risk of the firm will increase leading to an increase in the Cost of Capital (k).
4. Walter ignores the fact that market price of shares depends on many factors other than dividend expectation of the shareholders. In reality, market price fluctuates more because of the changes in industry structure and other macroeconomic variables rather than dividend alone.

9.6.2 Gordon's Model on Dividend

Myron J. Gordon also advocates that dividend policy of a firm significantly affects the value of share of the firm. Hence, dividend policy should primarily be based on its potential impact on the market price of shares of the firm. The model proposed by Gordon in this respect is known as Gordon's Model on Dividend Policy.

Assumptions

Gordon's Model is based on the following assumptions:

1. The firm is an all equity firm. Its Capital Structure does not comprise any Debt Capital.
2. It employs only retained earnings for additional financing.
3. The Internal Rate of Return (r) and Cost of Capital (k) are constant.
4. There is no corporate tax.
5. The retention ratio (b) once decided, is constant and the growth rate in dividend is a product of retention ratio (b) and Internal Rate of Return (r), i.e. $g = b \times r$
6. The Cost of Capital (k) is higher than the growth rate (g), i.e. $k > g$ or $k > b \times r$. Thus, retention ratio should always be lower than k/r.
7. The firm has an infinite lifespan.

Substance/Main Theme

Just like Walter's Model, in Gordon's Model also, the dividend policy of a firm is assumed to be dependent on the availability of profitable investment opportunities. The propositions of Gordon's Model are discussed as follows:

1. ***For growth firm, i.e. when r > k,*** the value per share (P) increases with increase in the retention ratio (b), i.e. value per share increases as dividend payout decreases. Thus, when $r > k$, the firm should distribute lesser dividend and retain as much as possible. However, the maximum retention should always be lower than k/r.
2. ***For declining firm, i.e. when r < k,*** the value per share (P) increases with decrease in the retention ratio (b). In other words, the shareholders do not welcome retention of profits. Thus, when $r < k$, the firm should distribute higher dividend and retain less. However, the maximum dividend payout ratio will surely be restricted by the condition $b < k/r$.
3. ***For normal firms, i.e. when r = k,*** the value per share under Gordon's Model becomes indifferent to the retention ratio (b) or the dividend payout adopted. Thus, dividend policy seems to be irrelevant for the firm.

Notes: Though initially Gordon argued that a normal firm may adopt any dividend policy, he later modified his proposition under the given context. Gordon assumed that under situation of uncertainty:

- The shareholders (investors) are risk averse
- The shareholders (investors) prefer certain return to uncertain return.

Because of these two assumptions, under situation of uncertainty, the Cost of Capital (k) of a normal firm subsequently increases over r. As a result, dividend payment becomes inevitable.

Computation Formula

According to Gordon, value per share is nothing but the Present Value of the infinite stream of dividend growing at a constant rate, g i.e. $(b \times r)$. Hence,

$$P = \frac{E(1-b)}{k - b \times r} \tag{9.4}$$

where, P = Market price per share; E = Earnings per share; b = retention ratio; r = Rate of Return on Investment, k = Cost of Capital, $1 - b$ = dividend payout ratio.

Illustration 9.3

Problem

From the following information compute the value per share of each of the companies under Gordon's Dividend Model assuming dividend payout ratios of 25%, 50%, 75% and 100%.

Particulars	X Ltd.	Y Ltd.	Z Ltd.
Earnings per share (E)	₹10	₹10	₹10
Rate of Return on Investment (r)	15%	10%	5%
Cost of Capital (k)	10%	10%	10%

Also comment on the optimal dividend policy to be followed by individual firms.

Solution

According to Gordon, value per share is given as:

$$P = \frac{E(1-b)}{k - b \times r}$$

where, P = Market price per share; E = Earnings per share; b = retention ratio; r = Rate of Return on Investment, k = Cost of Capital, $1 - b$ = dividend payout ratio.

Statement Showing Computation of Market Price per Share

Particulars	X Ltd. (where $r > k$)	Y Ltd. (where $r = k$)	Z Ltd. (where $r < k$)
Given	E = ₹10 r = 15% or 0.15 k = 10% or 0.10	E = ₹10 r = 10% or 0.10 k = 10% or 0.10	E = ₹10 r = 5% or 0.05 k = 10% or 0.10
Where dividend payout ratio = 25%, i.e. $1 - b = 0.25$ and hence, $b = 0.75$	$P = \frac{10 \times 0.25}{0.10 - 0.75 \times 0.15}$ $= -200$	$P = \frac{10 \times 0.25}{0.10 - 0.75 \times 0.10}$ $= 100$	$P = \frac{10 \times 0.25}{0.10 - 0.75 \times 0.05}$ $= 40$
Where dividend payout ratio = 50%, i.e. $1 - b = 0.5$ and hence, $b = 0.5$	$P = \frac{10 \times 0.5}{0.10 - 0.5 \times 0.15}$ $= 200$	$P = \frac{10 \times 0.5}{0.10 - 0.5 \times .0.10}$ $= 100$	$P = \frac{10 \times 0.5}{0.10 - 0.5 \times 0.05}$ $= 66.67$

(Contd.)

Particulars	X Ltd. (where $r > k$)	Y Ltd. (where $r = k$)	Z Ltd. (where $r < k$)
Where dividend payout ratio = 75%, i.e. $1 - b = 0.75$ and hence, $b = 0.25$	$P = \frac{10 \times 0.75}{0.10 - 0.25 \times 0.15} = 120$	$P = \frac{10 \times 0.75}{0.10 - 0.25 \times 0.10} = 100$	$P = \frac{10 \times 0.75}{0.10 - 0.25 \times 0.05} = 85.71$
Where dividend payout ratio = 100%, i.e. $1 - b = 1$ and hence, $b = 0$	$P = \frac{10 \times 1}{0.10 - 0 \times 0.15} = 100$	$P = \frac{10 \times 1}{0.10 - 0 \times 0.10} = 100$	$P = \frac{10 \times 1}{0.10 - 0 \times 0.05} = 100$

1. In case of X Ltd., Rate of Return (r) is higher than the Cost of Capital (k). Hence, it is a growth firm. It can be observed here that as X Ltd. increases the dividend payout ratio value per share decreases. Hence, to maximize the benefits to the shareholders, it should retain more and pay lesser dividend. However, maximum retention should be lower than k/r, i.e. 66.67%. It may be observed that violation of this limit will produce absurd results. For example, a dividend payout of 25%, i.e. retention of 75% has resulted into a negative value per share.
2. In case of Z Ltd., Rate of Return (r) is lower than the Cost of Capital (k). Hence, it is a declining firm. It can be observed here that as Z Ltd. increases the dividend payout ratio value per share also increases. Value per share is the maximum when dividend payout ratio is 100% (This time it is feasible as k/r is 2 here). Therefore, optimal dividend policy for the firm is to pay more dividends and retain less. Maximum retention should however, not violate the limit k/r.
3. In case of Y Ltd., Rate of Return (r) is exactly equal to the Cost of Capital (k). Hence, it is a normal firm. It can be observed here in spite of change in the dividend payout ratio value per share has remained unaltered. In other words, value per share has been indifferent to the dividend policy adopted by the firm. Hence, there exists no single dividend policy for the firm. Dividend payout can be anything between 0% and 100%, subject to the condition $b < k/r$.

Criticism of the Model

Gordon's Model shares the same criticisms same as Walter's Model (Section 9.6.1). Additionally, it is also criticized on the following two grounds:

1. Under this model, there may be some values of b for which the share price may become undefined (when $b = k/r$) or negative (when $b > k/r$) which is absurd.
2. Taxes do exist in reality; moreover, in many countries capital gain is taxed at a lower rate than dividend income. Here shareholders will prefer capital gain to dividend. Hence, in these situations non-payment of dividend may bring some adverse impact on the share price.

9.6.3 Modigliani and Miller (M-M) Model

According to M-M hypothesis, the dividend policy of the firm is irrelevant. It has no effect on the wealth of shareholders, rather the value of the firm is determined by its potential earning power or profitability of its investment policy. The relative share of dividend and retained earnings in the total earnings has nothing to do with the value of the firm.

Assumptions

M-M hypothesis is based on a number of assumptions which are listed as follows:

1. The firm operates in a perfect capital market. The implications of this assumption are:
   - Information availability to all market participants at free of cost.
   - Non-existence of any transaction cost.
   - Inability on the part of an individual investor to affect the market price of shares.
2. Taxes either do not exist or there is no tax differential between dividend and capital gain.
3. The investment policy of the firm is fixed. Hence, financing new projects through retained earnings or by raising new capital does not change the operating risk of the firm.
4. All investors are rational, i.e. they have no preference for dividend over capital gain.
5. All investors are perfectly certain about the future investment programs and future profits of the firm.

Concept of Terminal Value per Share

According to M-M Model, terminal value per share is the price of share at the end of the period (say one year). This is calculated by the formula:

$$P_1 = \frac{\text{Owners' Equity}}{\text{No. of Equity Shares}} = \frac{\text{Share Capital + Retained Earnings}}{\text{No. of Equity Shares}} \tag{9.5}$$

According to M-M Model, there is an inverse relationship between dividend and terminal value per share.

Substance/Main Theme

M-M argues that the value depends on earnings of the firm and is unaffected by the pattern of income distribution. Suppose, a firm which pays dividend has to raise funds externally to finance its investment plans. M-M contend that dividend policy does not affect the wealth of the shareholders, implies that when the firm pays dividend, its advantage is offset by external financing. This means the terminal value of the share declines. Thus, the wealth of the shareholders—dividend plus terminal price—remains unchanged. As a result, the Present Value per share after dividends and external financing is equal to the Present Value per share before the payment of dividend. Hence, the shareholders are indifferent between payment of dividend and retention of earnings.

This can be easily understood from the following example.

Suppose a firm X Ltd. has 1,00,000 outstanding equity shares and a net asset of ₹30,00,000 represented by its shareholders' fund (i.e. share capital + retained earnings). So, its current terminal value per share is ₹30 (i.e. 30,00,000/1,00,000). Now suppose, it has decided to pay a dividend of ₹5 per share. Due to the payment of dividend, the shareholders' fund will get reduced by ₹5,00,000 and the revised terminal value will be ₹25. Thus, the shareholders get ₹5 per share as dividend but at the same time suffer a capital loss of ₹(30 – 25) = ₹5 due to

decline in the terminal value. Hence, their total wealth per share remains the same. Again, if new shares are required to be issued to collect the amount paid as dividend, that can be issued at the terminal value of ₹25. So the new shareholder also gets the share at the fair value. As an alternative if the firm decides not to pay dividend, the value per share will remain at ₹30 and even if an investor sells a part of his holding he will generate exactly ₹30 from the market. Thus, his wealth will remain unchanged. Hence, whatever be the decision, the value of the firm will be unchanged.

Computation Formula

According to M-M Model, the current market price per share can be determined as follows:

$$P_0 = \frac{D_1 + P_1}{1 + K} \tag{9.6}$$

where, D_1 = Dividend per share at the end of the year; P_1 = Price (terminal value) per share at the end of the year; K = Cost of Capital; P_0 = Current price per share

Proof of M-M Hypothesis

The very basic proposition of M-M hypothesis is that the value of any firm is indifferent to dividend payment. This proposition can be proved mathematically as follows.

As per M-M, the current market price per share is equal to the Present Value of dividend likely to be paid at the end of the period plus the market price per share at the end of the period, i.e.,

$$P_0 = \frac{D_1 + P_1}{1 + K} \tag{9.7}$$

where, D_1 = Dividend per share at the end of the year; P_1 = Price (Terminal value) per share at the end of the year; K = Cost of Capital; P_0 = Current price per share.

Now, multiplying both sides of the Equation 9.7 by n we get,

$$nP_0 = \frac{nD_1 + nP_1}{1 + K} \tag{9.8}$$

Now, let m be the number of additional shares to be issued at price P_1. Hence, the total value of the firm at the beginning of the period will be:

$$nP_0 = \frac{nD_1 + nP_1 + mP_1 - mP_1}{1 + K} \text{ (i.e. introducing and then cancelling the term } mP_1\text{)}$$

$$= \frac{nD_1 + (n + m)P_1 - mP_1}{1 + K} \tag{9.9}$$

Now, if I be the new investment required by the firm, then,

I = Retained earnings + Proceeds from new issue

$I = (E - nD_1) + mP_1$ (where E = total earnings)

$$mP_1 = I - (E - nD_1)$$
$$mP_1 = I - E + nD_1$$

Putting the value of mP_1 in Equation 9.9, we get,

$$nP_0 = \frac{nD_1 + (n+m)P_1 - (I - E + nD_1)}{1+K}$$
$$nP_0 = \frac{nD_1 + (n+m)P_1 - I + E - nD_1}{1+K}$$
$$nP_0 = \frac{(n+m)P_1 - I + E}{1+K}$$

It can be seen from the above formula that it does not contain any dividend term. Hence, value of the firm is indifferent to dividend policy. Whatever be the policy, the value of the firm will always remain the same.

Illustration 9.4

Problem

M Ltd. belongs to a risk class for which the appropriate price-earnings ratio is 10. It currently has 25,000 equity shares selling at ₹10 each. The company is contemplating the declaration of ₹0.80 dividend per share at the end of the current financial year which has just started. Given the assumption of Modigliani and Miller, answer the following:

1. What will be the price of the share at the end of the year (a) if dividend is not declared; (b) if dividend is declared?
2. Assume that the firm paying the dividend has net profit of ₹50,000 and makes investment of ₹1,00,000 during the period, how many new shares must be issued?
3. If the firm decides not to pay any dividend, how many new shares will it require to issue?
4. What will be the value of the firm (a) if dividend is not declared; (b) if dividend is declared?

Solution

Given, Price-earnings ratio $(P/E) = 10$

So, Cost of Capital $(K) = \frac{1}{\text{Price-earnings ratio}} = \frac{1}{10} = 0.10$

Current market price per share $(P_0) =$ ₹10

We know that, as per M-M, current market price per share $(P_0) = \frac{D_1 + P_1}{1+K}$, *where*, D_1 = Dividend per share at the end of the year; P_1 = Price (Terminal value) per share at the end of the year

1. (a) Price per share at the end of the year when dividend is not declared (i.e. $D_1 = 0$):

Conditionally, $10 = \frac{0 + P_1}{1 + 0.10}$

$P_1 = 10 \times 1.1$

$P_1 = 11$

(b) Price per share at the end of the year when dividend is declared (i.e. $D_1 = 0.80$):

Conditionally, $$10 = \frac{0.80 + P_1}{1 + 0.10}$$

$$0.80 + P_1 = 10 \times 1.1$$

$$P_1 = 11 - 0.80$$

$$P_1 = 10.20$$

2. New shares to be issued when dividend is declared:

Given,

I = amount of investment required = ₹1,00,000

E = Earnings, i.e. net profit available = ₹50,000

D_1 = Dividend per share at the end of the year = ₹0.80

P_1 = Price per share at the end of the year = ₹10.20

n = existing number of shares = 25,000

m = Number of new shares to be issued

Conditionally, $mP_1 = I - (E - nD_1)$

$$m \times 10.20 = 1,00,000 - (50,000 - 25,000 \times 0.80)$$

$$m \times 10.20 = 70,000$$

$$m = \frac{70,000}{10.20} = 6863 \text{ (approximately)}$$

3. New shares to be issued when dividend is not declared:

Here, $D_1 = 0$

Conditionally, $mP_1 = I - (E - nD_1)$

$$m \times 11 = 1,00,000 - (50,000 - 25,000 \times 0)$$

$$m \times 11 = 50,000$$

$$m = \frac{50,000}{11} = 4545 \text{ (approximately)}$$

4. (a) Valuation of the firm when dividend is not paid:

Value of the firm, $nP_0 = \frac{(n + m)P_1 - I + E}{1 + K}$

$$nP_0 = \frac{\left(25,000 + \frac{50,000}{11}\right)11 - 1,00,000 + 50,000}{1 + 0.10}$$

$$nP_0 = \frac{2,75,000 + 50,000 - 1,00,000 + 50,000}{1 + 0.10}$$

$$nP_0 = \frac{27,50,000}{1 + 0.10}$$

$$nP_0 = 2,50,000$$

Hence, value of the firm is ₹2,50,000.

(b) Valuation of the firm when dividend is paid:

(a) Value of the firm, $nP_0 = \dfrac{(n+m)P_1 - I + E}{1+K}$

$$nP_0 = \frac{\left(25{,}000 + \frac{70{,}000}{10.20}\right)10.20 - 1{,}00{,}000 + 50{,}000}{1+0.10}$$

$$nP_0 = \frac{2{,}55{,}000 + 70{,}000 - 1{,}00{,}000 + 50{,}000}{1+0.10}$$

$$nP_0 = \frac{27{,}50{,}000}{1+0.10}$$

$$nP_0 = 2{,}50{,}000$$

Hence, value of the firm is ₹2,50,000.

Note: It can be seen that value of the firm has remained indifferent to dividend policy adopted.

Criticism of the Model

1. The assumption that investors will remain indifferent between dividend and capital gain is not valid. When uncertainty prevails and firm retains its earnings without paying dividends, there is no surety that investors will receive the earnings in future in terms of capital gain due to realisation of higher value per share. Generally, investors are risk averse and hence they prefer dividends to capital gains under condition of uncertainty.
2. The assumption regarding taxation is also unrealistic. Taxes do exist in reality and there may be tax differential between dividend and capital gain in many countries. For example, in India dividend received from Indian companies are exempt and so also the long-term capital gain, but the short-term capital gain is taxable. This tax differential may make one preferable to the other.
3. The validity of M-M hypothesis can also be challenged on the ground that capital markets are hardly perfect even in the most developed countries. Information may be costly and transaction cost like brokerage, stamp duty, etc., may be quite substantial for small transactions. Investors, in such a situation, would like the firm to reinvest the earnings rather than pay dividend and then go for external financing.

9.6.4 Residual Theory of Dividend

In any organisation, dividend, investment and financing decisions are inter-dependent and in the long run, the firm must strike a balance among these three as otherwise it will have to:

1. Sacrifice profitable investment opportunities.
2. Operate with a non-optimum Capital Structure.
3. Finance dividend by issuing new shares or raising loans.

The dividend policy that avoids one of these choices is to treat dividends as a residual.

Under residual theory of dividend, it is assumed that a firm will distribute cash dividends only if it has retained earnings "left over" after financing all profitable investment opportunities. If there is no earning left, no dividend will be paid. Hence, dividend policy in this case is nothing but a financing decision and payment of cash dividend is a passive residual.

As an obvious consequence, under residual dividend policy, dividend will fluctuate from period to period in keeping with fluctuation in the amount of profitable investment opportunities available to the firm. When the firm has sufficient opportunities, the percentage of dividend payout is likely to be zero. On the other hand, when the firm finds it difficult to invest the funds profitably, the payout is likely to be 100%. In case of situations in between these two extremes the payout ratio can be any fraction is between 0% and 100%.

9.7 ADDITIONAL SOLVED PROBLEMS

1. The following data are available for XY Ltd.:

Earnings per share	₹3.00
Internal Rate of Return	15%
Cost of Capital	12%

If Walter's valuation formula holds, what will be the price per share when the dividend payout ratio is 50%, 75% and 100%? *[C.U. M.Com., 1997]*

Solution

As per Walter's Model, value per share is given by:

$$P = \frac{D + \frac{r}{k}(E - D)}{k}$$

where P = Market price per share; D = Dividend per share; E = Earnings per share; r = Rate of Return on Investment; k = Cost of Capital.

Statement Showing Computation of Market Price of Share

Dividend payout ratio = 50%	**Dividend payout ratio = 75%**	**Dividend payout ratio = 100%**
Here, $E = 3$, $D = 3 \times 0.5 = 1.5$ $k = 0.12$ and $r = 0.15$ So, $P = \frac{1.5 + \frac{0.15}{0.12}(3 - 1.5)}{0.12}$ $= \frac{3.375}{0.12}$ $= 28.125$	Here, $E = 3$, $D = 3 \times 0.75 = 2.25$ $k = 0.12$ and $r = 0.15$ So, $P = \frac{2.25 + \frac{0.15}{0.12}(3 - 2.25)}{0.12}$ $= \frac{3.1875}{0.12}$ $= 26.5625$	Here, $E = 3$, $D = 3 \times 1 = 3$ $k = 0.12$ and $r = 0.15$ $P = \frac{3 + \frac{0.15}{0.12}(3 - 3)}{0.12}$ $= \frac{3}{0.12}$ $= 25.00$

2. Y Ltd. has 1,00,000 equity shares of ₹10 each fully paid. The company expects its earnings at ₹12,00,000 and Cost of Capital at 10% for the next financial year. Using Walter's Model, what dividend policy would you recommend when the Rate of Return on Investment of the company is estimated at 8% and 12%? What will be the price of equity share if your recommendations are accepted? *[C.U. M.Com., 1998]*

Solution

As per Walter's Model, value per share is given by:

$$P = \frac{D + \frac{r}{k}(E - D)}{k}$$

where, P = Market price per share; D = Dividend per share; E = Earnings per share; r = Rate of Return on Investment; k = Cost of Capital.

Here, $E = \frac{12,00,000}{1,00,000} = ₹12$, $k = 10\% = 0.10$

When Rate of Return on Investment = 8%

Here Rate of Return, i.e. r (8%) < Cost of Capital, i.e. k (10%). Hence, the company is a declining company. According to Walter's Model, the market price for a declining firm is the maximum when dividend payout is 100%. So, here 100% dividend payout is recommended.

If such recommendation is accepted, the market price per share will be:

$$P = \frac{12 + \frac{0.08}{0.10}(12 - 12)}{0.10} \text{ (Since } D = 12 \times 100\% = 12)$$

$$= 120.00$$

When Rate of Return on Investment = 12%

Here Rate of Return, i.e. r (12%) > Cost of Capital, i.e. k (10%). Hence, the company is a growth company. According to Walter's Model, the market price for a growth firm is the maximum when dividend payout is zero. So, here no dividend payout is recommended.

If such recommendation is accepted, the market price per share will be:

$$P = \frac{0 + \frac{0.12}{0.10}(12 - 0)}{0.10} \text{ (Since } D = 12 \times 0 = 0)$$

$$= 144.00$$

3. The earnings per share of XYZ Ltd. is ₹10 and the rate of capitalisation applicable is 12%. The company has before it an option of adopting (a) 50% and (b) 100% dividend payout ratio. Calculate the market price of the share as per Walter's Model if it can earn a return of (i) 20% and (ii) 12% on its retained earnings. *[C.U. M.Com. (H), 2008]*

Solution

As per Walter's Model, value per share is given by:

$$P = \frac{D + \frac{r}{k}(E - D)}{k}$$

where, P = Market price per share; D = Dividend per share; E = Earnings per share; r = Rate of Return on Investment; k = Cost of Capital.

Statement Showing Computation of Market Price of Share

Particulars	When r = 20%	When r = 12%
When dividend payout ratio = 50% or 0.5	Here, $E = 10$, $D = 10 \times 0.5 = 5$ $k = 0.12$ and $r = 0.20$ So, $P = \frac{5 + \frac{0.20}{0.12}(10 - 5)}{0.12}$ $= \frac{13.33}{0.12}$ $= 111.11$	Here, $E = 10$, $D = 10 \times 0.5 = 5$ $k = 0.12$ and $r = 0.12$ $P = \frac{5 + \frac{0.12}{0.12}(10 - 5)}{0.12}$ $= \frac{10}{0.12}$ $= 83.33$
When dividend payout ratio = 100% or 1	Here, $E = 10$, $D = 10 \times 1 = 10$ $k = 0.12$ and $r = 0.20$ $P = \frac{10 + \frac{0.20}{0.12}(10 - 10)}{0.12}$ $= \frac{10}{0.12}$ $= 83.33$	Here, $E = 10$, $D = 10 \times 0.5 = 5$ $k = 0.12$ and $r = 0.20$ $P = \frac{10 + \frac{0.12}{0.12}(10 - 10)}{0.12}$ $= \frac{10}{0.12}$ $= 83.33$

4. The following figures are collected from the annual report of XYZ Ltd.:

Net profit	₹30 Lakhs
Outstanding 12% preference shares	₹100 Lakhs
Number of equity shares	3 Lakhs
Return on Investment	20%
Cost of Capital	16%

What should be the approximate dividend payout ratio so as to keep the share price at ₹42 by using Walter's Model? *[C.A. Final 2005]*

Solution

As per Walter's Model, value per $P = \frac{D + \frac{r}{k}(E - D)}{k}$

where P = Market price per share; D = Dividend per share; E = Earnings per share; r = Rate of Return on Investment; k = Cost of Capital.

Here, $r = 20\%$ or 0.20, $k = 16\%$ or 0.16

$$E = \frac{30 - (100 \times 12\%)}{3} = ₹6$$

Let D/P ratio is x

So, $D = ₹6 \times x = ₹6x$

Conditionally, $P = \dfrac{D + \dfrac{r}{k}(E - D)}{k}$

$$42 = \frac{6x + \frac{0.20}{0.16}(6 - 6x)}{0.16}$$

$$6.72 = 6x + 7.50 - 7.50x$$

$$1.5x = 0.78$$

$$x = 0.52$$

So the required dividend payout ratio is 52%.

5. A company has a book value per share of ₹137.80. Its return on equity is 15% and it follows a policy of retaining 60% of its earnings. If the opportunity Cost of Capital is 18%, what is the price of the share today? *[C.A. Final May 2002]*

Solution

As per Walter's Model, value per share is given by:

$$P = \frac{D + \frac{r}{k}(E - D)}{k}$$

where, P = Market price per share; D = Dividend per share; E = Earnings per share; r = Rate of Return on Investment; k = Cost of Capital.

Here, $r = 15\%$ or 0.15, $k = 18\%$ or 0.18

$$E = ₹137.80 \times 0.15 = ₹20.67$$

$$D = ₹20.67 \times (1 - 0.60) = ₹8.268$$

So, $$P = \frac{8.268 + \frac{0.15}{0.18}(20.67 - 8.268)}{0.18} = ₹103.35$$

Therefore, the price per share today is ₹103.35.

6. A company's total investment in assets is ₹10,00,000. It has 1,00,000 shares of ₹10 each. Its expected Rate of Return on Investment is 30% and Cost of Capital is 18%. The company has a policy of retaining 25% of its profits. Determine the value of the firm using Gordon's Model. *[C.U. M.Com., 1993]*

Solution

Given, Cost of Capital (k) = 18% = 0.18
Return on Investment (r) = 30% = 0.30
Retention ratio (b) = 25% = 0.25
Face value per share = ₹10
So, Earnings per share (E) = 10×0.30 = ₹3

As per Gordon's Model, value per share = $P = \frac{E(1-b)}{k - b \times r} = \frac{3(1-0.25)}{0.18 - 0.25 \times 0.30} = \frac{2.25}{0.105}$ = 21.428571

Therefore, value of the firm = $1,00,000 \times 21.428571$ = ₹21,42,857.10

7. XYZ Ltd. has 1,00,000 outstanding shares of ₹10 each. The company earns a rate of 24% on its investments and retains 50% of earnings as a policy. If Cost of Capital is 18%, calculate price of the share according to Gordon's Model. The company has total investment of around ₹10,00,000 in assets. If payout ratio changes to 10%, 90% how will share price change? Also comment on the optimal dividend policy for XYZ Ltd. as per Gordon's Model. *[C.U. M.Com., 1995]*

Solution

Given, Cost of Capital (k) = 18% = 0.18
Return on Investment (r) = 24% = 0.24

Earnings per share (E) = $\frac{10,00,000 \times 0.24}{1,00,000}$ = ₹2.40

Retention ratio (b) = 50% = 0.50

As per Gordon's Model, value per share = $P = \frac{E(1-b)}{k - b \times r} = \frac{2.4(1-0.5)}{0.18 - 0.5 \times 0.24} = \frac{1.20}{0.06}$ = ₹20

If payout ratio ($1 - b$) = 10% i.e. 0.10, then, retention ratio (b) = 90% = 0.90

Value per share = $P = \frac{E(1-b)}{k - b \times r} = \frac{2.4(1-0.9)}{0.18 - 0.9 \times 0.24} = \frac{0.24}{-0.036}$ = −6.67 (₹)

Now, if payout ratio ($1 - b$) = 90% i.e. 0.90, then, retention ratio (b) = 10% = 0.10

Value per share = $P = \frac{E(1-b)}{k - b \times r} = \frac{2.4(1-0.1)}{0.18 - 0.1 \times 0.24} = \frac{2.16}{0.156}$ = ₹13.85

In this case $r > k$, so the firm is a growth firm. Hence, according to Gordon Model as the retention ratio increases the value per share also increases. Therefore, the optimal policy for the firm is to retain as much as possible. However, according to Gordon, maximum retention ratio should be lower than k/r i.e. 0.18/0.24 = 2/3.

8. The following data are available for KPI Ltd.

Earnings per share	₹8.00
Rate of Return on Investment	16%
Rate of Return required by the shareholders	12%

If Gordon's basic valuation formula holds, what will be the price per share when the dividend payout ratio is 25% and 60%. *[C.U. M.Com., 2003]*

Solution

According to Gordon, value per share of a company is given by:

$$P = \frac{E(1-b)}{k - b \times r}$$

where, P = Market price per share, E = Earnings per share, b = retention ratio, r = Rate of Return on Investment, k = Cost of Capital, $1 - b$ = dividend payout ratio.

Given, E = ₹8, r = 16% or 0.16, k = 12% or 0.12

When dividend payout ratio is 25% (i.e. $1 - b = 0.25$ and $b = 0.75$)

$$\text{Value per share} = P = \frac{8 \times 0.25}{0.12 - 0.75 \times 0.16} = \frac{2}{0} = \alpha \text{ (Undefined)}$$

When dividend payout ratio is 60% (i.e. $1 - b = 0.60$ and $b = 0.40$)

$$\text{Value per share} = P = \frac{8 \times 0.60}{0.12 - 0.60 \times 0.16} = \frac{4.80}{0.024} = 200$$

9. ABC Ltd. has 1,00,000 outstanding shares of ₹10 each. The company earns a rate of 20% on its investments and retains 50% of earnings as a policy. If Cost of Capital is 18%, calculate price of the share according to Gordon's Model. The company has total investment of around ₹10,00,000 in assets. If payout ratio changes to 70%, 20%, how will share price change? *[C.U. M.Com., 2006]*

Solution

Given, Cost of Capital (k) = 18% or 0.18

Return on Investment (r) = 20% i.e. 0.20

$$\text{Earnings per share } (E) = \frac{10,00,000 \times 0.20}{1,00,000} = ₹2.00$$

Retention ratio (b) = 50% = 0.50

$$\text{As per Gordon's Model, value per share} = P = \frac{E(1-b)}{k - b \times r} = \frac{2(1-0.5)}{0.18 - 0.5 \times 0.20} = \frac{1}{0.08} = ₹12.50$$

Now, if payout ratio $(1 - b)$ = 70%, retention ratio (b) = 30% or 0.30

$$\text{Value per share} = P = \frac{E(1-b)}{k - b \times r} = \frac{2(1-0.3)}{0.18 - 0.3 \times 0.20} = \frac{1.40}{0.12} = ₹11.67$$

If payout ratio $(1 - b) = 20\%$, retention ratio $(b) = 80\%$ or 0.80

Value per share $= P = \dfrac{E(1-b)}{k - b \times r} = \dfrac{2(1-0.8)}{0.18 - 0.8 \times 0.20} = \dfrac{0.40}{0.02} = ₹20$

10. X Ltd. belongs to a risk class for which the appropriate price-earnings ratio is 10. It currently has 25,000 equity shares selling at ₹50 each. The company is contemplating the declaration of ₹4 as dividend per share at the end of the current financial year which has just started. Given the assumption of Modigliani and Miller, answer the following:
    (a) What will be the price of the share at the end of the year (i) if dividend is not declared; (ii) if dividend is declared?
    (b) Assume that the firm paying the dividend has net profit of ₹2,50,000 and makes investment of ₹5,00,000 during the period, how many new shares must be issued?
    (c) If the firm decides not to pay any dividend, how many new shares will it require to issue?
    (d) What will be the value of the firm: (i) if dividend is not declared; (ii) if dividend is declared? *[C.U. M.Com., 2002, Adapted]*

Solution

Given, Price-Earnings ratio $(P/E) = 10$

So, Cost of Capital $(k) = \dfrac{1}{\text{Price-earnings ratio}} = \dfrac{1}{10} = 0.10$

Current market price per share $(P_0) = ₹50$

We know that, as per M-M, current market price per share $(P_0) = \dfrac{D_1 + P_1}{1 + K}$

where, D_1 = Dividend per share at the end of the year, P_1 = Price (Terminal value) per share at the end of the year

(a) (i) Price per share at the end of the year when dividend is not declared (i.e. $D_1 = 0$):

Conditionally, $50 = \dfrac{0 + P_1}{1 + 0.10}$

or, $P_1 = 50 \times 1.1$

or, $P_1 = 55$

(ii) Price per share at the end of the year when dividend is declared (i.e. $D_1 = ₹4$):

Conditionally, $50 = \dfrac{4 + P_1}{1 + 0.10}$

or, $4 + P_1 = 50 \times 1.1$

or, $P_1 = 55 - 4$

or, $P_1 = 51$

(b) New shares to be issued when dividend is declared:

Given, I = amount of investment required = ₹5,00,000

E = Earnings i.e. net profit available = ₹2,50,000

D_1 = Dividend per share at the end of the year = ₹4
P_1 = Price per share at the end of the year = ₹51
n = existing number of shares = 25,000
m = Number of new shares to be issued

Conditionally, $mP_1 = I - (E - nD_1)$

$$m \times 51 = 5{,}00{,}000 - (2{,}50{,}000 - 25{,}000 \times 4)$$

$$m \times 51 = 3{,}50{,}000$$

$$m = \frac{3{,}50{,}000}{51} = 6{,}863 \text{ (approximately)}$$

(c) New shares to be issued when dividend is not declared:

Here, $D_1 = 0$

Conditionally, $mP_1 = I - (E - nD_1)$

$$m \times 55 = 5{,}00{,}000 - (2{,}50{,}000 - 25{,}000 \times 0)$$

$$m \times 55 = 2{,}50{,}000$$

$$m = \frac{2{,}50{,}000}{55} = 4{,}545 \text{ (approximately)}$$

(d) (i) Valuation of the firm when dividend is not paid:

Value of the firm $(nP_0) = \dfrac{(n+m)P_1 - I + E}{1+K}$

$$nP_0 = \frac{\left(25{,}000 + \frac{2{,}50{,}000}{55}\right)55 - 5{,}00{,}000 + 2{,}50{,}000}{1 + 0.10}$$

$$nP_0 = \frac{13{,}75{,}000 + 2{,}50{,}000 - 5{,}00{,}000 + 2{,}50{,}000}{1 + 0.10}$$

$$nP_0 = \frac{1{,}37{,}50{,}000}{1 + 0.10}$$

$$nP_0 = 12{,}50{,}000$$

Hence, value of the firm is ₹12,50,000.

(ii) Valuation of the firm when dividend is paid:

Value of the firm $(nP_0) = \dfrac{(n+m)P_1 - I + E}{1+k}$

$$nP_0 = \frac{\left(25{,}000 + \frac{3{,}50{,}000}{51}\right)51 - 5{,}00{,}000 + 2{,}50{,}000}{1 + 0.10}$$

$$nP_0 = \frac{12{,}75{,}000 + 3{,}50{,}000 - 5{,}00{,}000 + 2{,}50{,}000}{1 + 0.10}$$

$$nP_0 = \frac{1,37,50,000}{1+0.10}$$

$$nP_0 = 12,50,000$$

Hence, value of the firm is ₹12,50,000.

Note: It can be seen that value of the firm has remained indifferent to dividend policy adopted.

11. The appropriate capitalisation rate for a company which belongs to a risk class is 10%. Presently the company has 1,00,000 shares selling at ₹100 each. The company is contemplating the declaration of ₹5 as dividend at the end of the current financial year which has just started. What will be the price of the share at the end of the year (a) if dividend is not declared; (b) if dividend is declared? Answer these on the basis of Modigliani and Miller Model and assume no taxes. *[C.U. M.Com., 2004]*

Solution

Given, Cost of Capital (k) = 10% = 0.10

Current market price per share (P_0) = ₹100

We know that, as per M-M, current market price per share (P_0) = $\frac{D_1 + P_1}{1+K}$, where D_1 = Dividend per share at the end of the year, P_1 = Price (Terminal value) per share at the end of the year.

(a) Price per share at the end of the year when dividend is not declared (i.e. $D_1 = 0$):

Conditionally, $100 = \frac{0 + P_1}{1+0.10}$

$$P_1 = 100 \times 1.1$$

$$P_1 = 110$$

(b) Price per share at the end of the year when dividend is declared (i.e. D_1 = ₹5):

Conditionally, $100 = \frac{5 + P_1}{1+0.10}$

$$5 + P_1 = 100 \times 1.1$$

$$P_1 = 110 - 5$$

$$P_1 = 105$$

12. D Ltd. has 10 lakhs equity shares outstanding at the beginning of the accounting year 2006. The appropriate *P/E* ratio for the industry in which D Ltd. is 8.35. The earning per share is ₹15 in the last twelve months and current P/E ratio for the company is 10. The EPS is expected to be ₹20 at the end of the accounting year and the company has an investment budget of ₹4 crores. Based on M-M approach calculate the market price of share of the company.

(a) When the Board of Directors of the company has recommended ₹8 per share as dividend which is (i) not declared and (ii) declared.

(b) How many new shares are to be issued by the company at the end of the accounting year when (i) the above dividends are distributed; and (ii) dividends are not distributed.

(c) Show that the market value of the shares of the company at the end of the accounting year will remain the same whether dividends are (i) not declared or are (ii) declared. *[C.U. M.Com., 2007]*

Solution

Given, Price-Earnings ratio (P/E) = 8.35 (i.e. Industry P/E ratio)

So, Cost of Capital (k) = $\frac{1}{\text{Price-earnings ratio}} = \frac{1}{8.35} = 0.12$

Current market price per share (P_0) = EPS × Current P/E ratio = 15 × 10 = ₹150

We know that, as per M-M, current market price per share (P_0) = $\frac{D_1 + P_1}{1 + K}$, where D_1 = Dividend per share at the end of the year, P_1 = Price (Terminal value) per share at the end of the year.

(a) (i) Price per share at the end of the year when dividend is not declared (i.e. D_1 = 0):

Conditionally, $150 = \frac{0 + P_1}{1 + 0.12}$

$P_1 = 150 \times 1.12$

$P_1 = 168$

(ii) Price per share at the end of the year when dividend is declared (i.e. D_1 = ₹8):

Conditionally, $150 = \frac{8 + P_1}{1 + 0.12}$

$8 + P_1 = 150 \times 1.12$

$P_1 = 168 - 8$

$P_1 = 160$

(b) (i) New shares to be issued when dividend is distributed:

Given, I = amount of investment required = ₹4,00,00,000

E = Earnings, i.e. net profit available

= Expected EPS × Number of shares

= 20 × 10,00,000 = ₹2,00,00,000

D_1 = Dividend per share at the end of the year = ₹8

P_1 = Price per share at the end of the year = ₹160

n = existing number of shares = 10,00,000

m = Number of new shares to be issued

Conditionally, $mP_1 = I - (E - nD_1)$

$m \times 160 = 4,00,00,000 - (2,00,00,000 - 10,00,000 \times 8)$

$$m \times 160 = 2,80,00,000$$

$$m = \frac{2,80,00,000}{160} = 1,75,000 \text{ (approximately)}$$

(ii) New shares to be issued when dividend is not distributed

Here, $D_1 = 0$

Conditionally, $mP_1 = I - (E - nD_1)$

$$m \times 168 = 4,00,00,000 - (2,00,00,000 - 10,00,000 \times 0)$$

$$m \times 168 = 2,00,00,000$$

$$m = \frac{2,00,00,000}{168} = 119048 \text{ (approximately)}$$

(c) (i) Valuation of the firm when dividend is not paid:

Value of the firm $(nP_0) = \frac{(n+m)P_1 - I + E}{1+K}$

$$nP_0 = \frac{\left(10,00,000 + \frac{2,00,00,000}{168}\right)168 - 4,00,00,000 + 2,00,00,000}{1+0.12}$$

$$nP_0 = \frac{16,80,00,000 + 2,00,00,000 - 4,00,00,000 + 2,00,00,000}{1+0.12}$$

$$nP_0 = \frac{16,80,00,000}{1+0.12}$$

$$nP_0 = 15,00,00,000$$

Hence, value of the firm is ₹15,00,00,000.

(iv) Valuation of the firm when dividend is paid:

Value of the firm $(nP_0) = \frac{(n+m)P_1 - I + E}{1+K}$

$$nP_0 = \frac{\left(10,00,000 + \frac{2,80,00,000}{160}\right)160 - 4,00,00,000 + 2,00,00,000}{1+0.12}$$

$$nP_0 = \frac{16,00,00,000 + 2,80,00,000 - 4,00,00,000 + 2,00,00,000}{1+0.12}$$

$$nP_0 = \frac{16,80,00,000}{1+0.12}$$

$$nP_0 = 15,00,00,000$$

Hence, value of the firm is ₹15,00,00,000.

Therefore, it can be seen that value of the firm remains the same whether dividend is distributed or not.

13. A company currently has 1,00,000 shares. The company needs ₹10,00,000 to finance its new investments. The total earnings of the firm during the current year would be ₹10,00,000 and ₹5,00,000 would be paid by way of dividends. The market price per share at the end of the current year is expected to be ₹110. If the Cost of Capital is 15%, ascertain the Present Value of a share under M-M Model. *[C.U. M.Com., 1990]*

Solution

We know that, as per M-M, current market price per share $(P_0) = \frac{D_1 + P_1}{1 + K}$ where D_1 = Dividend per share at the end of the year, P_1 = Price (Terminal value) per share at the end of the year.

Here, $D_1 = \frac{5,00,000}{1,00,000} = ₹5$

$P_1 = ₹110$

And $k = 15\%$ or 0.15

Thus, $P_0 = \frac{5 + 110}{1 + 0.15} = ₹100$

Thus, the Present Value of a share is ₹100.

14. A company has at present 1,00,000 shares. The company requires ₹10,00,000 to finance a new project of which ₹4,00,000 would be available out of profits after paying ₹10,00,000 as dividends. The balance amount can be raised either by issuing new shares or new debentures. The company decides to procure finance through the issue of new shares. The market price per share at the end of the current year is expected to be ₹120. If the Cost of Capital is 18%, determine the Present Value of a share using the M-M Model.

[C.U. M.Com., 1992, Adapted]

Solution

We know that, as per M-M, current market price per share $(P_0) = \frac{D_1 + P_1}{1 + K}$ where D_1 = Dividend per share at the end of the year, P_1 = Price (Terminal value) per share at the end of the year.

Here, $D_1 = \frac{10,00,000}{1,00,000} = ₹10$

$P_1 = ₹120$

$k = 18\%$ i.e. 0.18

Thus, $P_0 = \frac{10 + 120}{1 + 0.18} = ₹110.17$

Thus, the Present Value of a share is ₹110.17.

15. D Ltd. has 10 lakhs equity shares outstanding at the beginning of the accounting year 2005. The current market price of the shares is ₹150 each. The BOD of the company has recommended ₹8 per share as dividend. The rate of capitalisation, appropriate to the risk class to which the company belongs, is 12%.
    (a) Based on M-M approach, calculate the market price of the shares of the company when the recommended dividend is (i) declared and (ii) not declared.
    (b) How many new shares are to be issued by the company at the end of the accounting year on the assumption that the Net Income for the year is ₹2 crores and the investment budget is ₹4 crores when (i) the above dividends are distributed and (ii) dividends are not declared?
    (c) Show that the market value of the shares of the company at the end of the accounting year will remain the same whether dividends are declared or not.

[C.S. Final June 1999]

Solution

Given, Cost of Capital (k) = 12% or 0.12

Current market price per share (P_0) = ₹150

We know that, as per M-M, current market price per share (P_0) = $\frac{D_1 + P_1}{1 + K}$, where D_1 = Dividend per share at the end of the year, P_1 = Price (Terminal value) per share at the end of the year

(a) (i) Price per share at the end of the year when dividend is declared (i.e. $D_1 = 8$):

$$\text{Conditionally, } 150 = \frac{8 + P_1}{1 + 0.12}$$

$$8 + P_1 = 150 \times 1.12$$

$$P_1 = 160$$

(ii) Price per share at the end of the year when dividend is not declared (i.e. D_1 = ₹0):

$$\text{Conditionally, } 150 = \frac{0 + P_1}{1 + 0.10}$$

$$P_1 = 150 \times 1.12$$

$$P_1 = 168$$

(b) (i) New shares to be issued when dividend is declared:

Given,

I = amount of investment required = ₹4,00,00,000

E = Earnings i.e. net profit available = ₹2,00,00,000

D_1 = Dividend per share at the end of the year = ₹8

P_1 = Price per share at the end of the year = ₹160

n = existing number of shares = 10,00,000

m = Number of new shares to be issued

Conditionally, $mP_1 = I - (E - nD_1)$

$$m \times 160 = 4,00,00,000 - (2,00,00,000 - 10,00,000 \times 8)$$

$$m \times 160 = 2,80,00,000$$

$$m = \frac{2,80,00,000}{160} = 1,75,000$$

(ii) New shares to be issued when dividend is not declared:

Here, $D_1 = 0$

Conditionally, $mP_1 = I - (E - nD_1)$

$$m \times 168 = 4,00,00,000 - (2,00,00,000 - 10,00,000 \times 0)$$

$$m \times 168 = 2,00,00,000$$

$$m = \frac{2,00,00,000}{168} = 1,19,048$$

(c) Verification of M-M Dividend Irrelevance Theory.

Value of the firm at the end of the year if dividend is declared = $(n + m) \times P_1$

= (10,00,000 + 1,75,000) × 160

= ₹1,880 lakhs

Value of the firm at the end of the year if dividend is declared = $(n + m) \times P_1$

= (10,00,000+1,19,048) × 168

= ₹1,880 lakhs

So, the value of the firm remains the same at the end of the year in both the cases.

9.8 SUMMARY

Model	Formula
1. Walter's Model	$P = \frac{D + \frac{r}{k}(E - D)}{k}$ *where,* P = Market price per share, D = Dividend per share, E = Earnings per share, r = Rate of Return on Investment, k = Cost of Capital.
2. Gordon's Model	$P = \frac{E(1 - b)}{k - b \times r}$ *where,* P = Market price per share, E = Earnings per share, b = retention ratio, r = Rate of Return on Investment, k = Cost of Capital, 1-b = dividend payout ratio.

3. M-M Model	
(i) Present Value per share (P_0)	$P_0 = \frac{D_1 + P_1}{1 + K}$ *where,* D_1 = Dividend per share at the end of the year, P_1 = Price (Terminal value) per share at the end of the year, K = Cost of Capital, P_0 = Current price per share.
(ii) Present Value of the firm	$nP_0 = \frac{(n+m)P_1 - I + E}{1 + K}$ *where,* E = Total earnings, I = Investment required, n = Existing number of share
(iii) Number of new shares to be issued (m)	$mP_1 = I - E + nD_1$

EXERCISES

A. Short-answer Type Questions (5 Marks)

1. What do you mean by dividend? What are the different types of dividend?
2. Explain Gordon's Model in respect of dividend payout.
   [C.U. B.Com. (H), 2006]
3. How can stability of dividend be maintained? *[C.U. B.Com. (H), 2009]*
4. Why is M-M Model of dividend policy called dividend irrelevance theory?
   [C.U. B.Com. (H), 2010]
5. Mention the assumptions of M-M Model of Dividend Policy.
   [C.U. B.Com. (H), 2007, 2012]
6. Write a short note on Gordon's Dividend Policy Model.
   [C.U. B.Com. (H), 2012]
7. Give five important factors that affirm should consider in formulating a dividend policy.
   [C.U. B.Com. (H), 2011]

B. Essay Type Questions (10 Marks)

1. (a) What are the factors that determine the dividend policy of a firm?
   (b) What is Modigliani-Miller irrelevance hypothesis?
   [C.U. B.Com. (H), 2006]
2. Critically discuss Walter's dividend Model. To what extent are the shortcomings of this model are justified by you? *[C.U. B.Com. (H), 2007]*
3. Critically explain the Gordon's Model on dividend policy.

4. Critically explain the Modigliani and Miller's Model on dividend policy.
5. Explain the factors, from the standpoint of the firm, that influences dividend policy.

[C.U. B.Com. (H), 2010]

C. Practical Problems

1. Calculate the market price of a share of ABC Ltd. under Walter's Model from the following data:

Earnings per share	₹5
Dividend per share	₹3
Cost of Capital	16%
Internal Rate of Return on Investment	20%
Retention ratio	50%

[C.S. Final Dec. 1994]

[Ans. P = ₹34.375]

2. ABC Ltd. was started a year back with a paid up Equity Capital of ₹40,00,000. The other details are as under:

Earnings of the company	₹4,00,000
Dividend paid	₹3,20,000
Price-earnings ratio	12.5
Number of shares	40,000

You are required to find out whether the company's dividend payout ratio is optimal, using Walter's formula. *[C.S. Final June 2000]*

[Ans. P = ₹131.25, Not optimal, Optimal Payout is Zero, P = ₹156.25]

3. The earnings per share of a company is ₹16. The market capitalisation rate applicable to the company is 12.5%. Retained earnings can be employed to yield a return of 10%. The company is considering a payout of 25%, 50% and 75%. Which of these would maximize the wealth of the shareholders as per Walter's Model? *[C.S. Final June 1998]*

[Ans. Price per share = ₹108.80, ₹115.20, ₹121.60]

4. Sahu & Co. earns ₹6 per share having capitalisation rate of 105 and a Rate of Return on Investment at the rate of 20%. According to Walter's Model what will be the price per share at 30% dividend payout ratio? Is this the optimum payout ratio as per Walter?

[C.A Final Nov. 2002]

[Ans. P = ₹102, No, Optimal is Zero.]

5. The EPS of a company is ₹10. It has an Internal Rate of Return of 15% and the capitalisation rate of its risk class is 12.5%. If Walter's Model is used:
   (a) What should be the optimum payout ratio of the company?
   (b) What will be price per share at this payout?
   (c) How shall the price of the share be effected, if a different payout were employed?

[C.S. Final June 2003]

[Ans. (i) Zero, (ii) P = ₹96, (iii) Assuming 30% payout, P = ₹91.20]

6. The Cost of Capital and the Rate of Return on Investment of WM Ltd. is 105 and 15% respectively. The company has 10,00,000 equity share of ₹10 each outstanding and its earnings per share is ₹5. Calculate the value of the firm in the following situations using Walter's Model: (i) 100% retention, (ii) 50% retention, (iii) No retention. Comment on your result.

[C.S.Final Dec. 1995]

[Ans. (i) ₹750 lakhs, (ii) ₹625 lakhs, (iii) ₹500 lakhs]

7. The MNC Ltd.'s available information is:

k = 15%, E = ₹30, r = (a) 14%, (b) 15% and (c) 16%

You are required to calculate market price of a share of MNC Ltd. as per Gordon's Model if: (i) b = 40%, (ii) b = 60% and (iii) b = 80%.

[C.S. Final June 2002]

[Ans. (i) ₹191.49, ₹200, ₹209.30, (ii) ₹181.82, ₹200, ₹222.22, (iii) ₹157.89, ₹200, ₹272.73]

8. A company has a total investment of ₹5,00,000 in assets and 50,000 outstanding ordinary shares at ₹10 per share (par value). It earns a rate of 15% of its investments and has a policy of retaining 50% of the earnings. If the appropriate discounting rate of the firm is 10%, determine the price of its shares using Gordon's Model. What shall happen to the price of the share, if the company has a payout of 80% or 20%?

[C.S. Final Dec. 2003]

[Ans. (i) 50% payout, P = 30, (ii) 80% payout, P = ₹17.14, (iii) 20% payout, P = ₹ (–)15]

9. The following information is available in respect of the Rate of Return on Investment (r), the capitalisation rate (k) and earnings per share (E) of XYZ Ltd.

r = 15%, E = ₹30

Determine the value of its shares, assuming the following:

Situation	Retention Ratio (%)	*D/P* Ratio (%)	*k* (%)
(a)	90	10	20
(b)	80	20	19
(c)	70	30	18
Situation	**Retention Ratio (%)**	***D/P* Ratio (%)**	***k* (%)**
(d)	60	40	17
(e)	50	50	16
(f)	40	60	15
(g)	30	70	14

[Ans. ₹46.15, ₹75, ₹94.74, ₹109.09, ₹120, ₹128.57, ₹135.48]

10. A chemical company belongs to a risk class for which the appropriate price-earnings ratio is 10. It currently has 50,000 equity shares (outstanding) selling at ₹100 each. The firm is contemplating the declaration of ₹8 as dividend per share at the end of the current financial year which has just started. Given the assumption of Modigliani and Miller, answer the following:
    (a) What will be the price of the share at the end of the year (i) if dividend is not declared; (ii) if dividend is declared?
    (b) Assume that the firm paying the dividend has net profit of ₹5,00,000 and makes investment of ₹10,00,000 during the period, how many new shares must be issued?

    [C.S. Final June 1996]

    [Ans. (a) ₹110, ₹102, (b) 8824]

11. A company belongs to a risk class for which the appropriate capitalisation rate for is 10%. It currently has 25,000 shares selling at ₹100 each. The firm is contemplating the declaration of ₹5 as dividend at the end of the current financial year. The company expects to have a Net Income of ₹2.5 lakhs and has a proposal for making new investments of ₹5 lakhs. Show that under the M-M assumptions, the payment of dividend does not affect the value of the firm at the end of the year. *[C.S. Final June 1997]*

    [Ans. (a) P_1 = ₹105, 110, (b) New shares = 3571, 2273, (c) Value = ₹30 lakhs]

12. RST Ltd. has a capital of ₹10,00,000 in equity shares of ₹100 each. The shares are currently quoted at par. The company proposes declaration of dividend of ₹10 per share. The capitalisation rate for the risk class to which the company belongs is 12%. What will be the market price of shares at the end of the year, if (i) no dividend is declared; and (ii) 10% dividend is declared?

    Assuming that the company pays the dividend and has a net profits of ₹5,00,000 and makes new investments of ₹10,00,000 during the period, how many new shares must be issued? Use M-M Model. *[C.S. Final Dec. 1999]*

    [Ans. (a) (i) ₹112, (ii) ₹102, (b) 5882 shares]

13. Exponent Ltd. has 50,000 equity shares of ₹10 each outstanding on 1st April. The shares are being quoted at par in the market. The company intends to pay a dividend of ₹2 per share for current financial year. It belongs to a risk class whose appropriate capitalisation rate is 15%.

    Using M-M Model and assuming no taxes, ascertain the price of company's share as it is likely to prevail at the end of the year when (i) dividend is declared and (ii) no dividend is declared.

    Also find out the number of new shares that the company must issue to meet its investment needs of ₹2,00,000 assuming Net Income of ₹1,10,000 and assuming that the dividend is paid. *[C.S. Final June 2001]*

    [Ans. (i) ₹9.50, (ii) ₹11.50, New shares = 20000 shares]

14. X Ltd. has 8 lakhs equity shares outstanding at the beginning of the accounting year 2005. The current market price of the shares is ₹120 each. The BOD of the company has recommended ₹6.40 per share as dividend. The rate of capitalisation, appropriate to the risk class to which the company belongs, is 9.6%.
    (i) Based on M-M approach, calculate the market price of the shares of the company when the recommended dividend is (a) declared and (b) not declared.
    (ii) How many new shares are to be issued by the company at the end of the accounting year on the assumption that the Net Income for the year is ₹1.60 crores and the investment budget is ₹3.20 crores when (a) the above dividends are distributed and (b) dividends are not declared? *[C.A. Final May 2003]*

    [Ans. (i) ₹125.12, ₹131.52, (ii) New shares = 168798, 121655]

15. Bestbuy Auto Ltd. has outstanding 1,20,000 shares selling at ₹20 per share. The company hopes to make a Net Income of ₹3,50,000 during the year ended 31st March 2005. The company is considering paying a dividend of ₹2 per share at the end of the current year. The capitalisation rate for the risk class of the company has been estimated to be 15%.
    Assuming no taxes, answer the questions listed below on the basis of the M-M Dividend Valuation Model:
    (i) What will be the price of the share at the end of the year (a) if dividend is paid and (b) dividend is not paid?
    (ii) How many new shares must the company issue if the dividend is paid and the company needs ₹740000 for an approved investment expenditure during the year? *[C.S. Final June 2003]*

    [Ans. (i) ₹21, ₹23, (ii) 30000 shares]

10 CHAPTER Financial Control

CHAPTER OUTLINE

10.1 Concept of Financial Control
10.2 Objectives of Financial Control
10.3 Steps of Financial Control
10.4 Major Tools of Financial Control
10.5 Advantages/Importance/Significance of Financial Control System
10.6 Limitations/Disadvantages/Drawbacks of Financial Control System
10.7 Essential Elements of an Effective Financial Control System
10.8 Summary

10.1 CONCEPT OF FINANCIAL CONTROL

Financial Control refers to the control of financial activities with the help of certain tools like Ratio Analysis, Budgetary Control, Break-Even Analysis, etc., with a view to ensure the accuracy of reporting, eliminating fraud and protecting the organisation's resources in order to achieve organisational objectives. It helps in assessing the long-term financial viability of the organisation. It assists in identification of areas which need improvement. It is a mechanism which helps in judging whether current financial activities of an organisation are in line with planned financial operations. Eventually, Financial Control helps in the formulation of future plans also.

10.2 OBJECTIVES OF FINANCIAL CONTROL

The objectives of Financial Control are enumerated as follows:

1. ***Use of funds:*** To ensure effective and appropriate use of funds.
2. ***Examination of financial processes:*** To examine effectiveness and efficiency of financial processes.
3. ***Safeguarding of assets:*** To ensure safeguarding of assets.
4. ***Improvement in financial strength:*** To improve the financial strength of the organisation.

5. ***Bringing in confidence:*** To bring in confidence amongst the stakeholders.
6. ***Financial discipline and financial stability:*** To bring about financial discipline and financial stability.
7. ***Fixing up financial authority and responsibility:*** To fix up financial authority and responsibility.
8. ***Achieving organisational objectives:*** To help in accomplishing organisational objectives.
9. ***Cost control:*** To aid in cost control.
10. ***Identifying deviations and corrective actions:*** To identify deviations, to examine the reasons for such deviations and to take appropriate remedial measures.

10.3 STEPS OF FINANCIAL CONTROL

Financial Control involves the following steps:

1. ***Setting the standard:*** Setting up the standard for financial transactions is the first step in Financial Control. Standards are required to be set in respect of cost, revenue and capital. Nevertheless, while setting up the standard, the basic objective of a firm (wealth maximisation) should be taken into account. Standard should be consistent and attainable.
2. ***Measurement of actual performance:*** The second step in Financial Control is to measure the actual performance. For keeping records of actual performance financial statements should be prepared periodically in a systematic manner.
3. ***Comparing actual performance with standard:*** In the third step, a comparison has to be made between actual performances and standard performance. Such comparison should be done at regular intervals.
4. ***Finding out reasons for deviations:*** If any deviations are observed between the actual performance and the standard performance, causes of such variations or deviations have to be ascertained. The same has to be brought to the notice of the appropriate authority for necessary action.
5. ***Taking remedial measures:*** Taking proper remedial measures is the last step in Financial Control. It is required to bridge the gaps between actual performance and standard performance in future.

10.4 MAJOR TOOLS OF FINANCIAL CONTROL

Finance is needed for each and every activity of the organisation. Since activities requiring finance are different in nature, different tools and techniques are required for controlling such activities. Some major tools of Financial Control are discussed next.

10.4.1 Budgetary Control

Budgetary Control is a control device whereby actual results are compared with budgets to find out deviations (if any) and to take remedial measures as per requirement for the purpose of

achieving organisational objectives. Planning, coordinating and controlling are the three main objectives of Budgetary Control. It is a control technique that aids management in allocating authority and responsibility.

Advantages of Budgetary Control

The advantages of Budgetary Control are:

1. ***Setting goals and targets:*** It precisely lays down the overall goals of the organisation and sets the performance targets for each department.
2. ***Defining responsibilities:*** It clearly defines responsibilities of all the persons of the organisation. As a result, everyone has a clear idea of what is expected from him.
3. ***Evaluating performance:*** It facilitates comparison of actual performance with budgeted targets and helps in finding out the deviation, if any, between the two. In this way, it helps in performance evaluation and aids in suggesting remedial measures.
4. ***Optimum resource utilisation:*** It ensures optimum use of available resources which promotes operational efficiency which helps in reduction of wastages.
5. ***Coordination:*** It fosters coordination of various activities of the business.
6. ***Cost control:*** It aids in cost control.
7. ***Cost consciousness:*** It creates cost consciousness amongst the managers.

Disadvantages/Limitations of Budgetary Control

The following are the disadvantages of Budgetary Control:

1. ***Estimate-based:*** Since budgets are estimate-based, such estimates may or may not actually come out to be true in future.
2. ***Rigidity:*** Rigidity in budgetary control makes it unsuitable in the changing scenario.
3. ***Problem of coordination:*** Lack of coordination arising out of lack of motivation can create problems.
4. ***Costly:*** The introduction and implementation of a budgetary control system is expensive.
5. ***Conflict:*** It can lead to departmental conflict because of disputes over resource allocation.

10.4.2 Return on Investment

Return on Investment (ROI) is an important tool of Financial Control. ROI is expressed as follows:

$$\text{ROI} = \text{Profit Margin} \times \text{Total Asset Turnover} \quad (1)$$

where,

Profit Margin = Net Income/Sales; Total Asset Turnover = Sales/Total assets

So,

$$\text{ROI} = (\text{Net Income}/\text{Sales}) \times (\text{Sales}/\text{Total assets}) \quad (2)$$

Net Income = Sales – Total Costs

Total Assets = Current Assets + Non-Current Assets

Net Profit Margin measures the operational effectiveness of an organisation. Asset turnover measures the ability of the organisation to use assets efficiently.

Advantages of ROI

Return on Investment has certain advantages which are listed as follows:

1. ***Simplicity:*** It is a relatively simple, easy-to-use financial control tool.
2. ***Understandability:*** It is easily understood across functional organisations and industries.
3. ***Completeness:*** It is a complete financial control technique.
4. ***Applicability:*** It can be applied to the entire organisation or to different departments of the organisation as per requirement.
5. ***Resource allocation:*** It helps in proper resource allocation and it also facilitates rational use of resources.

Disadvantages/Limitations/Drawbacks of ROI

Return on Investment suffers from certain limitations which are listed as follows:

1. ***Problem in standard setting:*** Difficulty in setting the standard rate of return on investment is a problem.
2. ***Dependence on profit:*** If profit is not accurately computed then ROI will also be misleading because the calculation of ROI is based on profit.
3. ***Emphasising short-term interest:*** Managers' decisions are often based on short-term interests and not on the basis of long-run interests.
4. ***Narrow focus:*** It can produce a narrow focus on divisional profitability at the cost of profitability for the organisation.

10.4.3 Break-Even Analysis

Break-Even Analysis is a Financial Control technique that analyses the interrelationship between production, cost and profit to formulate planning. Here, expenses are divided into two categories—fixed cost and variable cost.

Assumptions of Break-Even Analysis

The break-even analysis is based on the following set of assumptions:

1. The total costs may be classified into fixed and variable costs.
2. The cost function as well as revenue function remain linear.
3. The price of the product is assumed to be constant.
4. Sales volume and production volume are equal. It means that there is no opening or closing stock.
5. The fixed costs remain constant over the volume under consideration.
6. Variable costs will fluctuate in direct proportion to volume of output.
7. Product-mix will remain unaltered.

8. Selling price will remain constant.
9. The technology, production methods and efficiency remain unchanged.

Formula of Break Even Analysis

Break-even point (BEP) can be arrived at by using the following formula:

BEP (in units) = Fixed Cost / Contribution per unit

BEP (in sales value) = Fixed Cost / P/V Ratio

Contribution per unit = Selling price per unit – Variable cost per unit

P/V Ratio = Contribution / Sales

Advantages/Importance of Break-Even Analysis

The advantages of Break-Even Analysis are listed as follows:

1. ***Decision-making:*** It assists in managerial decision making. Decisions pertaining to make or buy, shut down point, acceptance of an order, etc. are taken on the basis of this analysis.
2. ***Determination of profit:*** Profit at different levels of activity can be easily determined with the help of break-even analysis.
3. ***Fixing selling price:*** It aids in fixation of the selling price of the products or services.
4. ***Cost control:*** It can be used as a tool of cost control.
5. ***Inter-firm comparison:*** It facilitates comparison of the profitability of different firms operating in the same industry.
6. ***Profit planning and budget preparation:*** It helps in profit planning and budget preparation.

Disadvantages/Limitations/Drawbacks of Break-Even Analysis

The oft-quoted disadvantages of Break-Even Analysis are:

1. ***Assumption-based:*** Certain assumptions (like fixed cost remains constant; variable cost varies proportionately with production etc.) on which this analysis is based are unrealistic. Because of so many restrictive assumptions underlying the analysis, calculation of BEP is considered an approximation rather than a reality.
2. ***Supplementary:*** This technique can at best be applied as a supplementary tool. It should not be used for control in isolation.
3. ***Unrealistic assumption about the nature of the firm:*** The nature of the firm (i.e., whether the firm is growing or declining) is ignored in this analysis. Here. it is assumed that the firm always remains constant.
4. ***Limited applicability:*** This technique cannot be appropriately used for multiproduct firms.
5. ***Not a decision-making tool:*** It should be viewed as a planning aid and not as a decision-making tool.

6. ***Ignoring capital employed:*** It does not take into consideration the amount of capital employed in the business. But capital employed is an important determinant of the profitability of a concern.

10.4.4 Ratio Analysis

A ratio is an expression of the relationship between numbers. It involves selecting two critical figures from the financial statement(s) and expressing the relationship.

Ratio Analysis is an important tool of Financial Control that is used to obtain a quick indication of a firm's financial performance in several key areas. It is a quantitative analysis of information contained in the financial statements. It is often used to evaluate the operating and financial performance of an organisation like liquidity, solvency efficiency, profitability, etc. It exhibits a summarised form of a fairly good idea about the financial position of a concern.

Advantages/Importance of Ratio Analysis

Ratio Analysis has the following advantages:

1. ***Decision-making:*** It aids in managerial decision making.
2. ***Trend analysis:*** It helps in trend analysis involving the comparison of performance of a single company over a period.
3. ***Determining financial performance:*** Ratio analysis helps in determining financial performance (liquidity, solvency, profitability etc.) of a firm.
4. ***Facilitating inter-firm and intra-firm comparisons:*** Inter-firm and intra-firm comparisons can be made easily with the help of ratio analysis.
5. ***Communication of information regarding the position and progress:*** Valuable information as to the position and progress of the organisation can be communicated to the stakeholders through ratio analysis.
6. ***Cost control:*** It aids in cost control.
7. ***Signal of the sickness:*** It can give a signal of the sickness of a firm in advance so that proper measures can be taken in time to prevent the occurrence of such sickness.
8. ***Financial forecasting:*** It aids in preparing financial estimates for the future (financial forecasting).

Disadvantages/Limitations of Ratio Analysis

The following are the disadvantages of Ratio Analysis:

1. ***Limitations of financial statements:*** Since ratios are calculated from financial statements the inherent limitations of financial statements also exist in ratio analysis.
2. ***Problem of single ratio:*** It is not possible to come to a conclusion from a single ratio in most of the cases. Supporting ratios are required to predict an incident.
3. ***Use of historical data:*** It is based on historical data which have little relevance for future.
4. ***Ignoring qualitative factors:*** Qualitative factors are outside the purview of ratio analysis.

5. ***Caution needed in application:*** In the case of **seasonal business** (like umbrella company) ratio analysis should be used with caution because there is a huge difference in demand for such products in seasons and out-of-seasons.
6. ***Ignoring exrnal factors:*** External factors (like the worldwide recession) are not considered in ratio analysis.
7. ***Providing partial information:*** It only gives part of the total information required for proper decision-making.
8. ***Irrelevant in case of application of different accounting policies:*** Differences in accounting policies make accounting ratios of two firms non-comparable.
9. ***Inability to provide solution:*** Ratios can provide clues to solutions but cannot provide solutions.

10.4.5 Zero-Based Budgeting

Zero-Based Budgeting (ZBB) is a method of budgeting in which all expenses need justification for each new period. It starts from the scratch with a 'zero base', and every function or activity is analysed for its needs and costs. Only new expenses are analysed in traditional budgeting, whereas ZBB calls for a justification of old, recurring, and new expenses. But it should not be used indiscriminately. If applied intelligently, ZBB is a useful tool to curb unnecessary expenditure. It is used as a managerial tool to control costs. It was developed by Peter A Pyhrr and gained popularity during the early 1970s.

Advantages/Importance/Merits of ZBB

The advantages of ZBB are briefly listed as follows:

1. ***Resource allocation:*** Efficient **resource allocation** can be ensured.
2. ***No scope for inflating the budget:*** The possibility of **inflating the budget** arbitrarily does not exist.
3. ***Eliminating non-key activities:*** By forcing managers to identify critical activities ZBB helps in **eliminating non-key activities**.
4. ***Removing redundant activities:*** It assists in the identification of **redundant activities** and consequent removal of such activities.
5. ***Operational efficiency:*** It promotes **operational efficiency**.

Disadvantages/Limitations/Shortcomings of ZBB

The following are the disadvantages of ZBB:

1. ***Time consuming:*** It is time consuming.
2. ***Requires skill, expertise and training:*** Successful implementation of ZBB requires skill, expertise and training.
3. ***High manpower requirement:*** Manpower requirement is high.

4. ***Emphasising short-term aspects:*** There may be more emphasis on short-term aspects at the cost of long-term activities (like Research & Development) which may not deliver revenue in the short-term.
5. ***Costly:*** It involves more expenses.

10.5 ADVANTAGES/IMPORTANCE/SIGNIFICANCE OF FINANCIAL CONTROL SYSTEM

Financial Control system has many advantages. These are stated as follows:

1. ***Financial discipline:*** Financial control ensures proper financial discipline.
2. ***Proper utilisation of resources:*** It ensures optimal utilisation of resources.
3. ***Prevention and elimination of wastage:*** It helps in prevention and elimination of wastage of financial resources.
4. ***Selecting appropriate source of finance:*** It aids in selecting appropriate source of finance.
5. ***Bringing in confidence:*** It brings in confidence amongst the stakeholders.
6. ***Cost reduction:*** It can help in achieving cost reduction.
7. ***Accomplishing organisational objectives:*** It helps in achieving organisational objectives.
8. ***Coordination:*** It facilitates coordination of financial activities.
9. ***Creditworthiness:*** It enhances creditworthiness of the organisation.
10. ***Financial decisions:*** It aids management to take appropriate financial decisions.
11. ***Reformulating financial plans:*** It helps in reformulating financial plans when the results are not satisfactory.
12. ***Self-control:*** It inspires employees to apply 'self-control'.

10.6 LIMITATIONS/DISADVANTAGES/DRAWBACKS OF FINANCIAL CONTROL SYSTEM

Limitations of Financial Control system are enumerated as follows:

1. ***Difficulty in standard setting:*** Setting the standard for an activity is a difficult task.
2. ***Problem of improper measurement:*** Improper measurement of actual financial performance makes the task of comparison difficult.
3. ***Rigidity:*** The rigidity of the standards makes it useless in changed situation.
4. ***Expensive:*** It involves lots of money. So all organisations are not in a position to implement it.
5. ***Unsuitable for controlling external financial activities:*** It can control internal financial activities. But controlling external financial activities is outside its scope.
6. ***Limitations of tools and techniques:*** Tools and techniques used in financial control have their own limitations. As a result, financial control also suffers from those limitations.
7. ***More emphasis on cure:*** It is often used as a curative measure than a preventive measure. As such, the loss already suffered is beyond its control.

8. ***Manipulation of data:*** Strict financial control may motivate managers to manipulate data by way of insufficient provision for bad debts or by means of providing inaccurate information.
9. ***Focus on short-term profit performance:*** It is often oriented towards short-term profit performance ignoring the long-term prospects.
10. ***Ignoring non-financial attributes:*** Important non-financial attributes like product quality, customer service, motivation of employees etc. are not taken into consideration.
11. ***Information overload:*** Information overload may act as a barrier to financial control.

10.7 ESSENTIAL ELEMENTS OF AN EFFECTIVE FINANCIAL CONTROL SYSTEM

An effective Financial Control system should have the following elements:

1. ***Flexibility:*** It should be **flexible** so that necessary changes can be easily accommodated when required.
2. ***Setting attainable standard:*** **Standard** set in financial control system should be **consistent and attainable**.
3. ***Economical:*** It should be **economical** as far as practicable.
4. ***Understandability:*** It should be designed in such a way that all concerned can **understand** it easily.
5. ***Forward-looking:*** It has to be **forward looking**.
6. ***Pervasiveness:*** It should be **pervasive** so that it can be applied to all kinds of financial transactions.
7. ***Preventive:*** It has to be **preventive** rather than curative.
8. ***Timely application:*** Applying financial control system **in time** is the key to its effectiveness.
9. ***Control by exception:*** It should focus on "**control by exception**" implying that it should concentrate on significant deviations and ignore minor variances.
10. ***Continuity:*** Financial control should be a **continuous** process.
11. ***Objectivity:*** Financial control has to be **objective** in nature. Objectivity has two dimensions: (a) It should be unbiased, and (b) It should be based on organisational needs and not on personal needs.

10.8 SUMMARY

- Financial control is the control of financial activities with the help of certain tools like ratio analysis, budgetary control, break-even analysis etc. with a view to ensuring the accuracy of reporting, eliminating fraud and protecting the organisation's resources in order to achieve organisational objectives.
- Effective and appropriate use of funds, safeguarding of assets, bringing about financial discipline and financial stability, fixing up financial authority and responsibility,

accomplishing organisational objectives, cost control, identifying deviations and corrective actions etc. are the main objectives or purposes of financial control. The steps of financial control include setting the standard, measurement of actual performance, comparing actual performance with standard, finding out reasons for deviations and taking remedial measures.

- Some major tools of financial control are budgetary control, Return on Investment (ROI), break-even analysis, ratio analysis, Zero-based Budgeting (ZBB) etc.
- Budgetary control is a control device whereby actual results are compared with budgets to find out deviations (if any) and to take remedial measures as per requirement for the purpose of achieving organisational objectives.
- **Planning, coordinating and controlling** are the three main objectives of budgetary control.
- Return on investment (ROI) is the product of profit margin and total asset turnover.
- Break-even analysis is a financial control technique that analyses the interrelationship between production, cost and profit to formulate planning. Here, expenses are divided into two categories: Fixed Cost and Variable Cost.
- Ratio analysis is an important tool of financial control that is used to evaluate the operating and financial performance of an organisation like liquidity, solvency efficiency, profitability etc.
- Zero-based budgeting (ZBB) is a method of budgeting in which all expenses need **justification** for each new period. It starts from the scratch with a "zero base," and every function or activity is analysed for its needs and costs.
- The oft-quoted advantages of financial control system are ensuring financial discipline, optimum resource utilisation, achieving organisational objectives, achieving cost reduction, selecting appropriate source of finance, prevention and elimination of wastage of financial resources etc.
- The limitations of financial control system include rigidity, ignoring non-financial factors, high cost, information overload, too much emphasis on short-term performance etc. An effective financial control system should be flexible, understandable, economical, forward-looking, pervasive, preventive, continuous and unbiased.

EXERCISES

A. Short-answer Type Questions **(5 Marks)**

1. What is Financial Control? *[C.U. B.Com. (H), 2007]*
2. Elucidate the objectives of Financial Control. *[C.U. B.Com. (H), 2008]*
3. Explain the steps in Financial Control. Describe the essential elements of an effective Financial Control system. *[C.U. B.Com. (H), 2006]*
4. Discuss in brief the major tools of Financial Control. *[C.U. B.Com. (H), 2007]*

5. State the advantages and disadvantages of Budgetary Control. *[C.U. B.Com. (H), 2007]*
6. Explain the concept of Ratio Analysis as a tool of Financial Control. Discuss its merits and demerits. *[C.U. B.Com. (H), 2009]*
7. How does Ratio Analysis help a firm in Financial Control? *[C.U. B.Com. (H), 2011]*
8. What is 'accounting Ratio Analysis'? State the limitations of accounting Ratio Analysis as a tool of Financial Control. *[C.U. B.Com. (H), 2014]*
9. "Return on Investment is an important tool of Financial Control."Discuss. *[C.U. B.Com. (H), 2006, 2012]*
10. Explain the concept of Return on Investment as a tool of Financial Control. *[C.U. B.Com. (H), 2008]*
11. Explain the role of Return on Investment in effecting Financial Control of a firm. *[C.U. B.Com. (H), 2010]*
12. Explain in brief Break-Even Analysis and Return on Investment as tools of Financial Control. *[C.U. B.Com. (H), 2013]*
13. Write briefly on ROI and zero base budgeting as tools of Financial Control. *[C.U. B.Com. (H), 2015]*
14. Write short notes on:
    (a) Break-Even Analysis *[C.U. B.Com. (H), 2008, 2012]*
    (b) Budgetary Control *[C.U. B.Com. (H), 2010]*
15. State the importance of financial control. Also state the steps involved in financial control. *[C.U. B.Com. (H), 2016]*

Previous-Years Solved Questions (2006–2016)

C.U. B. Com. (Hons.) Examinations

CHAPTER 1: INTRODUCTION

Theoretical Questions

5 Marks

1. Give an idea about the wealth maximization objective of financial management. (Refer to Page No. 1.10) *[C.U. B.Com. (H), 2006]*
2. Explain the various functions of financial management. (Refer to Page No. 1.5) *[C.U. B.Com. (H), 2007]*
3. Distinguish between profit maximization and wealth maximization objective of the firm. (Refer to Page No. 1.12) *[C.U. B.Com. (H), 2008]*
4. Discuss in brief the functions of financial management. (Refer to Page No. 1.5) *[C.U. B.Com. (H), 2009]*
5. 'The financial goal of a firm should be to maximize value or wealth'. Explain. (Refer to Page No. 1.10) *[C.U. B.Com. (H), 2010]*
6. Explain the interrelationship between financing decision, investment decision and dividend decision. (Refer to Page No. 1.7) *[C.U. B.Com. (H), 2011]*
7. What is value maximisation objective of a firm? How does it differ from profit maximisation objective? (Refer to Page No. 1.10, 1.12) *[C.U. B.Com. (H), 2011]*
8. Why is 'wealth maximisation' preferred over 'profit maximisation' as the goal of a firm? (Refer to Page No. 1.10) *[C.U. B.Com. (H), 2012]*
9. Why is it inappropriate to seek profit maximization as the goal of financial decision making? (Refer to Page No. 1.8) *[C.U. B.Com. (H), 2013]*
10. How do financial managers take financing and investment decisions? (Refer to Page No. 1.5) *[C.U. B.Com. (H), 2013]*
11. State briefly the role of chief financial officer? (Refer to Page No. 1.13) *[C.U. B.Com. (H), 2013]*
12. Briefly discuss the functions of financial management. (Refer to Page No. 1.5) *[C.U. B.Com. (H), 2014]*

13. 'Wealth maximisation is dependent on profit maximisation'. Discuss. (Refer to Page No. 1.12) *[C.U. B.Com. (H), 2014]*
14. Discuss the main objectives of financial management. (Refer to Page No. 1.4) *[C.U. B.Com. (H), 2015]*
15. Should profit maximization goal be regarded as the primary goal of financial management? (Refer to Page No. 1.8) *[C.U. B.Com. (H), 2015]*
16. Explain the role of Chief Financial Officer (CFO) in the modern business environment. (Refer to Page No. 1.13) *[C.U. B.Com. (H), 2015]*
17. Explain two basic functions of financial management. (Refer to Page No. 1.5) *[C.U. B.Com. (H), 2016]*
18. Specify the limitations of 'maximisation of profit' as the objective of a firm. (Refer to Page No. 1.8) *[C.U. B.Com. (H), 2016]*
19. What will be the role of CFO in the financial crisis of an organization? (Refer to Page No. 1.13) *[C.U. B.Com. (H), 2013]*

CHAPTER 2: BASIC CONCEPTS

Theoretical Questions

5 Marks

1. Explain with example the compounding technique and the discounting technique in relation to time value of money. (Refer to Page No. 2.11, 2.16) *[C.U. B.Com. (H), 2006]*
2. Explain the concept of time value of time value of money with examples. (Refer to Page No. 2.3) *[C.U. B.Com. (H), 2008]*
3. Write short note on time value of money. (Refer to Page No. 2.3) *[C.U. B.Com. (H), 2009]*
4. State the compounding and discounting techniques of time value of money. (Refer to Page No. 2.11, 2.16) *[C.U. B.Com. (H), 2010]*
5. Write short note on compounding and discounting technique. (Refer to Page No. 2.11, 2.16) *[C.U. B.Com. (H), 2012]*
6. What is time value of money? What is its importance in the long term financial decision making? (Refer to Page No. 2.3, 2.6) *[C.U. B.Com. (H), 2013]*
7. Give a brief idea regarding financial environment of a business. (Refer to Page No. 2.35) *[C.U. B.Com. (H), 2013]*
8. In which techniques time is adjusted with the value of money? (Refer to Page No. 2.11, 2.16) *[C.U. B.Com. (H), 2014]*
9. Discuss the relationship between risk and return. (Refer to Page No. 2.34) *[C.U. B.Com. (H), 2014]*

10. Discuss the basic components of the financial environment under which a firm has to operate. (Refer to Page No. 2.35) *[C.U. B.Com. (H), 2015]*

Practical Problems

1. Naba is offered either to receive ₹5,000 one year from now or ₹7,000 five years from now. Which one Naba will accept and why if discount rate is 10%? Given, present value of ₹1 at 10% is 0.909 and 0.621 for 1st and 5th year respectively? *[C.U. B.Com. (H), 2007]*

Solution

We know that, Present Value (PV) = $FV \left\{\frac{1}{(1+r)^n}\right\}$

where, r = interest rate i.e. 10% or, 0.10

n = no of years

PV = Principal Amount

Option I:

When FV = ₹5,000 and n = 1 year

$$PV = 5{,}000\left[\frac{1}{(1+0.10)^1}\right]$$

$$= 5{,}000 \times 0.909 \left[\text{Given}, \frac{1}{(1+0.10)^1} = 0.909\right]$$

$$= ₹4{,}545$$

Option II:

When FV = ₹7,000 and n = 5 year

$$PV = 7{,}000\left[\frac{1}{(1+0.10)^5}\right]$$

$$= 7{,}000 \times 0.621 \left[\text{Given}, \frac{1}{(1+0.10)^5} = 0.621\right]$$

$$= ₹4{,}347$$

Since the present value of 1st option is more than that of 2nd option, Naba sould accept the 1st option i.e. receiving ₹5,000 one year from now.

2. Shubha invested ₹10,000 at an interest of 12% p.a. for 3 years. Compute future value of investments assuming interest is compounded quarterly. [Given $FVIF_{(3,12)}$ = 1.4262] *[C.U. B.Com. (H), 2007]*

Solution

We know that, Future Value (FV) = $PV\left(1+\frac{r}{m}\right)^{mn}$

where,

r = interest rate i.e. 12% or, 0.12

n = no of years i.e. 3 years

m = no of times compounding done per year i.e. 4

PV = Principal Amount = ₹10,000

So, $$FV = 10{,}000\left(1+\frac{0.12}{4}\right)^{4\times 3}$$

$FV = 10{,}000\ (1.03)^{12}$

$FV = 10{,}000 \times 1.4262$ [Given FVIF (3,12) = 1.4262]

FV = ₹14,262

3. From the following cash flow streams, which cash flow would you recommend and why?

End of Year	Stream	Stream	Stream
	A	B	C
	(₹)	(₹)	(₹)
1	200	500	350
2	300	400	350
3	400	300	350
4	500	200	350

It is given that present value of ₹1 at 10% to be received t the end of each year is given below:

Year	1	2	3	4
P.V. Factor	0.91	0.83	0.75	0.68

[C.U. B.Com. (H), 2009]

Solution

PV of the Series of Cash Flows

Year	Stream A Cash flows (₹)	Stream B Cash flows (₹)	Stream C Cash flows (₹)	Present Value Factor	Present Value PV = FV × (PVIF r,n) Stream A	PV of Stream B	PV of Stream C
1	200	500	350	0.91	200 × 0.91 = 182	500 × 0.91 = 455	350 × 0.91 = 318.5
2	300	400	350	0.83	300 × 0.83 = 249	400 × 0.83 = 332	350 × 0.83 = 290.5
3	400	300	350	0.75	400 × 0.75 = 300	300 × 0.75 = 225	350 × 0.75 = 262.5
4	500	200	350	0.68	500 × 0.68 = 340	200 × 0.68 = 136	350 × 0.68 = 238
Total					₹1,071	1,148	1,109.5

Stream B should be chosen since it has the highest present value of ₹1,148.

4. A sum of ₹5,000 is invested for 2 years at 10% interest rate compounded biannually. Find the maturity amount. *[C.U. B.Com. (H), 2011]*

Solution

We know that, Future Value (FV) = $\text{PV}\left(1+\frac{r}{m}\right)^{mn}$

where,

r = interest rate i.e. 10% or, 0.10

n = no of years i.e. 2 years

m = no of times compounding done per year i.e. 2

PV = Principal Amount = ₹5,000

So, $\text{FV} = 5{,}000\left(1+\frac{0.10}{2}\right)^{2\times 2}$

$\text{FV} = 5{,}000\ (1.05)^4$

$\text{FV} = 5{,}000 \times 1.2155$ [Given FVIF (5,4) = 1.2155]

FV = ₹6,077.53

5. You want to make a gift of ₹1,00,000 to one of your friends after 4 years from now. What amount of money you need to invest every year starting from the beginning of the first year so that you can get the required amount after 4 years? The normal rate of return is 10%. *[C.U. B.Com. (H), 2013]*

Solution

Fixed amount of savings required:

$$A = \left\{\frac{S_n}{\frac{(1+r)^n-1}{r}}\right\}\frac{1}{(1+r)}, \textit{ where,}$$

A = Annual fixed amount or sinking fund

r = Rate of interest i.e. 10% or, 0.10

n = Number of years i.e. 4

S_n = Compounded sum of annuity or Future value of an annuity

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

$$A = \left\{\frac{1,00,000}{\frac{(1+0.10)^4-1}{0.10}}\right\}\frac{1}{(1+0.10)}$$

$$A = \left\{\frac{1,00,000}{\frac{(1.10)^4-1}{0.10}}\right\}\frac{1}{(1+0.10)}$$

$$A = \left\{\frac{1,00,000}{\frac{1.4641-1}{0.10}}\right\}\frac{1}{(1+0.10)}$$

$$A = \left\{\frac{1,00,000}{\frac{0.4641}{0.10}}\right\}\frac{1}{(1+0.10)}$$

$$A = \left\{\frac{1,00,000}{4.641}\right\}\frac{1}{(1+0.10)}$$

A = ₹19,558 (approx)

6. If the loan amount is ₹10 lakhs, tenure is 3 years and rate of interest is 12%, find out the equated annual instalment. ($PVIFA_{12\%,3} = 2.40$) *[C.U. B.Com. (H), 2014]*

Solution

Present Value of Annuity:

$$PVA = A \times PVIFA_{12\%,3}$$

$$A = \frac{PVA}{PVIFA_{12\%,3}}$$

$$A = \frac{10,00,000}{2.40}$$

A = ₹4,16,667

7. Mrs. Sunita has ₹50,000 at her disposal. She wants to get her money doubled.
   (a) If interest is compounded @12% p. a. annually, then how long she has to wait to fulfill her desire?
   (b) If she is ready not to wait for more than 4 years then what should be the approximate rate of compound interest? *[C.U. B.Com. (H), 2014]*

Solution

(a) No. of years required:

$$\text{No. of years} = \frac{72}{\text{annual rate of interest}}$$

$$\text{No. of years} = \frac{72}{12}$$

No. of years = 6 years

(b) Approximate rate of compound interest:
Let the required rate of interest is 'r'.

$$FV = P(1 + r)^4$$

$$1,00,000 = 50,000\ (1 + r)^4$$

$$\frac{1,00,000}{50,000} = (1 + r)^4$$

$$2 = (1 + r)^4$$

$$2^{\frac{1}{4}} = 1 + r$$

$$1.189 = 1 + r$$

$$r = 1.189 - 1 = 0.189 = 18.9\% \text{ (approx)}$$

8. You are approached by an insurance agent to buy an annuity of ₹50,000 for 6 years starting from the beginning of first year. How much you should be ready to pay now for this annuity if you consider discount factor of 8% per annum?

[C.U. B.Com. (H), 2015]

Solution

Let, Present Value of annuity = A

Given, A = ₹50,000

Rate of interest = r = 0.08

No. of years = n = 6

We know that, PVA = $A\left\{\frac{(1+r)^n - 1}{r(1+r)^n}\right\}$

$$\text{PVA} = 50,000\left\{\frac{(1+0.08)^6 - 1}{0.08(1+0.08)^6}\right\}$$

$$\text{PVA} = 50,000\left\{\frac{(1.08)^6 - 1}{0.08(1.08)^6}\right\}$$

$$\text{PVA} = 50,000\left\{\frac{1.58687432 - 1}{0.08 \times 1.4025517307}\right\}$$

$$\text{PVA} = 18,000\left\{\frac{0.58687432}{0.12694995}\right\}$$

$$\text{PVA} = 50,000 \times 4.62287949$$

$$\text{PVA} = ₹2,31,150$$

The annuity amount is ₹2,31,150.

9. Mr. X invested ₹50,000 at an interest of 12% p. a. for 3 years. You are required to compute future value of investment assuming interest is compounded quarterly.

[C.U. B.Com. (H), 2015]

Solution

We know that, Future Value (FV) = $\text{PV}\left(1 + \frac{r}{m}\right)^{mn}$

where, r = interest rate i.e. 12% or, 0.12

n = no. of years i.e. 3 years

m = no. of times compounding done per year i.e. 4

PV = Principal Amount = ₹50,000

So, $FV = 50{,}000\left(1+\frac{0.12}{4}\right)^{4\times3}$

$FV = 50{,}000\ (1.03)^{12}$

$FV = 50{,}000 \times 1.4262$ [Given FVIF (3%,12) = 1.4262]

FV = ₹71,310

So, the future value of annuity will be ₹71,310.

10. Mr. Chiko is offered the following cash inflows:

End of year:	1	2	3	4	5
Mount (₹)	15,000	20,000	32,000	20,000	18,000

Calculate the amount receivable by Mr. Chiko if he wants the whole amount at the end of 4th year. (Applicable interest rate is 10% p. a. compounded annually).

[C.U. B.Com. (H), 2016]

Solution

Compounded Value at the End of 4th Year

End of Year	**Cash Inflows (₹)**	**No. of Years Compounded**	**Compounded Factor**	**Future Value (₹) = PV($FVIF_{8\%,4}$)**
1	15,000	4	$(1 + 0.10)^4$ or, $(1.10)^4 = 1.4641$	$15{,}000 \times 1.4641 = 21{,}961.5$
2	20,000	3	$(1 + 0.10)^3$ or, $(1.10)^3 = 1.331$	$20{,}000 \times 1.331 = 26{,}620$
3	32,000	2	$(1 + 0.10)^2$ or, $(1.10)^2 = 1.21$	$32{,}000 \times 1.21 = 38{,}720$
4	20,000	1	$(1 + 0.10)^1 = 1.10$	$20{,}000 \times 1.10 = 22{,}000$
5	18,000	0	$(1 + 0.10)^0 = 1.000000$	$18{,}000 \times 1.0000 = 18{,}000$
Compounded Value at the end of 4th Year =				₹1,27,301.5

So, the amount receivable by Mr. Chiko is ₹1,27,301.50

11. X borrows ₹59,36,000 from Y at a compound interest rate of 12% p.a. It is agreed that the loan shall be payable in two equal instalments, which shall be payable at the end of the 1st year and 2nd year respectively. Calculate the amount of instalments.

[C.U. B.Com. (H), 2017]

Solution

Let the equated monthly instalment or annuity = A

Now, loan amount should be the Present value of annuity.

Now, $PVA = A \times PVIFA_{12\%,2}$

$$A = \frac{PVA}{PVIFA_{12\%,2}}$$

$$A = \frac{59,36,000}{1.69}$$

$$A = ₹35,12,426$$

So, the amount of each installment is ₹35,12,426.

12. Mr. H is offered either to receive ₹10,000 three years from now or ₹14,000 five years from now. Which offer Mr. H will accept? Assume rate of discount is 10%.
[Given: Present value of Rupee 1 at 10% is 0.751 and 0.621 for the 3rd and 5th year respectively.] *[C.U. B.Com. (H), 2017]*

Solution

We know that, Present Value (PV) = $FV\left\{\frac{1}{(1+r)^n}\right\}$

where, r = interest rate i.e. 10% or, 0.10
n = no of years
PV = Principal Amount

Option I:

When FV = ₹10,000 and n = 3 year

$$PV = 10,000\left[\frac{1}{(1+0.10)^3}\right]$$

$$= 10,000 \times 0.751 \left[\text{Given, } \frac{1}{(1+0.10)^3} = 0.751\right]$$

$$= ₹7,510$$

Option II:

When FV = ₹14,000 and n = 5 year

$$PV = 7,000\left[\frac{1}{(1+0.10)^5}\right]$$

$$= 14,000 \times 0.621 \quad \left[\text{Given, } \frac{1}{(1+0.10)^5} = 0.621\right]$$

$$= ₹8,694$$

Since the present value of 2nd option is more than that of 1st option, Mr. H should accept the 2nd option i.e. receiving ₹14,000 five years from now.

CHAPTER 3: COST OF CAPITAL

Theoretical Questions

5 Marks

1. What do you mean by cost of capital? Mention any two significances of cost of capital. (Refer to Page No. 3.23) *[C.U. B.Com. (H), 2007]*
2. Write short note on marginal cost of capital. (Refer to Page No. 3.59) *[C.U. B.Com. (H), 2008]*
3. 'Retained earnings have no cost'. Is the statement justified? (Refer to Page No. 3.50) *[C.U. B.Com. (H), 2009]*
4. Write short note on Capital Asset Pricing Model. (Refer to Page No. 3.45) *[C.U. B.Com. (H), 2010, 2012]*
5. What is the rationale behind the use of weighted average cost of capital over specific cost of capital in evaluating a project? (Refer to Page No. 3.52) *[C.U. B.Com. (H), 2010]*
6. What are the uses of cost of capital? (Refer to Page No. 3.24) *[C.U. B.Com. (H), 2010]*
7. How will you determine the cost of equity share capital in a growth company? (Refer to Page No. 3.40, 3.43) *[C.U. B.Com. (H), 2011]*
8. What do you mean by Finance Lease? Writs its features. (Refer to Page No. 3.16) *[C.U. B.Com. (H), 2010]*

Practical Problems

1. A company issues 12% redeemable preference shares of ₹100 each at 5% premium redeemable after 15 years at 10% premium. If the flotation cost of each share is ₹2, what is the value of K_p (cost of preference share) to the company? *[C.U. B.Com. (H), 2006]*

Solution

The Cost of Capital of redeemable preference share K_p may be computed as follows:

$$K_p = \frac{D + \frac{\text{RV} - \text{NP}}{n}}{\frac{\text{RV} + \text{NP}}{2}}$$

where,

K_p = Cost of redeemable preference share

D = Rate of dividend, i.e. ₹12 per share

n = Number of years to redemption, i.e. 15 years

RV = Amount payable at the time of redemption, i.e. ₹100 + (10% of ₹100) = ₹110

NP = Net cash proceeds at the time of issue, i.e. ₹100 + (5% of ₹100) – ₹2 = ₹103

Therefore, $K_p = \dfrac{₹12 + 1/15\ (₹110 - ₹103)}{1/2(₹110 + ₹103)}$

$= \dfrac{12 + 0.46667}{106.5}$

$= \dfrac{12.46667}{106.5}$

$= 0.1170579$ or 11.71%

2. RIL Ltd. opts for the following Capital Structure:

	₹
Equity Shares (1,00,000 shares)	50,00,000
15% Debentures	50,00,000
	Total 1,00,00,000

The company is expected to declare a dividend of ₹5 per share. The market price per share is ₹50. The dividend is expected to grow at 10%. Compute weighted average Cost of Capital of RIL Ltd. assuming 50% tax rate. *[C.U. B.Com. (H), 2008]*

Solution

(a) Calculation of specific cost of capital:

Cost of equity share capital (K_e):

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

where,

D_1 = Dividend per share at the end of the current year, i.e. ₹5

P_0 = Market price per share, i.e. ₹50

g = Expected growth rate of dividend, i.e. 10% or 0.10

Therefore, $K_e = \dfrac{₹5}{₹50} + 0.10$

$= 0.10 + 0.10 = 0.20$ or 20%

Cost of Debentures (K_d):

$$K_d = \frac{I}{\text{NP}}\ (1 - t) \quad \text{(assuming perpetual debt)}$$

where,

I = Fixed annual interest payment, i.e. 15% of ₹50,00,000 = ₹7,50,000

NP = Net cash proceeds from the issue of debt, i.e. ₹50,00,000

t = Tax rate, i.e. 50% or 0.50

Therefore, $K_d = \dfrac{₹7,50,000}{₹50,00,000}\ (1 - 0.50)$

$= 0.075$ or 7.5%

(b) Calculation of Weighted Average Cost of Capital (K_0)

Source of Capital	Amount (Book value) ₹	Proportion or Weights	After-tax Cost (%)	Weighted Cost
Equity Share Capital	50,00,000	0.50	20.00	10.00
15% Debentures	50,00,000	0.50	7.50	3.75
	1,00,00,000	1.00		13.75

Therefore,

$$K_0 = 13.75/1.00$$
$$= 13.75\%$$

3. X & Co. has issued 12% redeemable preference shares of face value ₹100 for ₹10 lakh. The shares are expected to be sold at 5% discount; it will also involve flotation cost of ₹5 per share. The shares are redeemable at a premium of 5% after 10 years. Calculate the Cost of Capital of redeemable preference share if the rate of tax is 50%. Ignore dividend tax. *[C.U. B.Com. (H), 2008]*

Solution

The Cost of Capital of redeemable preference share K_p may be computed as follows:

$$K_p = \frac{D + \dfrac{\text{RV} - \text{NP}}{n}}{\dfrac{\text{RV} + \text{NP}}{2}}$$

where,

K_p = Cost of redeemable preference share

D = Rate of dividend, i.e. ₹12 per share

n = Number of years to redemption, i.e. 10 years

RV = Amount payable at the time of redemption, i.e. ₹100 + (5% of ₹100) = ₹105

NP = Net cash proceeds at the time of issue, i.e. ₹100 – (5% of ₹100) – ₹5 = ₹90

Therefore, $K_p = \dfrac{₹12 + 1/10(₹105 - ₹90)}{1/2(₹105 + ₹90)}$

$$= \frac{12 + 1.5}{97.5}$$
$$= 0.1385 \text{ or } 13.85\%$$

4. TEXCO Ltd. has capital of 1,00,000 equity shares of ₹10 each. Its price earning ratio is 10 and earning available to equity shareholders is ₹6,00,000. The earnings are expected to grow at the rate of 10% p.a. You are required to compute the cost of equity shares under earnings growth model. *[C.U. B.Com. (H), 2008]*

Solution

The cost of Equity Capital under earnings growth model (K_e) may be ascertained as follows:

$$K_e = \frac{E}{P_0} + g$$

where,

E = Earning per share, i.e. ₹6,00,000/1,00,000 or ₹6

P_0 = Market price per share

g = Expected growth rate in earnings, i.e. 10% or 0.10

We know that price earning ratio (P/E ratio) is 10

MPS/EPS = 10

MPS = 10 × EPS = 10 × 6 = ₹60

Therefore,

$$K_e = \frac{6}{60} + 0.10 = 0.10 + 0.10 = 0.20 = 20\%$$

5. The Capital Structure and other information of a company are given as follows:

Sources	Amount (in lakh)	After-tax Cost of Capital (%)
Equity Shares (₹100 each)	100	14
Reserve and Surplus	50	?
Debentures	200	?

The market value of equity share is ₹300 per share. The company uses market value of weights for computing average cost of capital. Corporate tax rate is 40% whereas the average Cost of Capital is 10%.

What is the cost of reserve and surplus and cost of debt (before tax)?

[C.U. B.Com. (H), 2007]

Solution

Computation of WACC (Weights under Market Value)

Sources of Finance	Market Value (in lakh)	Weights	Specific Cost (%)	Weighted Cost
Equity shares capital	200	0.4	14	5.60
Reserve and Surplus	100	0.20	14	2.80
Debentures	200	0.40	x	0.40x
	500	1.00		10.00

Now, $5.60\% + 2.80\% + 0.4x = 10.00\%$

$$0.4x = (10.00 - 8.40)\ \%$$

$$x = 1.60\%$$

$$K_d = 1.60/.40$$

$$= 4\% \text{ (after tax)}$$

Cost of debt (before tax) = 4%/(1 – 0.40) = 6.67%

6. The Capital Structure and specific Cost of Capital (after tax) of a company are given as follows:

	Book Value ₹(in Lakh)	After-tax Cost (%)
Equity Share Capital (Share of ₹10 each)	200	18
Retained Earnings	100	18
Long-Term Debt	200	6
	500	

The present market value of equity is ₹90 per share. Corporate tax rate is 40%.

(i) Calculate weighted average Cost of Capital using:
  (a) book value as weights
  (b) market value as weights

(ii) Explain the difference in weighted average costs as above.

[C.U. B.Com. (H), 2009]

Solution

(i) (a) **Under Book Value:**

Computation of Weighted Average Cost Capital
(Weights under Book Value)

Sources of Finance	Book Value (in lakh)	Weights	Specific Cost	Weighted Cost (%)
Equity Shares Capital	200	0.40	18%	7.20
Retained Earnings	100	0.20	18%	3.60
Long-Term Debt	200	0.40	6%	2.40
	500	1.00		13.20

Therefore weighted average Cost of Capital under market value is 13.20%

(b) **Under Market Value:**
Total market value of equity shares = 20 lakh shares at the rate of ₹90 = ₹1,800 lakh
Ratio between equity shares and retained earnings

= 200:100
= 2:1

Market value equity = ₹1,800 × 2/3
= ₹1,200

Market value of retained earnings = ₹1,800 × 1/3
= ₹600

Computation of Weighted Average Cost Capital
(Weights under Market Value)

Sources of Finance	Market Value (in lakh)	Weights	Specific Cost	Weighted Cost (%)
Equity shares capital	1,200	0.60	18%	10.80
Retained earnings	600	0.30	18%	5.40
Long-term debt	200	0.10	6%	0.60
	2,000	1.00		16.80

Therefore weighted average Cost of Capital under market value is 16.80%.

(ii) The difference in weighted average cost capital under book value as weights and market value as weights is (16.80% – 13.20%) = 5.60%. This difference arises due to the market price of equity share which is nine times higher than the nominal value.

Market value of Equity share capital is also nine times higher than the book value of long-term debt.

7. In considering the most desirable Capital Structure for a company, the following estimates of the cost of debt and Equity Capital (after tax) have been made at various levels of debt–equity mix:

Debt as Percentage of Total Cost of Equity	Cost of Debt (%)	Cost of Equity (%)
0	5	12.0
10	5	5.0
20	5	12.0
30	5.5	13.0
40	6	14.0
50	6.5	15.5
60	8	20.0

You are required to determine the optimal debt–equity mix for the company by calculating composite cost of capital. *[C.U. B.Com. (H), 2010]*

Solution

Computation of Composite Cost of Capital to Determine Optimal Debt–Equity Mix

Debt (%) (a)	Equity (%) (b)	Cost of Debt (c)	Cost of Equity (d)	Composite Cost of Capital (%) (a) × (c) + (b) × (d)
0	100	5	12	0 + 12 = 12.00
10	90	5	12	0.5 + 10.8 = 11.30
20	80	5	12.5	1 + 10 = 11.00
30	70	5.5	13	1.65 + 9.1 = 10.75
40	60	6	14	2.4 + 8.4 = 10.80
50	50	6.5	15.5	3.25 + 7.75 = 11.00
60	40	8	20	4.8 + 8 = 12.80

At the lowest composite Cost of Capital 10.75%, the debt–equity ratio is 3:7 (30% Debt Capital and 70% Equity Capital). This can be regarded as the optimum Capital Structure.

8. X Ltd. requires additional finance of ₹20 lakhs for meeting its investment plans. It has ₹4 lakh in the form of retained earnings available for investment purposes. The following are the further details:
   (i) Debt–equity mix, 40:60
   (ii) Cost of debt: up to ₹4,00,000, 10% (before tax)
   Beyond ₹4,00,000, 12% (before tax)
   (iii) Earnings per share, ₹5
   (iv) Dividend payout, 60% of earnings
   (v) Expected growth rate in dividend, 5%
   (vi) Current market price per share, ₹35
   (vii) Tax rate, 35%

   Compute the overall weighted average after tax cost of additional finance.

   [C.U. B.Com. (H), 2011]

Solution

Additional finance required = 20,00,000

Debt–equity mix = 40:60

∴ Long-term debt required = 8,00,000

Rate of Tax = 35%

Equity finance required = ₹20,00,000 × 60% = ₹12,00,000

Less: Retained earnings available = ₹4,00,000

New equity share capital required = ₹8,00,000

Earnings per share = ₹5

∴ Dividend per share = ₹5 × 60% = ₹3

Growth rate in dividend = 5%

Market price per share = ₹35

(i) Cost of equity =

$$K_e = \frac{\text{Dividend per share (after growth)}}{\text{Market price per share}} 11 + \text{Expected growth rate}$$

$$= \frac{₹3 \times (1.05)}{₹35} \times 1.05$$

$$= 14\%$$

(ii) Cost of retained earnings (K_r) = Cost of equity (K_e) = 14%

(iii) Cost of 10% long-term debt = K_d = 10% (1 – 0.35) = 0.65 or 6.50%

(iv) Cost of 12% long-term debt = K_d = 12% (1 – 0.35) = 0.780 or 7.80%

Computation of Weighted Average after Cost of Capital

Sources of Finance	Market Value	Weights	Specific Cost (%)	Weighted Cost (%)
Equity shares capital	8,00,000	0.40	14.00	5.60
Retained earnings	4,00,000	0.20	14.00	2.80
10% Long-term debt	4,00,000	0.20	6.50	1.30
12% Long-term debt	4,00,000	0.20	7.80	1.56
	20,00,000	1.00		11.26

Therefore weighted average Cost of Capital is **

9. SWAN Ltd. has assets of ₹3,20,000 which have been financed with ₹1,04,000 of debt, ₹1,80,000 of equity, and a general reserve of ₹36,000. The company's total profit after interest and taxes for the year ended March 31, 2013 were ₹27,000. It pays 8% interest on borrowed funds and is in the 30% tax bracket. It has 1,800 equity shares of ₹100 per share, presently selling at a market price of ₹120 per share. What is the weighted average Cost of Capital of SWAN Ltd.? *[C.U. B.Com. (H), 2013]*

Solution

(i) Cost of equity share capital:

$$K_e = \frac{\text{Earnings per share } (E)}{\text{Market price per share } (P)} \times 100$$

$$= \frac{₹15}{₹120} \times 100 \; [E = ₹27{,}000/1{,}800 \text{ shares} = ₹15]$$

$$= ₹12.5\%$$

(ii) Cost of debt (K_d) = $I \times (1 - t)$

$$= 0.08 \times (1 - 0.3)$$

$$= 0.08 \times 0.7$$

$$= 0.56 \text{ or } 5.6\%$$

(iii) Cost of general reserve $(K_r) = (K_e) = 12.5\%$

Total market value of equity shares = 1,800 shares at the rate of ₹120 = ₹2,16,000

Ratio between equity shares and retained earnings

= 1,80,000:36,000

= 5:1

Market value equity = ₹2,16,000 × 5/6

= ₹1,80,000

Market value of retained earnings = ₹2,16,000 × 1/6

= ₹36,000

Computation of Weighted Average Cost Capital
(Weights under Market Value)

Sources of Finance	Market Value	Weights	Specific Cost	Weighted Cost (%)
Equity shares capital	1,80,000	0.5625	12.50%	7.04
Retained earnings	36,000	0.1125	12.50%	1.40
Long term debt	1,04,000	0.3250	5.60%	1.82
	3,20,000	1.0000		10.26

Therefore, weighted average Cost of Capital under market value is 10.26%.

10. Work out the marginal Cost of Capital from the following data:

Existing Capital:

	₹(in lakh)	Cost (%)
Equity	6,000	15
Preference Share Capital	1,000	10
Debt	4,000	12
Retained earnings	1,000	18

Additional Requirement:

	₹(in lakh)	Cost (%)
Equity	4,000	18
Preference Share Capital	2,000	12
Debt	3,000	16
Retained Earnings	1,000	18

Compute the weighted average Cost of Capital (WACC).

[C.U. B.Com. (H), 2015]

Solution

Statement Showing WACC (Marginal Weight)

Sources of Finance	Book Value (in lakh)	Weights	Specific Cost	Weighted Cost (%)
Equity shares capital	4,000	0.4000	18	7.20
Preference Share Capital	2,000	0.2000	12	2.40
Retained earnings	1,000	0.1000	18	1.80
Long-term debt	3,000	0.3000	16	4.80
	10,000	1.0000		16.20

Marginal weighted average Cost of Capital is 16.20%.

11. (i) The equity shares of a company is currently (i.e. at the end of 2015) selling in the market at ₹300 (F.V. is ₹100 each). It is known that the company has paid a dividend of ₹30 in 2014 and it has a steady growth rate of 4% per year. Find its cost of equity.

(ii) The capital structure of a company is given below:

Equity share capital (5,000 shares of ₹100 each)	₹5,00,000
10% Preference share (2,000 shares of ₹100 each	₹2,00,000
12% Debentures	₹3,00,000
	₹10,00,000

The operating profit is ₹2,90,000. The market price of each equity shares is ₹250 and of each preference share is ₹125.

Find the cost of each source of capital assuming

(a) Corporate tax to be 30% and

(b) Corporate dividend tax to be 10%. *[C.U. B.Com. (H), 2016]*

Solution

(i) The current market price of the equity share = P_1 = ₹300

Dividend of the previous year = D_0 = ₹30

Growth rate of dividend = 4%

Expected dividend = $D_1 = D_0(1 + g) = 30(1 + .04) =$ ₹31.2

$$K_e = \frac{D_1}{P_1} + g = \frac{31.2}{300} + 0.04 = 0.104 + .04 = 0.14 \text{ or } 14.4\%$$

So, the cost of equity **(K_e) = 14.4%**

(ii) Corporate tax = 30%

Corporate dividend tax = 10%

Operating profit = ₹2,90,000

Cost of Equity = K_e = $\frac{E}{P}$

where,

E = Earnings per share

P_1 = Market price of each equity share = 250

Now, earnings available to equity shareholders:

	₹
Operating profit	2,90,000
Less:	
Interest on Debenture (₹3,00,000 × 12%)	36,000
	2,54,000
Less:	
Corporate Tax @ 30% (₹2,54,000 × 30%)	76,200
	1,77,800
Less:	
Preference Dividend (₹2,00,000 × 10%)	20,000
	1,57,800
Less:	
Dividend distribution Tax on Preference Share Dividend (20,000 × 10%)	2,000
Earnings available to equity share holders	1,55,800

$$E = \text{Earnings per share} = \frac{\text{Earnings available to equity share holders}}{\text{No of equity shares}}$$

$$= \frac{1,55,800}{5,000} = ₹31.16$$

So,

$$K_e = \frac{E}{P_1} = \frac{31.16}{250} = 0.12464 \text{ or } \mathbf{12.464\%}$$

Cost of Preference share = $K_P = \frac{D}{P_1}$ $(1 + D_t)$

where,

D = Dividend per preference share = 10

P_1 = Market price of preference share = 125

D_t = Corporate dividend tax = 10%.

$$\frac{D}{P_1}(1 + D_t) = \frac{10}{125}\ (1 + 0.10) = 0.08 \times 1.10 = 0.088 = 8.8\%$$

So, Cost of Preference share = $\boldsymbol{K_P}$ **= 8.8%**

Cost of Debentures = $K_d = I(1 - t)$

where,

I = Rate of interest

t = Corporate tax = 30%

$K_d = I(1 - t) = 12(1 - 0.30) = 8.4\%$

So, Cost of Debentures = $\boldsymbol{K_d}$ **= 8.4%**

CHAPTER 4A: LEVERAGE

Theoretical Questions

5 Marks

1. Explain the relationship between margin of safety and degree of operating leverage. (Refer to Page No. 4A.5) *[C.U. B.Com. (H), 2006]*
2. What do you understand by operating leverage? How would you measure it? (Refer to Page No. 4A.3) *[C.U. B.Com. (H), 2007]*
3. Write short note on EBIT-EPS Analysis. (Refer to Page No. 4A.14) *[C.U. B.Com. (H), 2007]*
4. What is 'indifference point'? Explain it in relation to EBIT-EPS Analysis. (Refer to Page No. 4A.16) *[C.U. B.Com. (H), 2008]*
5. Write short note on EBIT-EPS Analysis. (Refer to Page No. 4A.14) *[C.U. B.Com. (H), 2009]*
6. Explain indifference point in EBIT-EPS Analysis. How is it measured? (Refer to Page No. 4A.16) *[C.U. B.Com. (H), 2010]*
7. Write short note on: Relation between margin of safety and degree of operating leverage. (Refer to Page No. 4A.5) *[C.U. B.Com. (H), 2010]*
8. What factors contribute to the operating risk and financial risk of a firm? (Refer to Page No. 4A.1, 4A.2) *[C.U. B.Com. (H), 2011]*
9. Write short note on EBIT-EPS Analysis. (Refer to Page No. 4A.14) *[C.U. B.Com. (H), 2011]*

10 Marks

10. (a) What do you understand by operating or business risk and financial risk of a firm? How would you measure them? (Refer to Page No. 4A.1 to 4A.4)
    (b) What are the components of total risk of a firm? State the combinations of operating and financial leverage that will provide (i) Low risk situation, (ii) High risk situation, and (iii) an ideal situation. (Refer to Page No. 4A.1, 4A.13) *[C.U. B.Com. (H), 2009]*

Practical Problems

1. A firm has sales of ₹5,00,000, variable cost of ₹3,50,000 and fixed cost of ₹1,00,000 and a debt of ₹2,50,000 at 10% rate of interest. What is combined leverage? If the firm wants to double its EBIT, how much of a rise in sales would be needed on a percentage basis? *[C.U. B.Com. (H), 2006]*

Solution

Particulars	Amount (₹)
Sales	5,00,000
Less: Variable Cost	3,50,000
Contribution	1,50,000
Less: Operating Fixed Cost	1,00,000
Operating Profit/EBIT	50,000
Less: Interest (10% of ₹2,50,000)	25,000
EBT	25,000
Combined Leverage (Contribution/EBT)	6
DOL (Contribution/EBIT) or % change in EBIT/% change in sales = 3 or 100/% change in sales = 3 or % change in sales = 100/3 = 33⅓ %	3

Therefore, 33⅓ % rise in sales is needed.

2. From the following information of Trends Ltd. calculate the degree of operating leverage, financial leverage and combined leverage for each situation A and B under financial plans I, II and III. Also indicate which of the above plan is most risky and which one is least risky.

Production and Sales	1000 units		
Selling price per unit	₹20		
Variable cost per unit	₹15		
Fixed cost (operating)			
Situation A	₹3,000		
Situation B	₹4,000		
Capital Structure:	**Plan**		
	I (₹)	**II (₹)**	**III (₹)**
Equity	7,000	5,000	3,000
10% Debt	3,000	5,000	7,000
	10,000	10,000	10,000

[C.U. B.Com. (H), 2006]

Solution

Particulars	Amount (₹)					
Sales (₹20 × 1000)	20,000					
Less: Variable Cost (15 × 1000)	15,000					
Contribution	5,000					
	Situation A			**Situation B**		
Less: Operating Fixed Cost	3,000			4,000		
Operating Profit (EBIT)	2,000			1,000		
DOL (Contribution/EBIT)	2.5			5		
	Plan I	**Plan II**	**Plan III**	**Plan I**	**Plan II**	**Plan III**
Less: Interest	300	500	700	300	500	700
EBT	1,700	1,500	1,300	700	500	300
DFL (EBIT/EBT)	1.18	1.33	1.54	1.43	2.00	3.33
DCL (DOL × DFL)	2.94	3.33	3.85	7.14	10.00	16.67

Comment: It is evident from the above calculation that **Plan III under situation B is the most risky** plan since it has the highest DCL. On the other hand, **Plan I under situation A is the least risky** one because it has the lowest DCL.

3. From the following information compute sales:
DOL-2, DFL-3, Interest-₹3,00,000, and contribution is 40% of sales.

[C.U. B.Com. (H), 2007]

Solution

Given, DOL = 2

Contribution/EBIT = 2

EBIT = Contribution/2 (1)

Given, DFL = 3

EBIT/EBT = 3

EBIT/(EBIT-Interest) = 3

(Contribution/2)/[(Contribution/2) – 3,00,000] = 3 [From (1)]

Contribution/2 = 3 Contribution/2 – 9,00,000

9,00,000 = Contribution

9,00,000 = 40% of sales

sales = 9,00,000/40% = 22,50,000

4. Relevant information about three companies are given below:

	BIL	PIL	MIL
Annual production capacity (units)	1,00,000	1,50,000	2,50,000
Capacity utilization and sales	75%	75%	75%
Unit Selling Price (₹)	40	50	50
Unit Variable Cost (₹)	15	15	20
Fixed cost p.a. (₹)	2,00,000	3,00,000	5,00,000
Equity Capital (1000 shares for each company) (₹)	5,00,000	7,00,000	10,00,000
10% Preference Share Capital (₹)	—	50,000	1,00,000
15% Debentures (₹)	1,00,000	2,00,000	3,00,000

Calculate Operating Leverage, Financial Leverage, Combined Leverage and EPS of these three companies and comment. *[C.U. B.Com. (H), 2008]*

Solution

Particulars	BIL (₹)	PIL (₹)	MIL (₹)
Sales	30,00,000 (1,00,000 × 75% × 40)	56,25,000 (1,50,000 × 75% × 50)	93,75,000 (2,50,000 × 75% × 50)
Less: Variable Cost	11,25,000	16,87,500	37,50,000
Contribution	18,75,000	39,37,500	56,25,000
Less: Fixed cost	2,00,000	3,00,000	5,00,000
EBIT	16,75,000	36,37,500	51,25,000
Less: Interest @ 15%	15,000	30,000	45,000
EBT	16,60,000	36,07,500	50,80,000
Less: Tax @ 50% (say)	8,30,000	18,03,750	25,40,000
EAT	8,30,000	18,03,750	25,40,000
Less: Prefernce Dividend @ 10%	0	5,000	10,000
EATESH	8,30,000	17,98,750	25,30,000
Number of equity shares	1,000	1,000	1,000
DOL (Contribution/EBIT)	1.12	1.08	1.10
DFL (EBIT/EBT)	1.01	1.01	1.01
DCL (DOL × DFL)	1.13	1.09	1.11
EPS (EATESH/Number of equity shares)	830	1,798.75	2,530

Comment: It is evident from the above calculation that **BIL is the most risky** company since it has the highest DCL. On the other hand, **PIL is the least risky** one because it has the lowest DCL. In terms of EPS, MIL is the best performer and BIL is the worst performer.

5. The following information have been taken from the Income Statement of X Ltd.:
   Fixed operating expenses ₹1,200
   Fixed financial charges ₹600
   Earning before tax ₹400
   Calculate percentage of change in EPS, if sales increase by 10 percent.

   [C.U. B.Com. (H), 2010]

   Solution

   We know that, EBIT – Interest = EBT
   EBIT – 600 = 400 (Interest = Fixed financial charges = ₹600)
   EBIT = 1,000
   Contribution – Fixed operating cost = 1,000
   (EBIT = Contribution – Fixed operating cost)
   Contribution – 1,200 = 1,000
   Contribution = 2,200

   We know that DOL = (Contribution/EBIT)
   = 2,200/1,000
   = 2.2

   Similarly, DFL = EBIT/EBT
   = 1,000/400
   = 2.5

   So, DCL = DOL × DFL
   = 2.2 × 2.5
   = 5.5

   Again, DCL = % change in EPS/% change in sales
   or 5.5 = % change in EPS/% change in sales
   It means that 1% increase in sales is accompanied by 5.5% increase in EPS.
   So, for 10% increase in sales EPS will be increased by 55% (5.5 × 10)

6. The capital structure of Moon Ltd. is given below:

	₹ (in Lakh)
Equity Share Capital (₹10 per share)	10.00
Retained Earnings	6.00
10% Preference Share Capital (₹)	4.00
	20.00

The firm has planned to undertake an expansion scheme of ₹10,00,000 which can be financed (i) entirely by issue of equity shares of ₹10 each, or (ii) by issue of 12% Debentures of ₹100 each at par.

As a result of expansion, sales and operating fixed cost will increase by 60% and 75% respectively. The other relevant information is given below:

Sales	₹50,00,000
Variable Cost	60%
Operating Fixed cost	₹5,00,000
Corporate Tax	40%

Calculate leverages and EPS before and after expansion and give your opinion for taking appropriate decision with respect to financing. *[C.U. B.Com. (H), 2010]*

Solution

Particulars	Present Situation (Before Expansion)	After Expansion	
		Option I	Option II
Capital Structure:			
Equity Share Capital	10,00,000	20,00,000	10,00,000
Retained Earnings	6,00,000	6,00,000	6,00,000
10% Preference Share Capital	4,00,000	4,00,000	4,00,000
12% Debentures	0	0	10,00,000
Total	20,00,000	30,00,000	30,00,000
Sales	₹50,00,000	80,00,000 (50,00,000 × 1.6)	80,00,000 (50,00,000 × 1.6)
Less: Variable Cost @ 60% of sales	30,00,000	48,00,000	48,00,000
Contribution	20,00,000	32,00,000	32,00,000
Less: Operating Fixed cost	5,00,000	8,75,000 (5,00,000 × 1.75)	8,75,000 (5,00,000 × 1.75)
EBIT	15,00,000	23,25,000	23,25,000
Less: Interest @ 12%	0	0	1,20,000 (10,00,000 × 12%)
EBT	15,00,000	23,25,000	22,05,000
Tax @ 40% of EBT	6,00,000	9,30,000	8,82,000
EAT	9,00,000	13,95,000	13,23,000

(Contd.)

Particulars	Present Situation (Before Expansion)	After Expansion	
		Option I	Option II
Less: Prefernce Dividend @ 10%	40,000	40,000	40,000
EATESH	8,60,000	13,55,000	12,83,000
Number of equity shares	1,00,000	2,00,000	1,00,000
DOL (Contribution/EBIT)	1.33	1.38	1.38
DFL (EBIT/[EBT – {P_d/(1 – t)}]	1.05	1.03	1.09
DCL (DOL × DFL)	1.40	1.42	1.50
EPS (EATESH/Number of equity shares)	8.6	6.775	12.83

Comment: Expansion program through debt financing should be undertaken since it results in the highest EPS.

7. Which of the following financial plans would you recommend and why?

Particulars	Equity Plan	Equity-Preference Plan	Equity-Debt Plan
Earning per share	₹9.50	₹8	₹11.25
Price-earning ratio	20	17	16

[C.U. B.Com. (H), 2011]

Solution

We know that MPPS = EPS × P/E Ratio

Where MPPS = Market Price per equity share

EPS = Earning per share

P/E Ratio = Price-earning ratio

Now, we are arranging the given information in tabular form:

Particulars	Equity Plan	Equity-Preference Plan	Equity-Debt Plan
EPS (₹)	9.50	8	11.25
P/E Ratio	20	17	16
MPPS (₹)	190	136	180

Comment: Here equity plan is recommended because under this plan Market Price per equity share (MPPS) is the maximum.

8. Malancha Plast Ltd. provides you the following information:

Capital Gearing Ratio: 3

Fixed Cost: 1/3rd to total operating cost

Dividend Yield: 6%

Operating Ratio: 75%
Ratio of 18% Preference Shares to 15% Debentures: 12.5%
Dividend Payout Ratio: 30%
Accumulated Reserves: ₹4,00,000
Capital Employed: ₹24,00,000
Market Price of an Equity Share of ₹10: ₹135
Tax Rate: 40%
Prepare an Income Statement and calculate the degree of operating leverage, financial leverage and combined leverage. *[C.U. B.Com. (H), 2011]*

Solution

Capital Gearing Ratio = 3
Fixed income bearing instruments/Equity shareholder's fund = 3
18% Preference Shares + 15% Debentures/Equity shareholder's fund = 3
18% Preference Shares + 15% Debentures = 3 Equity shareholder's fund (1)
Again, Capital Employed = ₹24,00,000
Equity shareholder's fund + 18% Preference Shares + 15% Debentures = ₹24,00,000
Equity shareholder's fund + 3 Equity shareholder's fund = ₹24,00,000 [From (1)]
4 Equity shareholder's fund = ₹24,00,000
Equity shareholder's fund = ₹24,00,000/4 = ₹6,00,000
Equity share capital + Reserves & Surplus = ₹6,00,000
Equity share capital + ₹4,00,000 = ₹6,00,000
Equity share capital = ₹2,00,000
Now, putting Equity shareholder's fund = ₹6,00,000 in equation (1) we get,
18% Preference Shares + 15% Debentures = 3 × ₹6,00,000 = ₹18,00,000 (2)
Further, 18% Preference Shares/15% Debentures = 12.5%
18% Preference Shares/15% Debentures = 1/8
15% Debentures = 8 × 18% Preference Shares (3)
Now, from equation (2) and equation (3) we get,
18% Preference Shares + 8 × 18% Preference Shares = ₹18,00,000
9 × 18% Preference Shares = ₹18,00,000
18% Preference Shares = ₹18,00,000/9 = ₹2,00,000
So, 15% Debentures = 8 × 18% Preference Shares
= 8 × ₹2,00,000
= ₹16,00,000
Dividend Yield = 6%

DPS/MPPS = 6% [DPS = Dividend per equity share, MPPS = Market Price per equity share]

DPS/135 = 6%

DPS = 135 × 6% = 8.1

Dividend Payout Ratio = 30%

DPS/EPS = 30% [EPS = Earnings per equity share]

8.1/EPS = 30%

EPS = 8.1/30% = 27

Number of equity shares = Equity share capital/Face value per equity share

= ₹2,00,000/₹10 = 20,000

Operating Ratio = 75%

So, Operating Profit Ratio = (100 – 75) % = 25%

Operating Profit/Sales = 25%

EBIT/Sales = 25% (4)

Computation of EBIT

Particulars	Amount (₹)
EATESH (EPS × Number of equity shares)	5,40,000 (₹27 × 20,000)
Add: Preference dividend	36,000 (18% of ₹2,00,000)
EAT	5,76,000
Add: Tax	3,84,000 (5,76,000 × 0.4/0.6)
EBT	9,60,000
Add: Interest on debentures	2,40,000 (15% of ₹16,00,000)
EBIT	12,00,000

Putting EBIT = ₹12,00,000 in equation (4) we get,

₹12,00,000/Sales = 25%

Sales = ₹12,00,000/25% = ₹48,00,000

Operating Ratio = 75%

Operating Expenses (or cost)/Sales = 75%

Operating Expenses (or cost)/₹48,00,000 = 75%

Operating Expenses (or cost) = ₹48,00,000 × 75% = ₹36,00,000

Fixed Cost = $1/3^{rd}$ to total operating cost

= $1/3^{rd}$ × ₹36,00,000 = ₹12,00,000

Variable Cost = $2/3^{rd}$ to total operating cost

= $2/3^{rd}$ × ₹36,00,000 = ₹24,00,000

Income Statement of Malancha Plast Ltd.

Particulars	Amount (₹)
Sales	48,00,000
Less: Variable Cost	24,00,000
Contribution	24,00,000
Less: Fixed Cost	12,00,000
EBIT	12,00,000
Less: Interest on debentures	2,40,000
EBT	9,60,000
Less Tax @ 40%	3,84,000
EAT	5,76,000
Preference dividend	36,000
EATESH	5,40,000
DOL (Contribution/EBIT)	2
DFL (EBIT/[EBT – (P_d/(1 – t)]	1.33
DCL (DOL × DFL)	2.67

[C.U. B.Com. (H), 2011]

9. Given the following information:

Sales (10,000 units)	₹10,00,000
Variable cost per unit	₹60
Interest	₹1,00,000
EBT	₹2,00,000
DCL	2.5

Calculate operating leverage and financial leverage. *[C.U. B.Com. (H), 2012]*

Solution

We know that EBIT – Interest = EBT

EBIT – 1,00,000 = 2,00,000

EBIT = 3,00,000

Again, we know that Contribution = Sales –Variable Cost

= 10,00,000 – (60 × 10,000)

= 10,00,000 – 6,00,000

= 4,00,000

Operating Leverage = Contribution/EBIT

(DOL) = 4,00,000/3,00,000

= 1.33

It is known that,

DCL = DOL × DFL (where DFL = Degree of Financial Leverage)

2.5 = 1.33 × DFL

DFL = 2.5/1.33

DFL = 1.88

10. Consider the following example for S Ltd.

	₹ In lakhs
EBIT	1,120
EBT	320
Fixed Cost	700

Calculate the percentage of changes in EPS if sales increase by 5%.

[C.U. B.Com. (H), 2012]

Solution

We know that,

DFL = EBIT/EBT

= 1,120/320

= 3.5

Again, we know that,

Contribution – Fixed Cost = EBIT

Contribution – 700 = 1,120

Contribution = 1,820

DOL = Contribution/EBIT

= 1,820/1,120

= 1.625

DCL = DOL × DFL

=1.625 × 3.5

= 5.6875

Again, DCL = % change in EPS/% change in Sales

5.6875 = % change in EPS/5

% change in EPS = 5.6875 × 5

= 28.4375%.

11. Anurup Ltd. has equity share capital of ₹5,00,000 divided into shares of ₹100 each. It wishes to raise ₹3,00,000 for expansion-cum-modernisation scheme. The company plans the following financing alternatives:
    (i) By issuing equity shares of ₹100 each
    (ii) ₹1,00,000 by issuing equity shares of ₹100 each and ₹2,00,000 through issue of 10% Debenture
    (iii) By raising loan at 10% per annum
    (iv) ₹1,00,000 by equity shares of ₹100 each and ₹2,00,000 by issuing 8% Preference Shares of ₹100 each.

    You are required to suggest the best alternative giving your comment assuming that the estimated earnings before interest and taxes (EBIT) after expansion is ₹1,50,000 and corporate tax rate is 35%. *[C.U. B.Com. (H), 2013]*

Solution

Particulars	Present Situation (Before Expansion)	After Expansion			
		Option I	Option II	Option III	Option IV
Capital Structure:					
Equity Share Capital of ₹100 each	5,00,000	8,00,000	6,00,000	5,00,000	6,00,000
10% Debentures			2,00,000		
10% Loan				3,00,000	
10% Preference Share Capital					2,00,000
Total	5,00,000	8,00,000	8,00,000	8,00,000	8,00,000
EBIT		1,50,000	1,50,000	1,50,000	1,50,000
Less: Interest @ 10%		NIL	20,000	30,000	NIL
EBT		1,50,000	1,30,000	1,20,000	1,50,000
Tax @ 35% of EBT		52,500	45,500	42,000	52,500
EAT		97,500	84,500	78,000	97,500
Less: Prefernce Dividend @ 8%		0	0	0	16,000
EATESH		97,500	84,500	78,000	81,500
Number of equity shares		8,000	6,000	5,000	6,000
EPS (EATESH/Number of equity shares)		12.1875	14.0833	15.6000	13.5833
Rank		4	2	1	3

It can be said that alternative III ranked 1 in terms of EPS. As such, it should be selected.

12. A company has the choice of issuing 10% debentures or ₹100 equity shares to raise ₹20 lakh to meet its long-term investment requirements. Its current capital structure consists of 20,000 ordinary shares of ₹100 each, 8% debentures of ₹10,00,000 and 12% preference shares of ₹10,00,000. Determine the level of EBIT at which EPS would be the same, whether the new funds are acquired by issuing ordinary shares or by issuing 10% debentures. Tax rate is assumed to be 50% (ignore dividend distribution tax).
Also, construct EBIT-EPS chart assuming various levels of EBIT. *[C.U. B.Com. (H), 2014]*

Solution

Calculation of Indifference point:

Intermediate Difference

$$[(E - I_1)(1 - t) - P_d]/N_1 = [(E - I_2)(1 - t) - P_d]/N_2$$

Here, E = EBIT

t = Tax rate = 50% = 0.5

P_d = Preference dividend = 12% of ₹10,00,000 = 1,20,000 (under both alternatives)

I_1 = Interest on debenture = 8% of ₹10,00,000 = 80,000

I_2 = Interest on debenture = (8% of ₹10,00,000) + (10% of ₹20,00,000) = 80,000 + 2,00,000 = 2,80,000

N_1 = Number of equity shares under alternative 1 = 20,000 + 20,000 = 40,000

N_2 = Number of equity shares under alternative 2 = 20,000

Hence,

$$[(E - 80{,}000)(1 - 0.5) - 1{,}20{,}000]/40{,}000 = [(E - 2{,}80{,}000)(1 - 0.5) - 1{,}20{,}000]/20{,}000$$

$$[(E - 80{,}000)(0.5) - 1{,}20{,}000]/[(E - 2{,}80{,}000)(0.5) - 1{,}20{,}000] = 40{,}000/20{,}000$$

$$(0.5E - 40{,}000 - 1{,}20{,}000)/(0.5E - 1{,}40{,}000 - 1{,}20{,}000) = 2$$

$$(0.5E - 1{,}60{,}000)/(0.5E - 2{,}60{,}000) = 2$$

$$(0.5E - 1{,}60{,}000) = 2(0.5E - 2{,}60{,}000)$$

$$(0.5E - 1{,}60{,}000) = E - 5{,}20{,}000$$

$$5{,}20{,}000 - 1{,}60{,}00 = E - 0.5E$$

$$3{,}60{,}000 = 0.5E$$

$$3{,}60{,}000/0.5 = E$$

$$7{,}20{,}000 = E$$

Now, in order to construct EBIT-EPS chart, it is assumed that the various levels of EBIT are ₹6,00,000 (below indifference point), ₹7,20,000 (indifference point) and ₹9,00,000 (above indifference point).

EBIT-EPS Chart at Various Levels of EBIT

	EBIT at Indifference Point		EBIT below Indifference Point		EBIT above Indifference Point	
	Alternative 1 (Eq-Pref)	**Alternative 2 (Eq-Debt-Preference)**	**Alternative 1 (Eq-Pref)**	**Alternative 2 (Eq-Debt-Preference)**	**Alternative 1 (Eq-Pref)**	**Alternative 2 (Eq-Debt-Preference)**
EBIT	7,20,000	7,20,000	6,00,000	6,00,000	9,00,000	9,00,000
Less: Interest	80,000	2,80,000	80,000	2,80,000	80,000	2,80,000
EBT	6,40,000	4,40,000	5,20,000	3,20,000	8,20,000	6,20,000
Tax @ 50% of EBT	3,20,000	2,20,000	2,60,000	1,60,000	4,10,000	3,10,000
EAT	3,20,000	2,20,000	2,60,000	1,60,000	4,10,000	3,10,000
Less: Prefernce Dividend	1,20,000	1,20,000	1,20,000	1,20,000	1,20,000	1,20,000
EATESH	2,00,000	1,00,000	1,40,000	40,000	2,90,000	1,90,000
Number of equity shares	40,000	20,000	40,000	20,000	40,000	20,000
EPS (EATESH/ Number of equity shares)	5	5	3.5	2	7.25	9.5
Rank	Equal		1	2	2	1
Comment	Both are equally preferable		Equity financing is preferable		Debt financing is preferable	

13. If the combined leverage and operating leverage of a company are 2.5 and 1.25 respectively, find the financial leverage and P/V ratio; given that the equity dividend per share is ₹2, interest payable per year is ₹2 lakh, total fixed cost ₹1 lakh and sales ₹20 lakh. *[C.U. B.Com. (H), 2015]*

Solution

We know that $DCL = DOL \times DFL$

$2.5 = 1.25 \times DFL$

$DFL = 2.5/1.25 = 2$

$EBIT / EBT = 2$

$EBIT/(EBIT - I) = 2$

$EBIT/(EBIT - 2,00,000) = 2$

$EBIT = 2\ EBIT - 4,00,000$

EBIT = 4,00,000

Further, DOL = Contribution/EBIT

1.25 = Contribution/4,00,000

Contribution = 5,00,000

P/V Raio = (Contribution/Sales) × 100

= (5,00,000/20,00,000) × 100

= 25%

14. X Ltd. is considering two alternative plans. Following information relates to these plans:

	Plan-A	Plan-B
Equity Share (₹10 each) (₹)	2,00,000	1,00,000
12% Debenture (₹)	—	1,00,000
Profit after tax (₹)	28,000	19,600
Price-Earning ratio	11	7.5

Which of the plans is preferable considering the wealth maximisation objective?

[C.U. B.Com. (H), 2016]

Solution

Calculation for Selection of Financing Plan

Particulars	Plan-A	Plan-B
Profit after tax (₹)	28,000	19,600
Less: Preference dividend (₹)	0	0
EATESH	28,000	19,600
Number of equity shares	20,000	10,000
EPS (EATESH/Number of equity shares)	1.4	1.96
Rank	2	1
Price-Earning ratio	11	7.5
MPPS (EPS × Price-Earning ratio)	15.4	14.7
Rank	1	2

On the basis of EPS, Plan-B is better than Plan-A. But Plan-A is better than Plan-B in terms of MPPS. On the whole, the decision should be taken on the basis of MPPS. Accordingly, Plan-A should be chosen.

CHAPTER 4B: CAPITAL STRUCTURE THEORIES

Theoretical Questions

5 Marks

1. Explain 'Trading on Equity' with illustration. (Refer to Page No. 4B.11)
[C.U. B.Com. (H), 2006]
2. What do you mean by Capital Structure? Mention any three factors that are to be considered in determining the capital structure. (Refer to Page No. 4B.1, 4B.8)
[C.U. B.Com. (H), 2007]
3. Write short note on Trading on Equity. (Refer to Page No. 4B.11)
[C.U. B.Com. (H), 2007]
4. Mention the factors that determine the capital structure of a firm. (Refer to Page No. 4B.8) *[C.U. B.Com. (H), 2009]*
5. Define high-geared, low-geared and evenly-geared capital with example. (Refer to Page No. 4B.5) *[C.U. B.Com. (H), 2009]*
6. Define Trading on Equity. Give an example. (Refer to Page No. 4B.11)
[C.U. B.Com. (H), 2010]
7. Neither overcapitalization nor undercapitalization is desirable". Elucidate the statement. (Refer to Page No. 4B.17, 4B.19) *[C.U. B.Com. (H), 2011]*
8. What is trading on equity? Illustrate the concept with the help of an example. (Refer to Page No. 4B.11) *[C.U. B.Com. (H), 2012]*
9. Explain the concept of earning theory of capitalization. (Refer to Page No. 4B.15)
[C.U. B.Com. (H), 2012]
10. Mention the cause of over-capitalization in a company. (Refer to Page No. 4B.16)
[C.U. B.Com. (H), 2012]

10 Marks

1. What do you mean by optimum capital structure? Discuss the features of an optimum capital structure. (Refer to Page No. 4B.10, 4B.11) *[C.U. B.Com. (H), 2012]*
2. (a) Briefly explain the relationship between cost of capital and financial leverage in accordance with M and M proposition. (Refer to Page No. 4B.32)
   (b) What will be the effect of taxation on the value of a firm under M and M approach? (Refer to Page No. 4B.34) *[C.U. B.Com. (H), 2013]*
3. What are the factors considered for capital structure planning? (Refer to Page No. 4B.8)
[C.U. B.Com. (H), 2014]

4. Discuss critically the Modigliani and Miller approach of capital structure theory. (Refer to Page No. 4B.31) *[C.U. B.Com. (H), 2015]*
5. Critically discuss the NOI approach of capital structure theory. (Refer to Page No. 4B.24) *[C.U. B.Com. (H), 2016]*

CHAPTER 5: WORKING CAPITAL MANAGEMENT (I)

Theoretical Questions

5 Marks

1. Explain how the operating cycle period can be reduced. (Refer to Page No. 5.19) *[C.U. B.Com. (H), 2006]*
2. What do you understand by gross working capital and net working capital? Give examples. (Refer to Page No. 5.4) *[C.U. B.Com. (H), 2007]*
3. Define and distinguish between permanent working capital and fluctuating working capital. (Refer to Page No. 5.3) *[C.U. B.Com. (H), 2008]*
4. State the operating cycle concept of working capital. (Refer to Page No. 5.12) *[C.U. B.Com. (H), 2009]*
5. What is Working Capital Cycle? (Refer to Page No. 5.12) *[C.U. B.Com. (H), 2011]*
6. What do you mean by negative working capital? What are its implications? (Refer to Page No. 5.6) *[C.U. B.Com. (H), 2011]*
7. Distinguish between fixed and variable working capital of a firm. (Refer to Page No. 5.3) *[C.U. B.Com. (H), 2012]*
8. Briefly discuss the relevance of liquidity and profitability in working capital management. (Refer to Page No. 5.7) *[C.U. B.Com. (H), 2013]*

10 Marks

1. State the factors which determine working capital requirements of a manufacturing firm. (Refer to Page No. 5.10) *[C.U. B.Com. (H), 2007]*
2. What are the factors of determining working capital of a manufacturing company? (Refer to Page No. 5.10) *[C.U. B.Com. (H), 2014]*
3. (a) What do you mean by permanent and temporary working capital? (Refer to Page No. 5.3)
   (b) State the factors to be considered in determining working capital of a firm. (Refer to Page No. 5.10) *[C.U. B.Com. (H), 2016]*

Practical Problems

1. From the following data compute the money block period of working capital:

	(₹ in 000)
Stock: Raw Materials	20
W.I.P	14
Finished Goods	21
Purchases	96
Cost of goods sold	140
Sales	160
Debtors	32
Creditors	16
1 year = 360 days	

[C.U. B.Com. (H), 2008]

Solution

Computation of the money block period of working capital

- Raw materials storage or conversion period = $\dfrac{\text{Average stock of raw materials}}{\dfrac{\text{Consumption of Raw materials}}{\text{365 days/12 months/52 weeks}}}$

Average Consumption of raw materials = $\dfrac{\text{Consumption of Raw materials}}{\text{365 days/12 months/52 weeks}}$

Here, Average Consumption of raw materials

$$= \frac{\text{Op stock of raw material} + \text{Purchase} - \text{Closing stock}}{\text{360 days}}$$

$$\text{Average Consumption of raw materials} = \frac{20{,}000 + 96{,}000 - 20{,}000}{\text{360 days}}$$

$$= 266.6666$$

Average stock of raw materials

$$= \frac{\text{Opening stock of raw materials} + \text{Closing stock of raw materials}}{2}$$

$$\text{Average stock of raw materials} = \frac{20{,}000 + 20{,}000}{2} = ₹20{,}000$$

So, Raw materials storage or conversion period = $\dfrac{\text{Average stock of raw materials}}{\dfrac{\text{Consumption of Raw materials}}{\text{365 days/12 months/52 weeks}}}$

$$= \text{Raw materials storage or conversion period} = \frac{₹20,000}{266.666667}$$

$$= 74.99 = 75 \text{ days}$$

- Work-in-Progress conversion period $= \dfrac{\text{Average work-in-progress}}{\dfrac{\text{Total cost of production}}{365 \text{ days}/12 \text{ months}/52 \text{ weeks}}}$

$$= \frac{14,000}{\dfrac{1,40,000}{360 \text{ days}}}$$

$$= \frac{14,000}{388.888889} = 36 \text{ days}$$

- Finished Goods Conversion Period $= \dfrac{\text{Average stock of finished goods}}{\dfrac{\text{Cost of goods sold}}{365 \text{ days}/12 \text{ months}/52 \text{ weeks}}}$

$$= \frac{21,000}{\dfrac{1,40,000}{360 \text{ days}}}$$

$$= \frac{21,000}{388.888889} = 54 \text{ days}$$

- Debtors Collection period $= \dfrac{\text{Average Debtors}}{\dfrac{\text{Total Credit Sales}}{365 \text{ days}/12 \text{ months}/52 \text{ week}}}$

$$= \frac{32,000}{\dfrac{1,60,000}{360 \text{ days}}} = \frac{32,000}{444.444444} = 72 \text{ days}$$

- Creditors Payment period $= \dfrac{\text{Average Creditors}}{\dfrac{\text{Total Credit Purchase}}{365 \text{ days}/12 \text{ months}/52 \text{ week}}}$

$$= \frac{16,000}{\dfrac{96,000}{360 \text{ days}}}$$

$$= \frac{16,000}{266.666667} = 60 \text{ days}$$

Operating cycle= 75 + 36 + 54 + 72 – 60 = 177 days

2. From the following information prepare a statement showing the Estimated Working Capital Requirements:

(i)	Projected annual sales	36,000 units
(ii)	Analysis of sales	₹
	Raw materials	6 per unit
	Labour	4 per unit
	Overhead	3 per unit
	Profit	2 per unit
	Selling Price	15 per unit

(iii) Additional information:

(a)	Raw materials in stock	1 month
(b)	Production process	2 months
(c)	Finished goods in store	3 months
(d)	Credit allowed to debtor	4 months
(e)	Credit allowed by suppliers	2 months

(f) Monthly wages and expenses are paid twice on 1st and 16th at each month.

(g) Production is carried on evenly during the year and expenses and wages accrue similarly.

(iv) Cash is to be kept at 10% of the net working capital. *[C.U. B.Com. (H), 2006]*

Solution

Projected annual sales = 36,000

So, Sales per month= $\frac{36,000}{12}$ = 3000 units

Statement of cost

	Total (₹)
Raw materials (3000 × 6)	18,000
Labour (3000 × 4)	12,000
Overhead (3000 × 3)	9,000
Profit (3000 × 2)	6,000
Selling price (3000 × 15)	45,000

Working Note 1: Since wages and expenses accrue similarly and they are paid at 1st and 16th of every month, so lag period in payment of wages and overheads in respect of W.I.P = $\frac{2}{2}$ = 1 month

Statement Showing Working Capital Requirement
(On the basis of Current Assets and Current Liabilities Method)

	Monthly Average Cost	Net Block (months)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock:				
(i) Raw materials	18,000	1		18,000
(ii) Work-in-progress:				
Raw Materials	18,000	2	36,000	
Wages	12,000	1	12,000	
Overhead	9,000	1	9,000	57,000
(iii) Finished Goods:				
Raw Materials	18,000	3	54,000	
Wages	12,000	3	36,000	
Overhead	9,000	3	27,000	1,17,000
				1,92,000
(iv) Debtors:				
Raw Materials	18,000	4	72,000	
Wages	12,000	4	48,000	
Overhead	9,000	4	36,000	
Profit	6,000	4	24,000	1,80,000
Total Current Assets				3,72,000
B. Current Liabilities				
Creditors for materials	18,000	2	36,000	
Outstanding wages	12,000	$\frac{1}{2}$	6,000	
Outstanding expenses	9,000	$\frac{1}{2}$	4,500	46,500
Net Working Capital requirement(A-B)				3,25,500
Add: cash in hand (10% of NWC)				32,550
Working Capital requirement				3,58,050

OR

Statement Showing Working Capital Requirement (Columnar or Matrix Method)

	Monthly Average Cost (₹)	Net Block (months)	Raw Materials (₹) (a)	Work-in-Progress(₹) (b)	Finished Goods (₹)(c)	Debtors(₹) (d)	Creditors (₹) (e)	Total (₹) [(a) + (b) + (c) + (d) – (e)]
1. Raw materials:	18,000							
(i) In store		1	18,000					
(ii) In WIP		2		36,000				
(iii) In Finished Goods		3			54,000			
(iv) In Debtors		4				72,000		
Gross Block		10						
Less: Credit from Creditors		2					36,000	
Net Block		8						1,44,000
2. Labour:	12,000							
(i) In WIP		1		12,000				
(ii) In Finished Goods		3			36,000			
(iii) In Debtors		4				48,000		
Gross Block		8						
Less: Outstanding wages		0.5					6,000	
Net Block		7.5						90,000
3. Overhead	9,000							
(i) In WIP		1		9,000				
(ii) In Finished Goods		3			27,000			
(iii) In Debtors		4				36,000		
Gross/ Net Block		8						
Less: Outstanding expenses		0.5					4,500	
		7.5						67,500
4. Profit								
(i) In Debtors (includes profit)	6,000	4				24,000		24,000
Add: cash in hand			18,000	57,000	1,17,000	1,80,000	46,500	
(10% of NWC)								3,25,500
Working Capital requirement								32,550
								3,58,050

3. A trading company's forecast sales and other particulars are given below:

Forecast annual sales	₹1,30,000
Net profit on cost of sales	25%
Average credit allowed to debtors	8 weeks
Average credit allowed by creditors	6 weeks
Average stock carrying (to meet sales)	4 weeks

Determine forecast working capital of the company. Estimated cash on hand and at Bank ₹5,000. *[C.U. B.Com. (H), 2007]*

Solution

Forecast annual sales = ₹1,30,000

Sales per week= $\frac{1,30,000}{52}$ = ₹2,500 per week

Profit on cost = 25% i.e. $\frac{1}{4}$ th on cost or $\frac{1}{5}$ th on sales.

So, Profit = $2,500 \times \frac{1}{5}$ = ₹500

So, Cost = 2,500 – 500 = ₹2,000

Statement showing Working capital requirement

	Weekly Average Cost	Net Block (week)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock	2,000	4	8,000	
Debtors	2,500	8	20,000	
Cash on hand and at bank			5,000	33,000
Total Current Assets				
B. Current Liabilities				
Creditors	2,000	6		12,000
Working Capital requirement (A-B)				21,000

4. P & G Ltd. furnishes below its cost and other data:

Unit Cost	₹
Raw Material	30
Direct Labour	20
Overhead	?
Profit (25% on selling price)	?
Unit selling price	100

Additional information is as follows:

Average raw material:

In stock	-	1 month
In process	-	$\frac{1}{2}$ month
Credit allowed by suppliers	-	$1\frac{1}{2}$ month
Credit allowed to debtors	-	3 months

Time lag in payment:

Wages	-	$\frac{1}{2}$ month
Overhead	-	$\frac{1}{2}$ month

Cash balance is assumed to be ₹1,00,000 and 70% of Sales are credit sales.

Assuming that production is carried on evenly throughout the year, you are required to determine the working capital requirement of the P&G Ltd. to achieve an output level of 1,20,000 units p.a. *[C.U. B.Com. (H), 2008]*

Solution

Projected annual sales = 1,20,000

So, Sales per month = $\frac{1,20,000}{12}$ = 10,000 units

Statement of Cost

	Total (₹)
Raw materials (10,000 × 30)	3,00,000
Labour (10,000 × 20)	2,00,000
Overhead (10,000 × 25)	2,50,000
Profit (10,000 × 25)	2,50,000
Selling price (10,000 × 100)	10,00,000

Working Note 1: Since production is carried out evenly, so lag period in payment of wages and overheads in respect of W.I.P = $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ month

Statement showing Working Capital Requirement

	Monthly Average Cost	Net Block (months)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock:				
(I) Raw materials	3,00,000	1		3,00,000
(II) Work-in-progress:				
Raw Materials	3,00,000	$\frac{1}{2}$	1,50,000	
Wages	2,00,000	$\frac{1}{4}$ (WN:1)	50,000	
Overhead	2,50,000	$\frac{1}{4}$	62,500	2,62,500
				5,62,500
Debtors:				
Raw Materials	3,00,000 × 70% = 2,10,000	3	6,30,000	
Wages	2,00,000 × 70% = 1,40,000	3	4,20,000	
Overhead	2,50,000 × 70% = 1,75,000	3	5,25,000	
Profit	2,50,000 × 70% = 1,75,000	3	5,25,000	21,00,000
Total Current Assets				26,62,500
B. Current Liabilities				
Creditors for materials	3,00,000	$1\frac{1}{2}$	4,50,000	
Outstanding wages	2,00,000	$\frac{1}{2}$	1,00,000	
Outstanding expenses	2,50,000	1	2,50,000	8,00,000
				18,62,500
				1,00,000
Net Working Capital (A-B)				
Add: Cash balance				
Working Capital requirement				19,62,500

5. Determine the working capital requirement from the following particulars:
Annual budget figures for:

	₹ Lakhs
Raw Materials	480
Direct Wages	240
Overheads	180
	900
Sales	1,000

Additional Information:

(i) Average stock level of raw materials- 18 days
(ii) Credit Sales: 20 days credit is normal
(iii) Finished goods are held in stock for a period of 10days before they are released for sale.
(iv) Process period is for 12 days
(v) The company enjoys 30 days credit facilities for purchase.
(vi) Estimated Cash and Bank balance: 10% of total working capital.

Assumptions:

(a) 1 year = 360 days
(b) Raw materials are introduced at the beginning of manufacturing process and labour overhead accrues evenly. *[C.U. B.Com. (H), 2009]*

Solution

Statement of Cost

	Total (₹ lakhs)
Raw materials	480
Labour	240
Overhead	180
Profit (balancing figure)	100
Selling price	1,000

Statement of Daily Cost

	Total (₹ lakhs)	**Total (₹ lakhs)**
A. Current Assets		
Stock:		
I. Raw materials $\left(\frac{480}{360}\times 18\right)$		24
II. Work-in-progress		
Raw Materials $\left(\frac{480}{360}\times 12\right)$	16	
Labour $\left(\frac{240}{360}\times 6\right)$ (WN:1)	4	
Overhead $\left(\frac{180}{360}\times 6\right)$ (WN:1)	3	23

(Contd.)

	Total (₹ lakhs)	Total (₹ lakhs)
(III) Finished Goods:		47
Raw Materials $\left(\frac{480}{360}\times 10\right)$	13.33	
Labour $\left(\frac{240}{360}\times 10\right)$	6.67	
Overhead $\left(\frac{180}{360}\times 10\right)$	5.00	25
III. Debtors:		
Raw Materials $\left(\frac{480}{360}\times 20\right)$	26.67	
Labour $\left(\frac{240}{360}\times 20\right)$	13.33	
Overhead $\left(\frac{180}{360}\times 20\right)$	10.00	
Profit $\left(\frac{100}{360}\times 20\right)$ (WN:2)	5.55	55.55
Total Current Assets		127.55
B. Current Liabilities		
Creditors for materials $\left(\frac{480}{360}\times 30\right)$		40.00
Net Working Capital (A-B)		87.55
Add: 10% cash in hand $\left(\frac{87.55}{90}\times 10\right)$		9.727
Working Capital Requirement		97.28

WN1: Since production is carried out evenly, so lag period in payment of wages and overheads in respect of W.I.P $\frac{12}{2}$ = 6 days

WN 2: If debtors are considered at cost price i.e. excluding profit then the answer would be ₹95.56 lakhs

6. Estimate the working capital requirement for the coming year from the following information of a manufacturing company.

Expected annual sales is 1,30,000 units of ₹10 per unit. The anticipated ratios of cost to selling price are: Raw-materials 50% and Direct wages 15%. Budgeted overhead is ₹52,000 per annum including ₹10,000 for depreciation.

Planned stock will include raw-material for ₹50,000 and 7,500 units of finished goods. Credit allowed to debtors is 4 weeks. Credit expected to be received from suppliers is

3 weeks. Overhead and wages payment will be made 1 week after their incurrence. Material will stay in the process for 2 weeks.

Cash in hand to be maintained is 10% of total working capital. Assume that production is carried on evenly throughout the year. Raw-materials are introduced at the beginning of the process and wages and overhead accrue evenly during processing.

[C.U. B.Com. (H), 2010]

Solution

Projected annual sales = 1,30,000

So, Sales per week= $\frac{1,30,000}{52}$ = 2,500 units

Statement of Cost

	Per Unit (₹)	Total (₹)
Raw materials (10 × 50%)	5.00	12,500
Labour (10 × 15%)	1.50	3,750
Overhead $\frac{52,000 - 10,000}{1,30,000}$	0.32307692	808
Depreciation $\frac{10,000}{1,30,000}$	0.07692308	192
Profit (balancing figure)	3.100	7,750
Selling price	10.00	25,000

Statement showing Working Capital Requirement

	Weekly Average Cost	Net Block (week)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock:				
(i) Raw materials	12,500	4		50,000
(ii) Work-in-progress:				
Raw Materials	12,500	2	25,000	
Direct Wages	3,750	1	3,750	
Overhead	808	1	808	29,558
(iii) Finished Goods:				
Raw Materials	12,500	3	37,500	
Direct Wages	3,750	3	11,250	
Overhead	808	3	2,424	51,174

(Contd.)

Debtors:				
Raw Materials	12,500	4	50,000	
Direct Wages	3,750	4	15,000	
Overhead	808	4	3,232	
Profit	7,750	4	31,000	99,232
Total Current Assets				2,29,964
B. Current Liabilities				
Creditors for materials	12,500	3	37,500	
Outstanding wages	3,750	1	3,750	
Outstanding overheads	808	1	808	42,058
Net Working capital(A-B)				1,87,906
Add: 10% cash in hand				20,878
Working Capital requirement				2,08,784

7. Mr. Roy wants to start a new trading business and gives the following information:
   (i) The projected annual sales- ₹60,00,000
   (ii) He has estimated fixed expenses ₹10,000 per month and variable expenses equal to 2 per cent of turnover.
   (iii) Percentage of gross profit on cost of purchase will be 25%.
   (iv) Average expected credit period from suppliers-15 days.
   (v) Average expected credit period allowed to debtors-1 month.
   (vi) He expects to turnover his stock 5 times in a year.
   (vii) Average cash holding – 1 month's expenses.

   You are required to forecast his working capital requirement. *[C.U. B.Com. (H), 2011]*

Solution

Projected annual sales = ₹60,00,000

Sales per month = $\frac{60,00,000}{12}$ = 5,00,000

Fixed expenses = ₹10,000 per month

Variable expenses = 60,00,000 × 2% = 1,20,000, so per month = $\frac{1,20,000}{12}$ = 10,000

Total expenses= 10,000 + 10,000 = 20,000 per month

Gross profit on cost of purchase= 25% i.e. $\frac{1}{5}$ th on sales = $\frac{1}{5} \times 60,00,000$ = ₹12,00,000, so $\frac{12,00,000}{12}$ = 1,00,000 per month

Cost of goods sold (COGS) = Sales – gross Profit

WN 1: COGS= 60,00,000 – 12,00,000 = ₹48,00,000

Stock turnover = 5 times

So, $$\frac{\text{Cost of Goods Sold}}{\text{Average stock}} = 5$$

$$\frac{48,00,000}{\text{Average stock}} = 5$$

$$\textbf{Average stock} = \frac{\textbf{48,00,000}}{\textbf{5}} = \textbf{9,60,000}$$

Assuming no opening stock, the stock figure represents closing stock.

WN 2: Credit period to debtors = 1 month

So, $$1 = \frac{12}{\text{Debtors turnover ratio}}$$

Debtors turnover ratio = 12

$$\frac{\text{Credit sales}}{\text{Debtors}} = 12$$

$$\frac{60,00,000}{\text{Debtors}} = 12$$

$$\textbf{Debtors} = \frac{\textbf{60,00,000}}{\textbf{12}} = \textbf{5,00,000}$$

WN 3: Credit period from supplier = 15 days = $\frac{1}{2}$ month

$$\frac{1}{2} = \frac{12}{\text{Creditors turnover ratio}}$$

Creditors turnover ratio = 24

$$\frac{\text{Credit purchase}}{\text{Creditors}} = 24$$

$$\frac{57,60,000}{\text{Creditors}} = 24$$

$$\textbf{Creditors} = \frac{\textbf{57,60,000}}{\textbf{24}} = \textbf{2,40,000}$$

Cost of Goods sold = Opening stock + Purchase – Closing stock

48,00,000 = Nil + Purchase – 9,60,000

48,00,000 + 9,60,000 = Purchase

Purchase = 57,60,000

Statement showing Working Capital Requirement

	Amount (₹)	Amount (₹)
A. Current Assets		
Stock:		
(i) Finished Goods (WN:1)	9,60,000	
(ii) Debtors (WN:2)	5,00,000	14,60,000
Total Current Assets		
(iii) Current Liabilities		
Creditors for materials (WN:3)		2,40,000
Net Working Capital(A-B)		12,20,000
Add: Cash holding (1 month's expenses)		20,000
Working Capital requirement		12,40,000

8. With the following information, prepare a statement showing the working capital required to finance a level of activity of 10,400 units per annum:
   (i) Selling price @₹5 per unit
   (ii) The expected ratios of cost to selling prices are:
      (a) Raw material 40%
      (b) Direct wages 10%
      (c) Overheads 30%
      (d) Profit 20%
   (iii) Raw materials are expected to remain in store for an average period of two months before being used for production and materials are in process on an average period of six weeks.
   (iv) Finished goods will stay in store approximately for six weeks before dispatch to customers.
   (v) Credit allowed to debtors is for a period of two months.
   (vi) Credit allowed by creditors is for a period of two months.
   (vii) Lag in payment of wages and overheads is for a period of two weeks.
   (viii) Cash in hand and bank is expected to be ₹10,000. It may be noted that production is carried on evenly during the year and wages and overheads accrue similarly. Assume 4 weeks a month. *[C.U. B.Com. (H), 2012]*

Solution

Projected annual sales = 10,400

So, Sales per week = $\frac{10,400}{52}$ = 200 units

Statement of Cost

	Per Unit (₹)	Total (₹)
Raw materials (5 × 40%)	2.00	400
Labour (5 × 10%)	0.50	100
Overhead (5 × 30%)	1.50	300
Profit (5 × 20%)	1.00	200
Selling price	5.00	1,000

Statement showing Working Capital Requirement

	Weekly Average Cost	Net Block (Week)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock:				
(i) Raw materials	400	8		3,200
(ii) Work-in-progress:				
Raw Materials	400	6	2,400	
Labour	100	3	300	
Overhead	300	3	900	3,600
(iii) Finished Goods:				
Raw Materials	400	6	2,400	
Wages	100	6	600	
Overhead	300	6	1,800	4,800
Debtors:				
Raw Materials	400	8	3,200	
Labour	100	8	800	
Overhead	300	8	2,400	
Profit	200	8	1,600	8,000
Total Current Assets				19,600
(iv) Current Liabilities				
Creditors for materials	400	8	3,200	
Outstanding labour	100	2	200	
Outstanding overheads	300	2	600	4,000
Net Working Capital(A-B)				15,600
Add: cash in hand				10,000
Working Capital requirement				25,600

9. B Ltd. supplies you the following information

		₹
(i)	Sales (at 2 months credit)	36,00,000
(ii)	Materials consumed (suppliers extend 2 months credit)	9,00,000
(iii)	Wages paid (lag in payment- 1 month)	7,20,000
(iv)	Manufacturing expenses outstanding at the end of the year (lag in payment- 1 month)	80,000
(v)	Total administrative expenses paid (lag in payment- 1 month)	2,40,000
(vi)	Sales promotion expenses paid quarterly in advance	1,20,000

The company sells its product at a gross profit of 25% counting depreciation as part of cost of production. It keeps one month's stock of each of raw materials and finished goods and a cash balance of ₹1,00,000.

Assuming a 20% safety margin, work out the working capital requirement of the company on cash cost basis. Ignore work-in-progress. *[C.U. B.Com. (H), 2013]*

Solution

Working Notes:

1. Calculation of Total Manufacturing Cost

	₹
Sales	36,00,000
(–) Gross profit (25% on sales)	9,00,000
Total Manufacturing Cost	27,00,000

2. Calculation of cash cost of manufacturing excluding depreciation

   Materials Consumed + Wages = Prime Cost

   9,00,000 + 7,20,000 = 16,20,000

   Prime cost + Cash manufacturing expenses = Cash cost of manufacturing

   16,20,000 + (80,000 × 12) = Cash cost of manufacturing

   Cash cost of manufacturing= 16,20,000 + 9,60,000 = ₹25,80,000

3. Calculation of depreciation

   Total manufacturing cost – Cash manufacturing cost = Amount of depreciation

   ₹27,00,000 – ₹25,80,000 = ₹1,20,000

4. Cost Sheet

	Cash Cost (Without Depreciation)	Normal (With Depreciation)
Materials consumed	9,00,000	9,00,000
(+) Wages	7,20,000	7,20,000
Prime Cost	16,20,000	16,20,000
(+) Cash manufacturing expenses	9,60,000	9,60,000
(+) Depreciation	Nil	1,20,000
Manufacturing Cost	25,80,000	27,00,000
(+) Administrative expenses	2,40,000	2,40,000
(+) Sales promotion expenses	1,20,000	1,20,000
Cost of Sales/ Total Cost	29,40,000	30,60,000

5. Stock of finished goods are valued at cash manufacturing cost ₹25,80,000.
6. Debtors are valued at cost price excluding profit i.e. at ₹29,40,000

Statement of Working Capital Requirement of B Ltd.

	Amount (₹)	Amount (₹)
A. Current Assets		
Stock:		
(i) Raw materials $\left(\frac{9,00,000}{12}\times 1\right)$	75,000	
(ii) Finished Goods: $\left(\frac{25,80,000}{12}\times 1\right)$ (WN:5)	2,15,000	
(iii) Debtors: $\left(\frac{29,40,000}{12}\times 2\right)$ (WN:4)	4,90,000	
(iv) Sales promotion expenses paid in advance $\left(\frac{1,20,000}{12}\times 3\right)$	30,000	
(v) Cash balance	1,00,000	9,10,000
Total Current Assets		
B. Current Liabilities		
(i) Creditors for Materials $\left(\frac{9,00,000}{12}\times 2\right)$	1,50,000	
(ii) Wages $\left(\frac{7,20,000}{12}\times 1\right)$	60,000	
(iii) Cash manufacturing expenses(Given)	80,000	
(iv) Administrative expenses $\left(\frac{2,40,000}{12}\times 1\right)$	20,000	3,10,000
Total Current liabilities		
Net Working Capital requirement (A-B)		6,00,000
Add: Safety Margin		1,20,000
Working Capital requirement		7,20,000

10. Cosmos Ltd. sells its products on a gross profit of 20% on sales. The following information is extracted from its annual accounts for the current year ended 31st March, 2014.

	₹
Sales at 3 months credit	40,00,000
Raw materials	12,00,000
Wages paid-average time lag 15 days	9,60,000
Manufacturing expenses paid- one month in arrears	12,00,000
Administration expenses paid-one month in arrears	4,80,000
Sales promotion expenses- payable half-yearly in advance	2,00,000

The company enjoys one month's credit from the suppliers of raw materials and maintains a 2 month's stock of raw materials and one-and-half month's stock of finished goods. The cash balance is maintained at ₹1,00,000 as precautionary measures. Assuming 10% margin, find out the working capital requirement of Cosmos Ltd.

[C.U. B.Com. (H), 2014]

Solution

Projected annual sales = 40,00,000

So, Gross Profit = 20% of sales = 40,00,000 × 20% = 8,00,000

Net Profit = Gross Profit – Administration expenses – Selling and Distribution expenses

= 8,00,000 – 4,80,000 – 2,00,000 = ₹1,20,000

Statement of Daily Cost

	Total (₹ lakhs)	Total (₹ lakhs)
A. Current Assets		
Stock:		
(i) Raw materials $\left(\frac{12,00,000}{12} \times 2\right)$		2,00,000
(ii) Finished Goods:		
Raw Materials $\left(\frac{12,00,000}{12} \times 1.5\right)$	1,50,000	
Labour $\left(\frac{9,60,000}{12} \times 1.5\right)$	1,20,000	
Overhead $\left(\frac{12,00,000}{12} \times 1.5\right)$ (WN:1)	1,50,000	4,20,000

(Contd.)

	Total (₹ lakhs)	Total (₹ lakhs)
(iii) Debtors:		
Raw Materials $\left(\frac{12,00,000}{12}\times 3\right)$	3,00,000	
Labour $\left(\frac{9,60,000}{12}\times 3\right)$	2,40,000	
Overhead $\left(\frac{18,80,000}{12}\times 3\right)$	4,70,000	
Profit $\left(\frac{8,00,000}{12}\times 3\right)$	2,00,000	12,10,000
Sales promotion expenses in advance $\left(\frac{2,00,000}{12}\times 6\right)$		1,00,000
Cash Balance		1,00,000
Total Current Assets		20,30,000
B. Current Liabilities		
Creditors for materials $\left(\frac{12,00,000}{12}\times 1\right)$	1,00,000	
Creditor for wages $\left(\frac{9,60,000}{12}\times 0.5\right)$	40,000	
Creditor for manufacturing expenses $\left(\frac{12,00,000}{12}\times 1\right)$	1,00,000	
Creditor for administration expenses $\left(\frac{4,80,000}{12}\times 1\right)$	40,000	2,80,000
Net Working Capital (A-B)		17,50,000
Add: 10% cash in hand $\left(\frac{17,50,000}{90}\times 10\right)$		1,75,000
Working Capital Requirement		19,25,000

WN 1: Overhead expense for finished goods taken at manufacturing cost only.

WN 2: If debtors are taken at cost then the working capital requirement is ₹17,27,000

11. For a new business Mr. Bose supplied the following information:
    (i) The projected annual sales- ₹1,20,00,000
    (ii) He has estimated fixed expenses ₹20,000 per month and variable expenses equal to 2 per cent of turnover.
    (iii) Percentage of gross profit on cost of purchase will be 25%.
    (iv) Average expected credit period allowed to debtors-1 month.
    (v) Average expected credit period from suppliers-15 days.

(vi) He expects to turnover his stock 5 times in a year.

(vii) Average cash holding – 1 month's expenses.

You are required to forecast his working capital requirement. *[C.U. B.Com. (H), 2015]*

Solution

Projected annual sales = ₹1,20,00,000

Sales per month = $\frac{1,20,00,000}{12}$ = 10,00,000

Fixed expenses = ₹20,000 per month

Variable expenses= 1,20,00,000 × 2% = 2,40,000, so per month = $\frac{2,40,000}{12}$ = 20,000

Total expenses = 20,000 + 20,000 = 40,000 per month

Gross profit on cost of purchase = 25% i.e. $\frac{1}{5}$ th on sales = $\frac{1}{5}$ × 120,00,000 = ₹24,00,000,

so $\frac{24,00,000}{12}$ = 2,00,000 per month

Cost of goods sold (COGS) = Sales – gross Profit

WN 1: COGS= 1,20,00,000 – 24,00,000 = ₹96,00,000

Stock turnover = 5 times

So, $$\frac{\text{Cost of Goods Sold}}{\text{Average stock}} = 5$$

$$\frac{96,00,000}{\text{Average stock}} = 5$$

$$\textbf{Average stock} = \frac{\textbf{96,00,000}}{\textbf{5}} = \textbf{19,20,000}$$

Assuming no opening stock, the stock figure represents closing stock.

WN 2: Credit period to debtors = 1 month

So, $$1 = \frac{12}{\text{Debtors turnover ratio}}$$

Debtors turnover ratio = 12

$$\frac{\text{Credit sales}}{\text{Debtors}} = 12$$

$$\frac{1,20,00,000}{\text{Debtors}} = 12$$

$$\textbf{Debtors} = \frac{\textbf{1,20,00,000}}{\textbf{12}} = \textbf{10,00,000}$$

WN 3: Credit period from supplier = 15 days = $\frac{1}{2}$ month

$$\frac{1}{2} = \frac{12}{\text{Creditors turnover ratio}}$$

Creditors turnover ratio = 24

$$\frac{\text{Credit purchase}}{\text{Creditors}} = 24$$

$$\frac{1,15,20,000}{\text{Creditors}} = 24$$

$$\textbf{Creditors} = \frac{\textbf{1,15,20,000}}{\textbf{24}} = \textbf{4,80,000}$$

Cost of Goods sold = Opening stock + Purchase – Closing stock

96,00,000 = Nil + Purchase – 19,20,000

96,00,000 + 19,20,000 = Purchase

Purchase = 1,15,20,000

Statement showing Working Capital Requirement

	Amount (₹)	**Amount (₹)**
A. Current Assets		
Stock:		
(a) Finished Goods (WN:1)	19,20,000	
(b) Debtors (WN:2)	10,00,000	29,20,000
Total Current Assets		
B. Current Liabilities		
Creditors for materials (WN:3)		4,80,000
Net Working Capital(A-B)		24,40,000
Add: Cash holding (1 month's expenses)		40,000
Working Capital requirement		24,80,000

12. A manufacturing company has a capacity to produce 60,000 units p.a. The cost structure at that capacity and selling price p.u are given below:

Materials	₹5
Labour	₹2
Overhead ₹5 (60% variable; of the fixed overhead ₹30,000 represents depreciation)	
	₹12
Profit	₹3
Selling Price	₹15

The other details are:

- Raw material storage period- 2 months; processing time- 1 month and finished goods in store-1 month.
- Debtors and Creditors turnover are 6 and 12 times a year respectively.
- Lag in payment of overhead is $\frac{1}{2}$ month.

Assuming that the company will be able to utilize 80% of its capacity. Estimate the working capital requirement on cash cost basis. *[C.U. B.Com. (H), 2016]*

Solution

Projected annual sales = 60,000

So, Sales per month = $\frac{60,000}{12}$ = 5,000 units

Operating at 80% capacity i.e. = 5,000 × 80% = 4,000 units

Debtors turnover = 6 times

Credit period allowed to debtors = $\frac{12}{6}$ = 2 months

Creditors turnover = 12 times

Credit period allowed by suppliers = $\frac{12}{12}$ = 1 months

Statement of Cost

	Per Unit (₹)	**Total (₹)**
Raw materials (5 × 4,000)	5.00	20,000
Labour (2 × 4,000)	2.00	8,000
Overhead Fixed = $\frac{96,000 - 30,000}{48,000}$ + Variable = [(5 × 60%) × 4,000 = 3 × 4,000)	1.375 + 3.00 = 4.375	5,500 + 12,000 = 17,500
Depreciation $\frac{30,000}{48,000}$	0.625	2,500
Profit	3.00	12,000
Selling price	15.00	60,000

Statement showing Working Capital Requirement

	Monthly Average Cost	Net Block (Month)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock:				
(i) Raw materials	20,000	2		40,000
(ii) Work-in-progress:				
Raw Materials	20,000	1	20,000	
Direct Wages	8,000	1	8,000	
Overhead	17,500	1	17,500	45,500
(iii) Finished Goods:				
Raw Materials	20,000	1	20,000	
Direct Wages	8,000	1	8,000	
Overhead	17,500	1	17,500	45,500
(iv) Debtors:				
Raw Materials	20,000	2 (WN:1)	40,000	
Direct Wages	8,000	2	16,000	
Overhead	17,500	2	35,000	
Profit	12,000	2	24,000	1,15,000
Total Current Assets				2,46,000
B. Current Liabilities				
Creditors for materials	20,000	1	20,000	
Outstanding overheads	17,500	$\frac{1}{2}$	8,750	28,750
Net Working capital(A-B)				
Working Capital requirement				2,17,250

13. Estimate the working capital requirement on profit basis for the coming year from the following information of a manufacturing company. Expected annual sales is 1,56,000 units of ₹10 per unit. The anticipated ratios of cost to selling price are: Raw materials 50% and Direct Wages 15%. Budgeted cash overhead is ₹42,000 and depreciation is ₹10,000 per annum. Planned stock will include raw material for ₹45,000 and 9,000 units of finished goods. Credit allowed to debtor is 1 month. Credit expected to be received from suppliers 3 weeks. Overhead and wages payment will be made 1 week after their occurrence. Material will stay in the process for 14 days. Cash in hand to be maintained is 15% of total working capital. Assume that production is carried on evenly throughout the year. Raw materials are introduced at the beginning of the process and wages and overhead accrue evenly during processing. *[C.U. B.Com. (H), 2017]*

Solution

Projected annual sales = 1,56,000

So, Sales per day = $\frac{1,56,000}{52}$ = 3,000 units

So total sales = $3{,}000 \times ₹10 = ₹30{,}000$

$$\text{Raw materials in stores} = \frac{\text{Cost of raw materials in stock}}{\text{Cost of raw materials per week}}$$

$$\frac{₹45{,}000}{3{,}000 \times 5} = \frac{₹45{,}000}{15{,}000} = 2 \text{ weeks}$$

$$\text{Finished goods in store} = \frac{\text{No of units of finished goods in stores}}{\text{units produced per week}}$$

$$\text{Finished goods in store} = \frac{9{,}000}{3{,}000} = 3 \text{ weeks}$$

Statement of Cost

	Per Unit	**Total (₹)**
Raw materials ($30{,}000 \times 50\%$)	5.00	15,000
Labour ($30{,}000 \times 15\%$)	1.50	4,500
Overhead $\frac{42{,}000}{1{,}56{,}000}$ (WN:1)	0.269	808
Depreciation $\frac{10{,}000}{1{,}56{,}000}$	0.06410	192
Profit	3.166	9,500
Selling Price	10.00	30,000

Statement showing Working Capital Requirement

	Weekly Average Cost	**Net Block (Weeks)**	**Amount (₹)**	**Amount (₹)**
A. Current Assets				
Stock:	15,000	3		45,000
I. Raw materials				
II. Work-in-progress:				
Raw Materials	15,000	2	30,000	
Labour	4,500	1	4,500	
Overhead(WN:1)	808	1	808	35,308
III. Finished Goods:				
Raw Materials	15,000	3	45,000	
Labour	4,500	3	13,500	
Overhead	808	3	2,424	60,924

(Contd.)

	Weekly Average Cost	Net Block (Weeks)	Amount (₹)	Amount (₹)
IV. Debtors:				
Raw Materials	15,000	1	15,000	
Labour	4,500	1	4,500	
Overhead	808	1	808	
Profit	9,500	1	9,500	29,808
Total Current Assets				1,71,040
B. Current Liabilities				
Creditors for materials	15,000	3	45,000	
Lag in payment of wages	4,500	1	4,500	
Lag in payment of overhead	808	1	808	50,308
Net Working Capital (A-B)				1,20,732
(+) Cash in hand $\left(\frac{1,20,732}{85} \times 15\right)$				21,306
Working Capital requirement				1,42,038

WN 1: Assuming production is carried out evenly, so lag period in payment of labour and overhead expenses in respect of W.I.P = $\frac{2}{2}$ = 1 week.

14. Between two periods of a company there is an increase of debt collection period and raw material conversion period by 20 days and 5 days respectively, whereas its creditors payment period and finished goods conversion period is reduced by 10 days and 5 days respectively. Calculate the changes in operating cycle of the company.

[C.U. B.Com. (H), 2017]

Solution

	Days	Days
Increase in debt collection period	20	
Decrease in creditors payment period	10	
Increase in raw material conversion period	5	35
Less: Decrease in finished goods conversion period		5
Increase in operating cycle		30

CHAPTER 6: WORKING CAPITAL MANAGEMENT (II)

Theoretical Questions

5 Marks

1. Write short notes on:
   (a) Inventory Management (Refer to Page No. 6.53) *[C.U. B.Com. (H), 2007]*
   (b) Inventories Management Ratio (Refer to Page No. 6.64) *[C.U. B.Com. (H), 2011]*
2. Write a short note on the recommendations of Tandon Committee regarding bank financing. (Refer to Page No. 6.16) *[C.U. B.Com. (H), 2013]*
3. Distinguish between conservative and aggressive strategies of financing current assets. (Refer to Page No. 6.12) *[C.U. B.Com. (H), 2013]*
4. Give a brief idea about the sources of finance of working capital. (Refer to Page No. 6.1) *[C.U. B.Com. (H), 2014]*
5. Write a short note on the recommendations of Chore Committee. (Refer to Page No. 6.19) *[C.U. B.Com. (H), 2014]*
6. What are the factors in determining the size of debtors? (Refer to Page No. 6.42) *[C.U. B.Com. (H), 2014]*
7. Discuss the different strategies of financing working capital of a firm. (Refer to Page No. 6.8) *[C.U. B.Com. (H), 2015]*
8. Briefly state two short term sources of working capital. (Refer to Page No. 6.3) *[C.U. B.Com. (H), 2016]*

10 Marks

9. (a) How the trade-off between Matching and Conservative Policy of financing the working capital is done? Explain. (Refer to Page No. 6.9)

Practical Problems

1. Zori Ltd. estimated its current assets and current liabilities for the coming year to be ₹8,40,000 and ₹2,20,000. Of the current assets, the value of core current assets is ₹1,20,000. You are required to calculate for Zori Ltd. the maximum permissible bank finance under all the three methods of lending norms as suggested by the Tandom Committee. *[C.U. B.Com. (H), 2016]*

Solution

Tandon Committee introduced the concept of Maximum Permissible Bank Finance (MPBF) in the working capital finance by banker. The computation of the maximum permissible bank finance under all the three methods of lending norms as suggested by the Tandom Committee are as follows:

First method

In the first method, 25% of the Working Capital Gap (CA- (CL excluding bank borrowing)) should be contributed by borrower through long-term funds and remaining 75% can be financed from bank borrowings.

MABF = 75% of (Current assets – Current liabilities other than bank borrowings)
= 75% of (8,40,000 – 2,20,000) = 75% of 6,20,00 = ₹4,65,000

Second method

Under this method the borrower should provide 25% of the total current assets through long-term funds.

MABF = (75% of Current assets) – (Current liabilities other than bank borrowings)
= (75% of 8,40,000) – 2,20,000 = 6,30,000 – 2,20,000 = ₹4,10,000

Third method

In this method the borrower should contribute from long-term sources to the extent of core current assets (Fixed Current assets) and 25% of the balance of the current assets. The remaining of the working capital gap can be met from bank borrowings.

MABF = {75% of (Current assets-Core current assets)} – Current liabilities other than bank borrowing
= {75% (8,40,000 – 1,20,000)} – 2,20,000 = 5,40,000 – 2,20,000 = ₹3,20,000

(Note: As there is no information regarding bank borrowing Zori Ltd., so we consider the figure of current liabilities of ₹2,20,000 as Current liabilities other than bank borrowing.)

CHAPTER 7: CAPITAL EXPENDITURE DECISIONS (I)

Theoretical Questions

5 Marks

1. Narrate the situations when a company needs to have capital budgeting decisions. (Refer to Page No. 7.5) *[C.U. B.Com. (H), 2009]*
2. State the significance of capital budgeting decision. (Refer to Page No. 7.2) *[C.U. B.Com. (H), 2011]*
3. What is Accounting Rate of Return? (Refer to Page No. 7.13) *[C.U. B.Com. (H), 2015]*
4. Specify the distinguishing features of capital budgeting decision. (Refer to Page No. 7.2) *[C.U. B.Com. (H), 2016]*

Practical Problems

1. You are requested to advise management about the purchase of a new machine on the basis of payback reciprocal of the two:

	Machine X	*Machine Y*
Initial outlay	₹2,00,000	₹3,00,000
Estimated life (years)	10	14
Annual cash inflow after tax	₹25,000	₹30,000

[C.U. B.Com. (H), 2012]

Solution

$$\text{Payback Reciprocal} = \frac{1}{\text{Payback Period}} \times 100$$

$$= \frac{1}{\frac{\text{Initial investment}}{\text{Annual cash inflow after tax}}} \times 100$$

$$= \frac{\text{Annual cash inflow after tax}}{\text{Initial investment}} \times 100$$

$$\text{For Machine X} = \frac{₹25,000}{₹2,00,000} \times 100 = 12.5\%$$

$$\text{For Machine Y} = \frac{₹30,000}{₹3,00,000} \times 100 = 10\%$$

Machine X is more profitable as it has higher Payback Reciprocal, hence the management is advised to buy Machine X.

2. A company decided to start a project cost of ₹12,000, part of which will be financed by long term debt. Following are the expected results for first year of the project:
   (i) Sales: 5000 units @₹50
   (ii) Variable cost per unit ₹30 and Fixed operating cost ₹18,000 (excluding depreciation)
   (iii) Depreciation: as per books of accounts ₹20,000
   as per Income tax rates ₹24,000
   (iv) Interest on loan (to finance the project) ₹8,000 and applicable tax rate 30%.

   You are required to calculate net cash flow (NCF) for the first year.

[C.U. B.Com. (H), 2016]

Solution

Project cost = ₹12,000

Applicable tax rate 30%

Statement showing the Computation of Net Cash Flow (NCF)

	₹
Sales 5,000 units @50 (5000 × 50)	2,50,000
Less:	
Variable cost (5,000 × 30)	1,50,000
	1,00,000
Less:	
Fixed operating cost (excluding depreciation)	18,000
	82,000
Less:	
Depreciation (as per books of accounts)	20,000
	62,000
Less:	
Interest on loan (to finance the project)	8,000
	54,000
Less:	
Tax @ 30% (54,000 × 30%)	16,200
	37,800
Add: Depreciation	20,000
	57,800

Hence, Net Cash Flow (NCF)) of the project for the first year is **₹57,800**.

3. A company is considering an investment proposal to install a new machine at a cost of ₹50,000. The facility has a life expectancy of 5 years with ₹5,000 salvage value. For the project additional working capital of ₹10,000 will also be required. The applicable income tax rate is 30%.

   Estimated EBDIT from the proposal are: ₹20,000, ₹22,000, ₹19,000, ₹17,000 and ₹24,000 respectively for 5 years.

   Compute the Accounting Rate of Return for the proposal. *[C.U. B.Com. (H), 2016]*

Solution

$$\text{Accounting or Average Rate of Return (ARR)} = \frac{\text{Average annual profit after tax}}{\text{Average Investment}} \times 100$$

where,

Average Investment = Additional Net working Capital + Salvage value + 1/2(Initial Investment – Salvage value)

Calculation of Average Annual Profit after Tax

	₹
EBDIT [(20,000 + 22,000 + 19,000 + 17,000 + 24,000)/5]	20,400
Less: Depreciation (50,000 – 5000)/5	9,000
EBIT	11,400
Less: Tax @ 30%	3,420
Average Annual Profit after Tax	7,980

Now,

Average Investment = 10,000 + 5,000 + (50,000 – 5,000)/5 = 15,000 + 22,500 = ₹37,500

$$\text{Accounting or Average Rate of Return (ARR)} = \frac{\text{Average annual profit after tax}}{\text{Average Investment}} \times 100$$

$$= \frac{7,980}{37,500} \times 100 = 21.28\%$$

Hence, Accounting or Average Rate of Return (ARR) of the project is 21.28%.

4. Raj and Co. intends to invest ₹10 lakh in a project having a life of 4 years. The Cash Inflows from the project at the end of year one to the fourth year are expected as ₹3,00,000, ₹4,20,000, ₹4,00,000 and ₹3,30,000 before charging depreciation and tax. You are required to calculate the Accounting Rate of Return of the project and comment on the use of the rate of return. *[C.U. B.Com. (H), 2007]*

Solution

$$\text{Accounting or Average Rate of Return (ARR)} = \frac{\text{Average Annual Profit after Tax}}{\text{Average Investment}} \times 100$$

where,

$$\text{Average Annual Profit after Tax} = \frac{\text{Total profit after depreciation and tax of the whole life of the project}}{\text{Project life (in years)}}$$

$$\text{Average investment} = \text{Additional Net Working Capital} + \text{Salvage Value} + \frac{1}{2}(\text{Initial Investment} - \text{Salvage Value})$$

$$= 0 + 0 + \frac{1}{2}(10,00,000 - 0)$$

$$= \frac{10,00,000}{2}$$

$$= 5,00,000$$

Statement Showing Profit After Tax During the Life of the Project

Year	Earning Before Depreciation and Tax (₹)	Depreciation = ₹10,00,000/4 (₹)	Earning Before Tax (₹)	Tax Assumed @ 50%	Earning After Tax (₹)
1	3,00,000	2,50,000	50,000	25,000	25,000
2	4,20,000	2,50,000	1,70,000	85,000	85,000
3	4,00,000	2,50,000	1,50,000	75,000	75,000
4	3,30,000	2,50,000	80,000	40,000	40,000
Total earning after tax			**(A)**		2,25,000
Project life			**(B)**		4 years
Average earning after tax			**(A/B)**		56,250

(Contd.)

$$\text{ARR} = \frac{56,250}{5,00,000} \times 100 = 11.25\%$$

5. Compute the Payback Period for the project:

End of the year	1	2	3	4	5
Book value of fixed assets	90	80	70	60	50
Profit after tax	20	22	24	26	28

[C.U. B.Com. (H), 2006]

Solution

In the problem, the initial investment is not given but it can be observed that the book value of fixed assets reduces by 10 over the years, so it can be assumed as depreciation per year. Also, the initial investment at 0 year may be taken as (90 + 10 = 100).

Calculation of Annual Cash Inflows After Tax (CIAT)

Year	Profit after Tax (PAT)	Depreciation	CIAT = PAT + Depreciation	Cumulative CIAT
1	20	10	30	30
2	22	10	32	62
3	24	10	34	96
4	26	10	36	132
5	28	10	38	170

The Payback Period lies somewhere between the 3rd and the 4th year, which is to be calculated by applying simple interpolation method. So Payback Period (say, x) is calculated as under:

$$\frac{x-3}{4-3}=\frac{100-96}{132-96}$$

$$x-3=\frac{4}{36}$$

$$x-3=0.1111$$

$$x=3.11 \text{ years}$$

Hence, Payback Period is 3.11 years.

6. From the information given below compute the Payback Period.

Initial outlay	₹80,000
Estimated life	5 years
Profit after tax:	
End of year 1	₹6,000
2	₹14,000
3	₹4,000
4	₹6,000
5	₹10,000

Depreciation has been calculated under straight line method. *[C.U. B.Com. (H), 2010]*

Solution

Statement Showing Calculation of Cash Inflows After Tax (CIAT):

Year	Profit after Tax (PAT) (₹)	Depreciation (₹80,000/5 years) (₹)	CIAT = (PAT + Depreciation) (₹)	Cumulative CIAT (₹)
1	6,000	16,000	22,000	22,000
2	14,000	16,000	30,000	52,000
3	4,000	16,000	20,000	72,000
4	6,000	16,000	22,000	94,000
5	10,000	16,000	26,000	1,20,000

It is evident from above that Payback Period (PBP) lies between 3rd and 4th year, which can be calculated by applying simple interpolation method as under:

$$\frac{\text{PBP}-3}{3-4}=\frac{80{,}000-72{,}000}{94{,}000-72{,}000}$$

or, $$\text{PBP}-3=\frac{8{,}000}{22{,}000}$$

or, $$\text{PBP}-3=0.3636$$

or, $$\text{PBP}=3.3636 \text{ years}$$

7. Following information is available for two machines:

Particulars	X (₹)	Y (₹)
Initial investment	1,00,000	1,00,000
Life	7 years	11 years
Net Cash Inflow	25,000	20,000
Realisable value after 5 years	50,000	75,000

With the help of Payback Period method, evaluate the efficient one.

[C.U. B.Com. (H), 2014]

Solution

$$\text{Payback Period} = \frac{\text{Cost of Initial Investment}}{\text{Uniform Annual Cash Inflow}}$$

For Machine X = ₹1,00,000/₹25,000 = 4 years

For Machine Y = ₹1,00,000/₹20,000 = 5 years

Therefore, Machine X is to be chosen as it has lower Payback Period.

Note: Realisable value is of no use here as the investment gets recovered before the terminal year.

8. Compute the Payback Period of a project of which the following details are available:

End of the Year	1	2	3	4	5
Book value of fixed assets (₹ in lakhs)	450	400	350	300	250
Profit after tax (₹ in lakhs)	80	88	96	104	112

[C.U. B.Com. (H), 2015]

Solution

In the problem the initial investment is not given but it can be observed that the book value of fixed assets reduces by ₹50 lakhs over the years, so it can be assumed as depreciation per year. Also, the initial investment at 0 year may be taken as (450 + 50 =) ₹500 lakhs.

Calculation of Annual Cash Inflows After Tax (CIAT):

Year	Profit after Tax (PAT) (₹)	Depreciation (₹)	CIAT = PAT + Depreciation (₹)	Cumulative CIAT (₹)
1	80	50	130	130
2	88	50	138	268
3	96	50	146	414
4	104	50	154	568
5	112	50	162	730

The Payback Period lies somewhere between the 3rd and the 4th year, which is to be calculated by applying simple interpolation method. So Payback Period (say, x) is calculated as under:

$$\frac{x-3}{4-3}=\frac{500-414}{568-414}$$

or, $$x-3=\frac{86}{154}$$

or, $$x-3=0.5584$$

or, $$x=3.56 \text{ years}$$

Hence, Payback Period is 3.56 years.

9. Project I costs ₹8,00,000 and project II costs ₹12,80,000. Both have a 10 year life. Uniform cash receipts expected from project I is ₹1,60,000 and project II is ₹3,20,000. Salvage Value expected from project I is ₹5,60,000 declining at an annual rate of ₹80,000 and project II is ₹6,40,000 declining at an annual rate of ₹1,60,000. Which one is to be selected?

[C.U. B.Com. (H), 2015]

Solution

For Project I

Year	Constant Annual Cash Receipts (₹) (A)	Cumulative Cash Receipts (₹) (B)	Salvage Value (₹) (C)	Cumulative Cash Inflows (CIAT) (₹) D = (B + C)
1	1,60,000	1,60,000	5,60,000	7,20,000
2	1,60,000	3,20,000	4,80,000	8,00,000
3	1,60,000	4,80,000	4,00,000	8,80,000
4	1,60,000	6,40,000	3,20,000	9,60,000
5	1,60,000	8,00,000	2,40,000	10,40,000
6	1,60,000	9,60,000	1,60,000	11,20,000
7	1,60,000	11,20,000	80,000	12,00,000
8	1,60,000	12,80,000	—	12,80,000
9	1,60,000	14,40,000	—	14,40,000
10	1,60,000	16,00,000	—	16,00,000

For Project-I, initial investment of ₹8,00,000 have been recovered in second year, so, Payback Period is 2 years.

For Project II

Year	Constant Annual Cash Receipts (₹) (A)	Cumulative Cash Receipts (₹) (B)	Salvage Value (₹) (C)	Cumulative Cash Inflows (CIAT) (₹) D = (B + C)
1	3,20,000	3,20,000	6,40,000	9,60,000
2	3,20,000	6,40,000	4,80,000	11,20,000
3	3,20,000	9,60,000	3,20,000	12,80,000
4	3,20,000	12,80,000	1,60,000	14,40,000
5	3,20,000	16,00,000	—	16,00,000
6	3,20,000	19,20,000	—	19,20,000
7	3,20,000	22,40,000	—	22,40,000
8	3,20,000	25,60,000	—	25,60,000
9	3,20,000	28,80,000	—	28,80,000
10	3,20,000	32,00,000	—	32,00,000

For Project-II, initial investment is ₹12,80,000 which has been recovered in 3rd year, so, Payback Period is 3 years.

CHAPTER 8: CAPITAL EXPENDITURE DECISIONS (II)

Theoretical Questions

5 Marks

1. What is Profitability Index? How it is superior to NPV? (Refer to Page No. 8.9)
[C.U. B.Com. (H), 2007]
2. Mention any three importance of capital budgeting. How will you take decision under NPV method in case of evaluation of a proposed project? (Refer to Page No. 8.4)
[C.U. B.Com. (H), 2008]
3. Write a short note on Discounted Payback method of project selection. (Refer to Page No. 8.26) *[C.U. B.Com. (H), 2008]*
4. Write short note: Internal Rate of Return. (Refer to Page No. 8.12)
[C.U. B.Com. (H), 2009]

10 Marks

1. (a) What is profitability Index in the context of Capital Expenditure decision? (Refer to Page No. 8.9)
   (b) What do you mean by Capital Rationing? (Refer to Page No. 8.29)
[C.U. B.Com. (H), 2013]

2. (a) What is the reinvestment rate and what are its assumptions under the NPV and IRR method? (Refer to Page No. 8.19)
   (b) How will you consider accept-reject decision under IRR method in case of evaluation of a proposed project? (Refer to Page No. 8.16) *[C.U. B.Com. (H), 2014]*

Practical Problems

1. Using the information given below compute the Payback Period under Discounted Payback Period method and comment.

   Initial outlay: ₹80,000

   Estimated life : 5 years

Year	1	2	3	4	5
PAT(₹)	6,000	14,000	24,000	16,000	Nil

Depreciation has been calculated under SLM. The cost of capital may be taken at 20% p.a. and the P.V of ₹1 at 20% p.a. is given below:

Year	1	2	3	4	5
PV factor	0.83	0.69	0.58	0.48	0.40

[C.U. B.Com. (H), 2008]

Solution

Calculation for DPBP

Year	**PAT**	**Depreciation**	**CIAT (₹)**	**PVIF @ 20%**	**PV of CIAT**	**Cumulative PV**
1	6,000	16,000	22,000	0.83	18,260	18,260
2	14,000	16,000	30,000	0.69	20,700	38,960
3	24,000	16,000	40,000	0.58	23,200	62,160
4	16,000	16,000	32,000	0.48	15,360	77,520
5	Nil	16,000	16,000	0.40	6,400	83,920

From the table it appears that initial investment of ₹80,000 is recovered along with the interest cost of fund in between 4^{th} and 5^{th} year.

We apply simple interpolation to get

$$\frac{\text{DPBP} - 4}{5 - 4} = \frac{80,000 - 77,520}{83,920 - 77,520}$$

DPBP = 4.3875 years

Since the project cost along with interest cost of fund is recovered within the life of the project, it is acceptable.

2. A company has to select one of the two alternative projects whose particulars are given below:

Project	Initial Outlay	Net Cash Flow				
		1	2	3		4
I	11,872	10,000	2,000	1,000	1,000	
II	10,067	1,000	1,000	2,000		10,000

The company can arrange fund at 8%. Compute the NPV and IRR of the project. The present value of ₹1 at different cost of capital is given below:

Year	8%	10%	12%	14%
1	0.926	0.909	0.893	0.877
2	0.857	0.826	0.797	0.770
3	0.794	0.751	0.712	0.675
4	0.735	0.683	0.536	0.592

[C.U. B.Com. (H), 2006]

Solution

Calculation of NPV

Year	Project I	Project II	PVIF @ 8%	Project I	Project II
1	10,000	1,000	0.926	9,260	926
2	2,000	1,000	0.857	1,714	857
3	1,000	2,000	0.794	794	1,588
4	1,000	10,000	0.735	735	7,350
Total PV of Cash flow				12,503	10,721
(–) Initial Outlay				11,872	10,067
NPV				631	654
Ranking				2	1

Since NPV is higher for Project II, it is acceptable.

Computation of IRR of Project I

Year	NCF	PV Factor at 12%	PV of CF
1	10,000	0.893	8,930
2	2,000	0.797	1,594
3	1,000	0.712	712
4	1,000	0.536	636
Total PV			11,872

Since at 12% Total PV = Initial Outlay, IRR = 12%

Computation of IRR of Project II

Year	NCF	PV Factor at 10%	PV of CF
1	1,000	0.909	909
2	1,000	0.826	826
3	2,000	0.751	1,502
4	10,000	0.683	6,830
Total PV			10,067

Since at 10% Total PV = Initial Outlay, IRR = 10%

So ranking under IRR: Project I –Rank 1 and Project II – Rank 2.

Hence under IRR, Project I is acceptable.

Thus there is a conflict between NPV and IRR as regards to the ranking of the project.

Under such a circumstance, we select the project based on NPV method because NPV is superior to IRR because of the following reasons:

(a) The assumption of reinvestment rate is more rational under NPV.

(b) This method s consistent with the value maximization objective of the firm.

So Project II is ultimately selected.

3. R Ltd. presently considering two machines for possible purchase. Other information related to the machines are as follows:

Particulars	Machine 1	Machine 2
Estimated Life (years)	4	4
Purchase Price (₹)	50,000	60,000
Cash Flow before Depreciation and tax (₹)		
Year 1	25,000	45,000
Year 2	25,000	19,000
Year 3	25,000	25,000
Year 4	25,000	27,000

Rate of tax is 40%.

Compute the NPV of each machine assuming a cost of capital of 8%. Which machine should the company buy? *[C.U. B.Com. (H), 2007]*

Solution

Calculation for CFAT of Machine 1

Year	CBDT	Depreciation	PBT	Tax @40%	PAT	CFAT
1	25,000	12,500 (50,000/4)	12,500	5,000	7,500	20,000
2	25,000	12,500	12,500	5,000	7,500	20,000
3	25,000	12,500	12,500	5,000	7,500	20,000
4	25,000	12,500	12,500	5,000	7,500	20,000

Calculation for CFAT of Machine 1

Year	CBDT	Depreciation	PBT	Tax @40%	PAT	CFAT
1	45,000	15,000 (60,000/4)	30,000	12,000	18,000	33,000
2	19,000	15,000	4,000	1,600	2,400	17,400
3	25,000	15,000	10,000	4,000	6,000	21,000
4	27,000	15,000	12,000	4,800	7,200	22,200

Calculation of NPV

Year	CFAT (₹)		PVIF at 8%	PV of CF (₹)	
	Machine 1	Machine 2		Machine 1	Machine 2
1	20,000	33,000	0.926	18,520	30,558
2	20,000	17,400	0.857	17,140	14,911.8
3	20,000	21,000	0.794	15,880	16,674
4	20,000	22,200	0.735	14,700	16,317
Total PV				66,240	78,460.8
(–) Purchase price				50,000	60,000
NPV				16,240	18,460.8

Since NPV is higher for Machine 2, it is recommended.

4. A company is considering an investment project which requires an initial cash outlay of ₹5,00,000 on equipment and ₹20,000 as working capital. The project's economic life is 6 years. An additional investment of ₹50,000 each would be necessary at the end of second and fourth year to restore the efficiency of the equipment. The annual cash inflows expected from the project are:

Year	1	2	3	4	5	6
Cash inflows (₹)	80,000	1,20,000	1,80,000	2,00,000	2,60,000	3,00,000

If the realizable scrap value of the equipment is ₹20,000 after 6 years and cost of capital is 20%, justify whether the project should be accepted or not by determining the NPV. Assume that the working capital will be recovered at the end of the project life.

[C.U. B.Com. (H), 2009]

Solution

Calculation for PV of Cash Inflow

Year	Cash inflows	PVIF at 20%	PV of Cash flow
1	80,000	0.833	66,640
2	1,20,000	0.694	83,280
3	1,80,000	0.579	1,04,220
4	2,00,000	0.482	96,400
5	2,60,000	0.402	1,04,520
6	3,40,000	0.335	1,13,900
Total PV			**5,68,960**

Note: Cash flow of 6^{th} year includes ₹20,000 working capital realized and ₹20,000 scrap value realized.

Calculation for PV of Cash Outflow

Year	Cash inflows	PVIF at 20%	PV of Cash flow
0	5,20,000	1	5,20,000
2	50,000	0.694	34,700
4	50,000	0.482	24,100
Total PV			**5,78,800**

Note: Cash flow for year 0 (i.e. initial cash flow includes ₹20,000 working capital investment.

So, NPV = PV of cash inflow – PV of cash outflow = ₹5,68,960 – ₹5,78,800 = –₹9,840.

Since NPV is negative, the project should be rejected.

5. Z Ltd. has to select one of the two alternative projects whose particulars are given below:

Project 1– Initial Outlay ₹2,40,000; The expected cash inflow from it at the end of first year and second year are ₹50,000 and ₹2,50,000 respectively.

Project 2– Initial Outlay ₹2,35,930; The expected cash inflow from it at the end of first year and second year are ₹1,90,000 and ₹90,000 respectively.

Rank the two projects in order of preference by the NPV and IRR method. Which of the alternative would you select and why? Assume cost of capital is 10%.

Present value of ₹1 at different rates of cost of capital are as follows:

Rate	10%	11%	12%	13%	14%	15%
Year 1	0.909	0.901	0.892	0.885	0.877	0.867
Year 2	0.826	0.812	0.797	0.783	0.770	0.756

[C.U. B.Com. (H), 2010]

Solution

Calculation for NPV of the proposals

Year	Proposal A	Proposal B	PVIF @ 10%	Proposal X	Proposal Y
1	50,000	1,90,000	0.909	45,450	1,72,710
2	2,50,000	90,000	0.826	2,06,500	74,340
Total PV of Cash flow				2,51,950	2,47,050
(-)Initial Investment				2,40,000	2,35,930
NPV				11,950	11,120
Rank				1	2

Calculation of IRR of the proposals

Based on trial and error method using the discounting rates given in the problem, we find that the IRR of Proposal A is 13% and that of B is 14%.

So, ranking based on IRR is:

Project 1 = Rank 2

Project 2 = Rank 1

Thus there appears a conflict between the proposals as regards to their ranking under the two methods.

Final Selection:

Between NPV and IRR, NPV method is always a better approach because –

(a) NPV method attempts maximization of the benefits from any project in terms of present value. Therefore this is in line with the corporate objective of value maximization of the firm.

(b) NPV is based on more rational assumption regarding the re-investment rate than that of IRR.

Thus finally we adopt NPV method and select project 1 having higher NPV.

6. From the following particulars given below calculate the IRR of the project.

(i) Net profit after tax (₹): End of Year 1 = ₹13,750
End of Year 2 = ₹22,000
End of Year 3 = ₹27,500
End of Year 4 = ₹11,000

(ii) Initial outlay ₹55,000. There will be no scrap value at the end of the project life.
(iii) Present value of Re. 1 receivable at the end of year 1, 2,3 and 4 at different discounting rate are given below:

Rate	12%	13%	14%	15%
Year 1	0.892	0.885	0.877	0.867
Year 2	0.797	0.783	0.770	0.756
Year 3	0.712	0.693	0.675	0.658
Year 4	0.636	0.613	0.592	0.572

[C.U. B.Com. (H), 2011]

Solution

Calculation for CFAT and IRR

Year	PAT	Depreciation	CFAT	PVIF at 12%	PVCF	PVIF at 15%	PVCF
1	13,750	13,750	27,500	0.892	24,530	0.867	23,842.5
2	22,000	13,750	35,750	0.797	28,492.75	0.756	27,027
3	27,500	13,750	41,250	0.712	29,370	0.658	27,142.5
4	11,000	13,750	24,750	0.636	15,741	0.572	14,157
Total PV					98,133.75		92,169

Depreciation = 55,000/4 = ₹13,750
Applying extrapolation, we get,
IRR = 33.69%

7. A company wants to replace its existing machine by machine A which is of similar kind or by machine B which is more expensive and of higher capacity, due to the increased demand. The available cash flow from the two machines are as follows:

Machine	Initial Outlay	Cash Inflow (₹ in lakh) at the end				
	₹ in lakh	1	2	3	4	5
A	25	Nil	5	20	14	14
B	40	10	14	16	17	15

The company's cost of capital is 10%. The finance manager tries to appraise the machines by calculating the following:
(i) NPV
(ii) PI
(iii) DPBP

Comment on these calculations and guide the manger to select the investment.

[C.U. B.Com. (H), 2012]

Solution

(i) and (ii) Calculation for NPV and PI of Projects.

Year	CF (₹in lakh)		PVIF @ 10%	PV of CF (₹in lakh)		Cumulative PVCF	
	Machine A	Machine B		Machine A	Machine B	Machine A	Machine B
1	Nil	10	0.91	Nil	9.10	Nil	9.10
2	5	14	0.83	4.15	11.62	4.15	20.72
3	20	16	0.75	15	12	19.15	32.72
4	14	17	0.68	9.52	11.56	28.67	44.28
5	14	15	0.62	8.68	9.30	37.35	53.58
Total PV of Cash flow				37.35	53.58		
(–) Initial Investment				25	40		
NPV				12.35	13.58		
PI = $\frac{\text{Total PV of CF}}{\text{Initial Investment}}$				1.494	1.3395		

Thus under NPV Machine B and under PI Machine A is to be selected.

(iii) Calculation for DPBP:

From the table we find that DPBP lies between 3rd and 4th year for machine A and B both.

Applying simple interpolation we get,

DPBP for A = 3.6145 years and for B = 3.6298 years.

Since DPBP is lower for A, machine A should be selected.

8. Reliance Industries Ltd. has an investment budget of ₹10 lakh for the current year. It has short listed two projects X and Y. Further particulars regarding them are given below:

Projects	X(₹)	Y(₹)
Initial Investment required	10,00,000	9,00,000
Av. Estimated CBDT	2,40,000	2,05,000

Salvage value is estimated to be nil for both the projects after the estimated life of 10 years. The company follows SLM of charging depreciation and tax rate is 35%. Assume cost of capital of 12%, find out:

(i) NPV

(ii) IRR

Given PV of annuity of ₹1 for ten years at different rates:

Rate (%)	10	11	12	13	14	15
Annuity	6.1446	5.8992	5.6502	5.4262	5.2161	5.0188

[C.U. B.Com. (H), 2013]

Solution

Calculation for NPV

Particulars	**Project X(₹)**	**Project Y(₹)**
CBDT	2,40,000	2,05,000
(–) Depreciation	1,00,000(10,00,000/10)	90,000(9,00,000/10)
PBT	14,0000	1,15,000
(–) Tax @ 35%	49,000	40,250
PAT	91,000	74,750
(+) Depreciation	1,00,000	90,000
CFAT	1,91,000	1,64,750
PVIFA at 12% for 10 years	5.6502	5.6502
Total PV	10,79,188	9,30,870
(–) Initial Outlay	10,00,000	9,00,000
NPV	79,188	30,870

Using trial and error approach we calculate the IRR of project X by considering 13% and 14% trial rate and then by interpolating. IRR of Project X = 13.91%

Similarly, using trial and error approach we calculate the IRR of project Y by considering 12% and 13% trial rate and then by interpolating. IRR of Project X = 12.84%

9. A machine costing ₹12,00,000 is required to undertake a proposed project. The effective life of the machine is expected to be 5 years with residual value of ₹2,00,000. The company follows SLM of charging depreciation. The estimated EBT of the project are as follows:

Year	1	2	3	4	5
EBT (₹)	4,80,000	5,60,000	6,40,000	4,00,000	32,000

If tax rate is 40% and cost of capital is 15%, calculate the NPV and suggest whether the machine should be acquired or not.

Given the PV of ₹1 at 15% discount rate:

Year	1	2	3	4	5
PVIF	0.8696	0.7561	0.6575	0.5718	0.4972

[C.U. B.Com. (H), 2014]

Solution

Year	EBT	Tax @40%	EAT	Depreciation	CFAT	PVIF	PVCF
1	4,80,000	1,92,000	2,88,000	2,00,000 (12,00,000 – 2,00,000)/5	4,88,000	0.8696	4,24,364.8
2	5,60,000	2,24,000	3,36,000	2,00,000	5,36,000	0.7561	4,05,269.6
3	6,40,000	2,56,000	3,84,000	2,00,000	5,84,000	0.6575	3,83,980
4	4,00,000	1,60,000	2,40,000	2,00,000	4,40,000	0.5718	2,51,592
5	3,20,000	1,28,000	1,92,000	2,00,000	5,92,000	0.4972	2,94,342.4
Total PV							17,59,549
(–) Initial Investment							12,00,000
NPV							5,59,548.8

Note: 5th year CFAT includes the scrap value of ₹2,00,000.

Since NPV is positive, it is acceptable.

10. Two machines are not identical in many respects. Following are the information regarding the two. The estimated life of both the machines is five years leaving no salvage value at the end.

Machine	Cost (₹)	Anticipated CFAT (₹ in lakh) per year				
		1	2	3	4	5
M	6,25,000	Nil	1,25,000	5,00,000	3,50,000	1,50,000
N	10,00,000	2,50,000	3,50,000	4,00,000	4,25,000	2,00,000

The company's cost of capital is 16%. You are required to make an appraisal of the two machines and advise the company using (i) NPV and (ii) IRR.

Given, PV of ₹1.

End of Year	16%	18%	20%
1	0.862	0.847	0.833
2	0.743	0.718	0.694
3	0.641	0.609	0.579
4	0.552	0.516	0.482
5	0.476	0.437	0.402

[C.U. B.Com. (H), 2015]

Solution

(i) Calculation for NPV of Projects.

Year	CF (₹)		PVIF @ 16%	PV of CF (₹)	
	Machine A	Machine B		Machine A	Machine B
1	Nil	2,50,000	0.862	Nil	2,15,500
2	1,25,000	3,50,000	0.743	92,875	2,60,050
3	5,00,000	4,00,000	0.641	3,20,500	2,56,400
4	3,50,000	4,25,000	0.552	1,93,200	2,34,600
5	1,50,000	2,00,000	0.476	71,400	95,200
Total PV of Cash flow				6,77,975	10,61,750
(–)Initial Investment				6,25,000	10,00,000
NPV				52,975	61,750

Since NPV is higher for Machine B, it is acceptable.

Considering 18% and 20% as the trial rate and then by interpolating we calculate the IRR of Machine A as 18.88% and of B as 18.59%.

Thus under IRR method machine A with higher IRR is acceptable.

11. Following figures relate to a new project for which a machine is to be acquired at a cost of ₹2,50,000 and initially ₹60,000 is to be invested as working capital:

Year	1	2	3	4
EBDIT (₹)	80,000	90,000	1,45,000	1,20,000
Depreciation (₹)	75,000	62,000	48,000	25,000

At the beginning of 2nd year, an amount of ₹10,000 is to be introduced as additional working capital.

On completion of the project i.e. at the end of the fourth year, it is expected that ₹40,000 will be realized from sale of scrap and working capital will be recovered in full.

Cost of capital is 12% and applicable tax rate is 30%.

Calculate NPV of the project and comment on its acceptability.

[C.U. B.Com. (H), 2016]

Calculation for PV of Cash Inflow

Year	EBDIT	Depreciation	EBT	Tax	EAT	CFAT	PVIF at 12%	PVCF
1	80,000	75,000	5,000	1,500	3,500	78,500	0.893	70,100.5
2	90,000	62,000	28,000	8,400	19,600	81,600	0.797	65,035.2
3	1,45,000	48,000	97,000	29,100	67,900	1,15,900	0.712	82,520.8
4	1,20,000	25,000	95,000	28,500	66,500	2,01,500	0.636	1,28,154
Total								3,45,810.5

Note: Cash flow of 4th year includes ₹70,000 working capital realized and ₹40,000 scrap value realized.

Calculation for PV of Cash Outflow

Year	Cash inflows	PVIF at 12%	PV of Cash flow
0	3,10,000	1	3,10,000
1	10,000	0.893	8,930
Total PV			3,18,930

Note: Cash flow for year o (i.e. initial cash flow includes ₹60,000 working capital investment.

So, NPV = PV of cash inflow - PV of cash outflow = ₹3,45,810.50 – ₹3,18,930 = ₹26,880.50.

Since NPV is positive, the project should be rejected.

12. Given below are the information relating to some projects:

Projects	A	B	C	D	E	F
NPV (₹)	2,20,000	(15,000)	1,40,000	1,62,000	76,000	64,000
PI	1.22	0.95	1.2	1.18	1.19	1.16

Suppose the firm has a budget ceiling of ₹20,00,000. Advise the firm on selection of the projects assuming that the projects are not divisible. *[C.U. B.Com. (H), 2016]*

Solution

Calculation for Initial Outlay

Projects	NPV (₹)	PI	Initial Outlay = NPV (PI – 1)
A	2,20,000	1.22	10,00,000
B	–15,000	0.95	3,00,000
C	1,40,000	1.2	7,00,000
D	1,62,000	1.18	9,00,000
E	76,000	1.19	4,00,000
F	64,000	1.16	4,00,000

Selection of the Projects

Projects	Initial Outlay	NPV
A,C	17,00,000	3,60,000
A,D	19,00,000	3,82,000
A,E,F	18,00,000	3,60,000
C,D,E	20,00,000	3,78,000
C,D,F	20,00,000	3,66,000

Based on the highest NPV, projects A and D should be taken together.

CHAPTER 9: DIVIDEND POLICY

Theoretical Questions

5 Marks

1. Explain Gordon's Model in respect of dividend payout. (Refer to Page No. 9.13) *[C.U. B.Com. (H), 2006]*
2. State the assumptions of M-M model of dividend policy. (Refer to Page No. 9.16) *[C.U. B.Com. (H), 2007]*
3. How can stability of dividend be maintained? (Refer to Page No. 9.2) *[C.U. B.Com. (H), 2009]*
4. State the Modigliani and Miller model relating to Dividend Policy. (Refer to Page No. 9.15) *[C.U. B.Com. (H), 2009]*
5. Why is M-M model of dividend policy called dividend irrelevance theory? (Refer to Page No. 9.15) *[C.U. B.Com. (H), 2010]*
6. Give five important factors that affirm should consider in formulating a dividend policy. (Refer to Page No. 9.6) *[C.U. B.Com. (H) 2011]*
7. Mention the assumptions of M-M model of dividend policy. (Refer to Page No. 9.16) *[C.U. B.Com. (H) 2012]*
8. Write a short note on Gordon's Dividend Policy Model. (Refer to Page No. 9.13) *[C.U. B.Com. (H) 2012]*

10 Marks

1. (a) What are the factors that determine the dividend policy of a firm? (Refer to Page No. 9.6)
   (b) What is Modigliani-Miller irrelevance hypothesis? (Refer to Page No. 9.15) *[C.U. B.Com. (H), 2006]*
2. Critically discuss Walter's dividend model. To what extent are the shortcomings of this model justified by you? (Refer to Page No. 9.9) *[C.U. B.Com. (H), 2007]*
3. Explain the factors, from the standpoint of the firm, that influences dividend policy. (Refer to Page No. 9.6) *[C.U. B.Com. (H) 2010]*
4. Critically discuss Prof. James Walter's dividend model. To what extent are the shortcomings of this model taken care of by Prof. Gordon in his model? (Refer to Page No. 9.9) *[C.U. B.Com. (H), 2013]*
5. Critically explain Modigliani and Miller Model regarding dividend policy. (Refer to Page No. 9.15) *[C.U. B.Com. (H), 2014]*
6. What do you mean by dividend policy? Explain the factors that influence the dividend policy of a company. (Refer to Page No. 9.1, 9.6) *[C.U. B.Com. (H), 2015]*
7. Discuss with example 'constant dividend payout ratio and stable dividend per share policy of distribution of dividend by a company. (Refer to Page No. 9.2) *[C.U. B.Com. (H), 2016]*

Practical Problems

1. You are given the following information in respect of XYZ Ltd.

Earning	₹1,00,000
Equity Capital	5,000 shares of ₹10 each
Cost of capital	10%
Expected rate of return	(i) 9%, (ii) 10% and (iii) 12%

Assuming that dividend payout ratios are 0%, 50% and 100% respectively, determine the effect of the different dividend policies on the share price of XYZ Ltd. for the above mentioned three alternative levels of rate of return using Gordon's Model.

[C.U. B.Com., 2008]

Solution

According to Gordon, value per share of a company is given by:

$P = \dfrac{E(1-b)}{k - b \times r}$ *where*, P = Market price per share, E = Earnings per share, b = retention ratio

r = rate of return on investment, k = cost of capital, 1-b = dividend payout ratio.

Given, $E = \dfrac{1{,}00{,}000}{5{,}000} = ₹20$

Statement Showing Computation of Market Price per Share			
Particulars	***where*, r = 9% i.e. 0.09**	***where*, r = 10% i.e. 0.10**	***where*, r = 12% i.e. 0.12**
Given	E = ₹20 r = 9% i.e. 0.09 k = 10% i.e. 0.10	E = ₹20 r = 10% i.e. 0.10 k = 10% i.e. 0.10	E = ₹20 r = 12% i.e. 1.5 k = 10% i.e. 0.10
where, Dividend Payout ratio = 0 i.e. 1-b = 0 and hence, b = 1	$P = \dfrac{20 \times 0}{0.10 - 1 \times 0.09} = 0$	$P = \dfrac{20 \times 0}{0.10 - 1 \times .0.10}$ = α (undefined)	$P = \dfrac{20 \times 0}{0.10 - 1 \times 0.12} = 0$
where, Dividend Payout ratio = 50% i.e. 1-b = 0.5 and hence, b = 0.5	$P = \dfrac{20 \times 0.5}{0.10 - 0.5 \times .0.09}$ = 181.82	$P = \dfrac{20 \times 0.5}{0.10 - 0.5 \times .0.10}$ = 200	$P = \dfrac{20 \times 0.5}{0.10 - 0.5 \times .0.12}$ = 250
where, Dividend Payout ratio = 100% i.e. 1-b = 1 and hence, b = 0	$P = \dfrac{20 \times 1}{0.10 - 0 \times .0.09}$ = 200	$P = \dfrac{20 \times 1}{0.10 - 0 \times .0.10}$ = 200	$P = \dfrac{20 \times 1}{0.10 - 0 \times .0.12}$ = 200

2. *Z* Co. Ltd. has an investment of ₹10,00,000 in equity shares of ₹100 each. The profitability rate of the company is 16%. Payout ratio is 80%. Cost of capital is 10%. What will be the price per share as per Walter's model? Do you consider the given payout ratio as optimum? *[C.U. B.Com., 2009]*

Solution

Given, Cost of Capital (k) = 10% i.e. 0.10

Rate of Return on Investment (r) = 16% i.e. 0.16

So, EPS (E) = $\dfrac{10,00,000 \times 0.16}{10,000}$ = ₹16

Dividend payout ratio = 80% i.e. 0.80, so DPS (D) = ₹16 × 0.80 = 12.80

As per Walter's model, value per share (P) = $\dfrac{12.80 + \dfrac{0.16}{0.10}(16 - 12.80)}{0.10}$ = ₹179.20

Since here rate of return (r) > cost of capital (k), it is a growth firm. So as per Walter's model the optimum dividend payout ratio that maximizes the value per share will be zero. So the given payout ratio cannot be considered optimum.

3. From the following information, calculate the market value of equity share of a company as per Walter's model:

Earnings after tax – ₹15,00,000; number of equity shares outstanding – 3,00,000; Dividend paid – ₹6,00,000, Price-earnings ratio – 10, Rate of return on investment – 20%.

What is the optimum dividend payout ratio in this case? *[C.U. B.Com., 2011]*

Solution

Given, Dividend paid = ₹6,00,000, so DPS (D) = $\dfrac{6,00,000}{3,00,000}$ = ₹2

Earnings after tax = ₹15,00,000, so, EPS (E) = $\dfrac{15,00,000}{3,00,000}$ = ₹5

Price-earnings ratio = 10, so, cost of capital (k) = $\dfrac{1}{\text{Price} - \text{earnings Ratio}} = \dfrac{1}{10}$ = 0.10

Rate of return on investment (r) = 20% i.e. 0.20

As per Walter's model, value per share (P) = $\dfrac{2 + \dfrac{0.20}{0.10}(5 - 2)}{0.10}$ = ₹80

Since here rate of return (r) > cost of capital (k), it is a growth firm. So as per Walter's model the optimum dividend payout ratio that maximizes the value per share will be zero.

4. A company belongs to a risk class for which the appropriate capitalization rate for is 10%. It currently has outstanding 25,000 shares selling at ₹100 each. The firm is contemplating the declaration of ₹5 as dividend at the end of the current financial year. The company expects to have a net income of ₹2.5 lakhs and has a proposal for making new investments of ₹5 lakhs.

Answer the following questions based on M-M model (assume there is no tax):

(i) What will be the price per share at the end of the year if dividend is paid?

(ii) What will be the price per share at the end of the year if dividend is not paid?

(iii) How many new shares are to be issued?
(iv) Determine the value of the firm considering (a) and (b) above.

[C.U. B.Com. (H), 2013]

Solution

(i) (a) Price per share at the end of the year when dividend is paid (i.e. D_1 = ₹5):

$$\text{Conditionally, } 100 = \frac{5 + P_1}{1 + 0.10}$$

$$5 + P_1 = 100 \times 1.10$$

$$P_1 = 110 - 5$$

$$P_1 = 105$$

(b) Price per share at the end of the year when dividend is not paid (i.e. $D_1 = 0$):

$$\text{Conditionally, } 100 = \frac{0 + P_1}{1 + 0.10}$$

$$P_1 = 100 \times 1.10$$

$$P_1 = 110$$

$$P_1 = 110$$

(ii) New shares to be issued when dividend is paid:

Given, I = amount of investment required = ₹5,00,000

E = Earnings i.e. net profit available = ₹2,50,000

D_1 = Dividend per share at the end of the year = ₹ 5

P_1 = Price per share at the end of the year = ₹105

n = existing number of shares = 25,000

m = Number of new shares to be issued

Conditionally, $mP_1 = I - (E - nD_1)$

$$m \times 105 = 5,00,000 - (2,50,000 - 25,000 \times 5)$$

$$m \times 105 = 3,75,000$$

$$m = \frac{3,75,000}{105} = 3,571 \text{ (app.)}$$

(c) New shares to be issued when dividend is not distributed

Here, $D_1 = 0$

Conditionally, $mP_1 = I - (E - nD_1)$

$$m \times 110 = 5,00,000 - (2,50,000 - 25,000 \times 0)$$

$$m \times 110 = 2,50,000$$

$$m = \frac{2,50,000}{110} = 2,273 \text{ (app.)}$$

(iv) (a) Valuation of the firm when dividend is paid:

$$\text{Value of the firm } (nP_0) = \frac{(n+m)P_1 - I + E}{1+K}$$

$$nP_0 = \frac{\left(25,000 + \frac{3,75,000}{105}\right)105 - 5,00,000 + 2,50,000}{1+0.10}$$

$$nP_0 = 25,00,000$$

Hence, value of the firm is ₹25,00,000.

(b) Valuation of the firm when dividend is paid:

$$\text{Value of the firm } (nP_0) = \frac{(n+m)P_1 - I + E}{1+K}$$

$$nP_0 = \frac{\left(25,000 + \frac{2,50,000}{110}\right)110 - 5,00,000 + 2,50,000}{1+0.10}$$

$$nP_0 = 25,00,000$$

Hence, value of the firm is ₹25,00,000.

Therefore, it can be seen that value of the firm remains the same whether dividend is distributed or not.

5. From the following information compute the value per share of each of the companies under Walter's Dividend Model when the dividend payout ratio is (i) NIL, (ii) 25%, and (iii) 75%.

Particulars	M Ltd.	L Ltd.	N Ltd.
Internal rate of return (r)	15%	12%	10%
Cost of Capital (k)	12%	12%	12%
Earnings per share (E)	₹10	₹10	₹10

What conclusion would you draw from your observation? *[C.U. B.Com. (H), 2014]*

Solution

According to Walter, the value per share can be determined by the formula:

$$P = \frac{D + \frac{r}{k}(E - D)}{k}$$ where P = Market price per share,

D = Dividend per share, E = Earnings per share,

r = rate of return on investment, k = cost of capital.

Statement Showing Computation of Market Price per Share			
Particulars	***M* Ltd. (where $r > k$)**	***L* Ltd. (where $r = k$)**	***N* Ltd. (where $r < k$)**
Given	E = ₹10 r = 15% i.e. 0.15 k = 12% i.e. 0.12	E = ₹10 r = 12% i.e. 0.12 k = 12% i.e. 0.12	E = ₹10 r = 10% i.e. 0.10 k = 12% i.e. 0.12
Where Dividend Payout ratio = 0	$D = E \times$ Payout ratio $=10 \times 0 = 0$ Hence, $P = \frac{0 + \frac{0.15}{0.12}(10 - 0)}{0.12}$ $=104.17$	$D = E \times$ Payout ratio $=10 \times 0 = 0$ Hence, $P = \frac{0 + \frac{0.12}{0.12}(10 - 0)}{0.12}$ $= 83.33$	D = E × Payout ratio $= 10 \times 0 = 0$ Hence, $P = \frac{0 + \frac{0.10}{0.12}(10 - 0)}{0.12}$ $= 69.44$
Where Dividend Payout ratio = 25%	D = E × Payout ratio $=10 \times 0.25 = 2.50$ Hence, $P = \frac{2.50 + \frac{0.15}{0.12}(10 - 2.50)}{0.12}$ $= 98.96$	$D = E \times$ Payout ratio $=10 \times 0.25 = 2.50$ Hence, $P = \frac{2.50 + \frac{0.12}{0.12}(10 - 2.50)}{0.12}$ $= 83.33$	$D = E \times$ Payout ratio $= 10 \times 0.25 = 2.50$ Hence, $P = \frac{2.50 + \frac{0.10}{0.12}(10 - 2.50)}{0.12}$ $= 72.92$
Where Dividend Payout ratio = 75%	$D = E \times$ Payout ratio $= 10 \times 0.75 = 7.50$ Hence, $P = \frac{7.50 + \frac{0.15}{0.12}(10 - 7.50)}{0.12}$ $= 88.54$	$D = E \times$ Payout ratio $= 10 \times 0.75 = 7.50$ Hence, $P = \frac{7.50 + \frac{0.12}{0.12}(10 - 7.50)}{0.12}$ $= 83.33$	$D = E \times$ Payout ratio $= 10 \times 0.75 = 7.50$ Hence, $P = \frac{7.50 + \frac{0.10}{0.12}(10 - 7.50)}{0.12}$ $= 79.86$

Comment:

In case of *M* Ltd., rate of return (r) is higher than the cost of capital (k). Hence it is a growth firm. It can be observed here that as *X* Ltd. increases the dividend payout ratio value per share decreases. Value per share is the maximum when dividend payout ratio is zero.

In case of *L* Ltd., rate of return (r) is equal to the cost of capital (k). Hence it is a normal firm. It can be observed here that as even if *L* Ltd. increases the dividend payout ratio value per share remains unchanged.

In case of *N* Ltd., rate of return (r) is lower than the cost of capital (k). Hence it is a declining firm. It can be observed here that as *N* Ltd. increases the dividend payout ratio value per share increases. Value per share is the maximum when dividend payout ratio is 75%.

6. Given, Earnings per share ₹90, Calculate the market price per share of a company using Gordon's model when the dividend payout ratio is (i) 30% and (ii) 60%, assuming that:
   (a) The company is a growth company ($r > k$) when r = 20%

(b) The company is a normal company ($r = k$) when $r = k = 15\%$

(c) The company is a declining company ($r < k$) when $r = 12\%$

Also comment on the result. *[C.U. B.Com. (H), 2015]*

Solution

Statement Showing Computation of Market Price per Share			
Particulars	**where r = 20% i.e. 0.20**	**where r = 15% i.e. 0.15**	**where r = 12% i.e. 0.12**
Given	E = ₹90 r = 20% i.e. 0.20 k = 15% i.e. 0.15	E = ₹90 r = 15% i.e. 0.15 k = 15% i.e. 0.15	E = ₹90 r = 12% i.e. 0.12 k = 15% i.e. 0.15
Where Dividend Payout ratio = 30% i.e. 1-b = 0.3 and hence, b = 0.7	$P = \frac{90 \times 0.3}{0.15 - 0.7 \times .0.20}$ = 2700	$P = \frac{90 \times 0.3}{0.15 - 0.7 \times .0.15}$ = 600	$P = \frac{90 \times 0.3}{0.15 - 0.7 \times .0.12}$ = 409.09
Where Dividend Payout ratio = 60% i.e. 1-b = 0.60 and hence, b = 0.40	$P = \frac{90 \times 0.6}{0.15 - 0.4 \times .0.20}$ = 771.43	$P = \frac{90 \times 0.6}{0.15 - 0.4 \times .0.15}$ = 600	$P = \frac{90 \times 0.6}{0.15 - 0.4 \times .0.12}$ = 529.41

It is evident that as D/P ratio increases the price of the growth firm decreases whereas that of the declining firm increases. However the price of the normal firm remains unchanged.

7. A company has ₹1,00,000 equity shares of ₹10 each. The company expects its earnings at ₹6,00,000 during the next financial year and cost of capital at 10%. Using Walter's model, what dividend policy would you recommend when the rate of return on investment of the company is estimated at (i) 8% and (ii) 12% respectively? What will be the price of equity share if your recommendations are accepted? *[C.U. B.Com. (H), 2016]*

Solution

As per Walter's model, value per share is given by:

$$P = \frac{D + \frac{r}{k}(E - D)}{k}$$ *where*, P = Market price per share,

D = Dividend per share, E = Earnings per share,

r = rate of return on investment, k = cost of capital.

Here, $E = \frac{6,00,000}{10,000}$ = ₹60, k = 10% = 0.10

(i) When rate of return on investment = 8%

Here rate of return i.e. r (8%) < cost of capital i.e. k (10%). Hence the company is a declining company. According to Walter's model, the market price for a declining firm is the maximum when dividend payout is 100%. So, here 100% dividend payout is recommended.

If such recommendation is accepted, the market price per share will be:

$$P = \frac{60 + \frac{0.08}{0.10}(60 - 60)}{0.10} \text{ [Since } D = 60 \times 100\% = 12\text{]}$$

$$= 600.00$$

(ii) When rate of return on investment = 12%

Here rate of return i.e. r (12%) > cost of capital i.e. k (10%). Hence the company is a growth company. According to Walter's model, the market price for a growth firm is the maximum when dividend payout is zero. So, here no dividend payout is recommended.

If such recommendation is accepted, the market price per share will be:

$$P = \frac{0 + \frac{0.12}{0.10}(60 - 0)}{0.10} \text{ [Since } D = 60 \times 0 = 0\text{]}$$

$$= 720.00$$

CHAPTER 10: FINANCIAL CONTROL

Theoretical Questions

5 Marks

1. 'Return on investment is an important tool of financial control'. Discuss. (Refer to Page No. 10.3) *[C.U. B.Com. (H), 2006, 2012]*
2. State the advantages and disadvantages of budgetary control. (Refer to Page No. 10.3) *[C.U. B.Com. (H), 2007]*
3. Elucidate the objectives of Financial Control. (Refer to Page No. 10.1) *[C.U. B.Com. (H), 2008]*
4. Explain the role of Return on Investment in effecting financial control of a firm. (Refer to Page No. 10.3) *[C.U. B.Com. (H), 2010]*
5. Write short notes on: Budgetary Control. (Refer to Page No. 10.2) *[C.U. B.Com. (H), 2010]*
6. How does ratio analysis help a firm financial control? (Refer to Page No. 10.6) *[C.U. B.Com. (H), 2011]*

10 Marks

1. Explain the steps in financial control. Describe the essential elements of an effective Financial Control System. (Refer to Page No. 10.2) *[C.U. B.Com. (H), 2006]*

2. What is Financial Control? Discuss in brief the major tools of financial control. (Refer to Page No. 10.1, 10.2) *[C.U. B.Com. (H), 2007]*
3. Explain the concept of Ratio Analysis as a tool of financial control. Discuss its merits and demerits. (Refer to Page No. 10.6) *[C.U. B.Com. (H), 2009]*
4. Explain in brief, break-even analysis and return on investment as tools of financial control. (Refer to Page No. 10.4) *[C.U. B.Com. (H), 2013]*
5. What is 'Accounting Ratio Analysis'? State the limitations of accounting ratio analysis as a tool of financial control. (Refer to Page No. 10.6) *[C.U. B.Com. (H), 2014]*
6. Write briefly on ROI and Zero Base Budgeting as tools of financial control. (Refer to Page No. 10.3, 10.7) *[C.U. B.Com. (H), 2015]*
7. State the importance of financial control. Also state the steps involved in financial control. (Refer to Page No. 10.1, 10.2) *[C.U. B.Com. (H), 2016]*

Practical Problems

1. Compute Current Assets and Current Liabilities:
   Current Ratio- 3:1, Quick Ratio-1:1, Closing Stock-₹60,000, Bank Overdraft-Nil.
   [C.U. B.Com. (H), 2012]

Solution

Current Ratio = 3:1

Current Assets / Current Liabilities = 3

Current Assets = 3 Current Liabilities (1)

Quick Ratio = 1:1

(Current Assets – Closing Stock)/(Current Liabilities – Bank Overdraft) = 1

(3 Current Liabilities – Closing Stock)/Current Liabilities = 1 [Putting Current Assets = 3 Current Liabilities from equation (1) and given that Bank Overdraft = Nil]

3 Current Liabilities – ₹60,000 = Current Liabilities

2 Current Liabilities = ₹60,000

Current Liabilities = ₹60,000 / 2 = **₹30,000**

Hence, Current Assets = 3 Current Liabilities

$= 3 \times$ ₹30,000

= ₹90,000

Solved Question Paper 2017

FINANCIAL MANAGEMENT – HONOURS
C.U. B.Com. (H)
Full Marks – 100
The figures in the margin indicate full marks
Candidates are required to give their answer in their own words as far as practicable

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Group-A

1. Discuss the nature and objectives of financial management. **5**

Solution

Refer to Page No. 1.4

2. Why value maximization objective is called better than profit maximisation objective? **5**

Solution

Refer to Page No. 1.10

Or

What will be the role of CFO in the financial crisis of an organisation? **5**

Solution

Refer to Page No. 1.13

3. X borrows ₹59,36,000 from Y at a compound interest rate of 12% p.a. It is agreed that the loan shall be payable in two equal instalments, which shall be payable at the end of the 1st year and 2nd year respectively. Calculate the amount of instalments. **5**

Solution

Let the equated monthly instalment or annuity be A. Now, loan amount should be the Present value of annuity.

Now, $\text{PVA} = A \times \text{PVIFA}_{12\%,2}$

$$A = \frac{\text{PVA}}{\text{PVIFA}_{12\%,2}}$$

$$A = \frac{5936000}{1.69}$$

A = ₹35,12,426

So, the amount of each instalment is ₹35,12,426.

4. Mr. H is offered either to receive ₹10,000 three years from now or ₹14,000 five years from now. Which offer Mr. H will accept? Assume rate of discount is 10%.
[Given: Present value of ₹1 at 10% is 0.751 and 0.621 for the 3rd and 5th year respectively.] **5**

Solution

We know that, Present Value (PV) = $FV\left\{\frac{1}{(1+r)^n}\right\}$

where, r = Interest rate i.e 10% or, 0.10
n = Number of years
PV = Principal Amount

Option I:

When FV = ₹10,000 and n = 3 year

$$PV = 10{,}000\left[\frac{1}{(1+0.10)^3}\right]$$

$$= 10{,}000 \times 0.751 \left[\text{Given, } \frac{1}{(1+0.10)^3} = 0.751\right]$$

$$= ₹7{,}510$$

Option II:

When FV = ₹14,000 and n = 5 year

$$PV = 7{,}000\left[\frac{1}{(1+0.10)^5}\right]$$

$$= 14{,}000 \times 0.621 \left[\text{Given, } \frac{1}{(1+0.10)^5} = 0.621\right]$$

$$= ₹8{,}694$$

Since the present value of 2nd option is more than that of 1st option, Mr. H should accept the 2nd option i.e. receiving ₹14,000 five years from now.

Or

Write in brief about the financial environment of the business.

Solution

Refer to page no. 2.36 **5**

5. A project of ₹3,00,000 is supposed to yield ₹40,000 after depreciation @12.5% and is subject to income tax @40%. Calculate the payback period of the project. **5**

Solution

The first step would be to calculate the cash inflow from this project. The cash inflow is calculated as follows:

	Profit before tax	40,000
Less:	Tax @ 40%	16,000
	Profit after tax	24,000
Add:	Depreciation written off (3,00,000 × 12.5%)	37,500
	Total cash inflow	61,500

$$\text{Payback Period} = \frac{\text{Cost of initial investment}}{\text{Annual Cash Inflow}} = \frac{3,00,000}{61,500} = 4.88 \text{ years}$$

Or

Write the demerits of Payback Period Method of project evaluation.

Solution

Refer to Page No. 7.21 **5**

6. Based on the following information, which project will you accept and why?

Year	Project I	Depreciation	Project II	Depreciation	Project III	Depreciation
	EAT		EAT		EAT	
1	20,000	3,000	50,000	5,000	35,000	4,000
2	30,000	2,000	40,000	4,500	35,000	4,000
3	40,000	2,500	30,000	4,000	35,000	4,000

Assume tax rate is 50% and discount rate is 10%. **5**

Solution

Calculation of CFAT

Year	Project I			Project II			Project III		
	EAT	Depre-ciation	CFAT	EAT	Depre-ciation	CFAT	EAT	Depre-ciation	CFAT
1	20,000	3,000	23,000	50,000	5,000	55,000	35,000	4,000	39,000
2	30,000	2,000	32,000	40,000	4,500	44,500	35,000	4,000	39,000
3	40,000	2,500	42,500	30,000	4,000	34,000	35,000	4,000	39,000

Calculation of Total PV

	CFAT		PVIF at 10%	PVCF		
I	II	III		I	II	III
23,000	55,000	39,000	0.909	20,907	49,995	35,451
32,000	44,500	39,000	0.863	27,616	38,403.5	33,657
42,500	34,000	39,000	0.751	31,917.5	25,534	29,289
				80,440.5	1,13,932.5	98,397

Since the total PV is the highest under Project II, it should be selected.

Group-B

7. Estimate the working capital requirement on profit basis for the coming year from the following information of a manufacturing company. Expected annual sales is 1,56,000 units of ₹10 per unit. The anticipated ratios of cost to selling price are: Raw materials 50% and Direct Wages 15%. Budgeted cash overhead is ₹42,000 and depreciation is ₹10,000 per annum. Planned stock will include raw material for ₹45,000 and 9,000 units of finished goods. Credit allowed to debtor is 1 month. Credit expected to be received from suppliers 3 weeks. Overhead and wages payment will be made 1 week after their occurrence. Material will stay in the process for 14 days. Cash in hand to be maintained is 15% of total working capital. Assume that production is carried on evenly throughout the year. Raw materials are introduced at the beginning of the process and wages and overhead accrue evenly during processing. **10**

Solution

Projected annual sales = 1,56,000

So, Sales per week = $\frac{1,56,000}{52}$ = 3,000 units

So, Total sales = 3,000 × ₹10 = ₹30,000

Raw materials in stores = $\frac{\text{Cost of raw materials in stock}}{\text{Cost of raw materials per week}}$

$$\frac{₹45,000}{3,000 \times ₹5} = \frac{₹\ 45,000}{₹\ 15,000} = 3 \text{ weeks}$$

Finished goods in store = $\frac{\text{No. of units of finished goods in stores}}{\text{units produced per week}}$

Finished goods in store = $\frac{9,000}{3,000}$ = 3 weeks

Statement of Cost

	Per Unit	Total (₹) Per Week
Raw materials (30,000 × 50%)	5.00	15,000
Labour (30,000 × 15%)	1.50	4,500
Overhead $\frac{42,000}{1,56,000}$ (WN:1)	0.269	808
Depreciation $\frac{10,000}{1,56,000}$	0.06410	192
Profit	3.166	9,500
Selling Price	10.00	30,000

Statement showing Working Capital Requirement

	Weekly Average Cost	Net Block (Weeks)	Amount (₹)	Amount (₹)
A. Current Assets				
Stock:				
I. Raw materials	15,000	3		45,000
II. Work-in-progress:				
Raw Materials	15,000	2	30,000	
Labour	4,500	1	4,500	
Overhead(WN:1)	808	1	808	
III. Finished Goods:				35,308
Raw Materials	15,000	3	45,000	
Labour	4,500	3	13,500	
Overhead	808	3	2,424	
IV. Debtors:				60,924
Raw Materials	15,000	4	60,000	
Labour	4,500	4	18,000	
Overhead	808	4	3,232	
Profit	9,500	4	38,000	1,19,232
Total Current Assets				2,60,464
B. Current Liabilities				
Creditors for materials	15,000	3	45,000	
Lag in payment of wages	4,500	1	4,500	
Lag in payment of overhead	808	1	808	
Net Working Capital (A-B)				50,308
(+) Cash in hand $\left(\frac{2,10,156}{85} \times 15\right)$				2,10,156
Working Capital requirement				37,086
				2,47,242

WN 1: Assuming production is carried out evenly, so lag period in payment of labour and overhead expenses in respect of W.I.P = $\frac{2}{2}$ = 1 week.

Or

(a) Between two periods of a company there is an increase of debt collection period and raw material conversion period by 20 days and 5 days respectively, whereas its creditors payment period and finished goods conversion period is reduced by 10 days and 5 days respectively. Calculate the changes in operating cycle of the company. **5**

Solution

	Days	Days
Increase in debt collection period	20	
Decrease in creditors payment period	10	
Increase in raw material conversion period	5	35
Less: Decrease in finished goods conversion period		5
Increase in operating cycle		30

(b) 'Length of Operating Cycle is the major determinant of the working capital needs of a business firm'. Discuss. **5**

Solution

Refer to Page No. 5.14

8. (a) How the trade-off between Matching and Conservative Policy of financing the working capital is done? Explain. **5**

Solution

Refer to Page No. 6.9

(b) Explain the principal motives for holding cash. **5**

Solution

Refer to Page No. 6.24

9. A company is considering two mutually exclusive projects X and Y. Following are the details available to you: (₹ in lakhs)

Particulars	Project X	Project Y
Project Cost	3,500	3,500
Cash Inflow: Year 1	500	2,500
Year 2	1,000	2,000
Year 3	1,500	1,000
Year 4	2,250	500
Year 5	3,000	500

Assume no residual value at the end of the fifth year. The firm's cost of capital is 10%. You are required to calculate the following in respect of the two projects –

(a) NPV using 10% discounting
(b) IRR
(c) PI **3 + 4 + 3**

Solution

(i) and (iii) Calculation for NPV and PI

Year	Cash Flow		PVIF at 10%	PV of CF	
	X	Y		X	Y
1	500	2,500	0.909	454.5	2,272.5
2	1,000	2,000	0.826	826	1,652
3	1,500	1,000	0.751	1,126.5	751
4	2,250	500	0.683	1,536.75	341.5
5	3,000	500	0.621	1,863	310.5
Total PV				5,806.75	5,327.5
(–) Initial Outlay				3,500	3,500
NPV				2,306.75	1,827.5
PI = Total PV/Initial Outlay				1.66	1.52

Thus under NPV method Project Y with higher NPV and under PI method Project X with higher PI is acceptable.

Calculation of IRR:

Using trial and error method by increasing the discounting rate from 10%, we find that the IRR of project X is 27% (app) and that for project Y is 38% (app).

Or

What is capital rationing? How is it applied in case of divisible and indivisible projects?

Solution

Refer to Page No. 8.29 **10**

10. The following details of P Ltd. For the year ended 31.3.2016 are furnished:
Operating leverage 3:1
Financial leverage 2:1
Interest charges per annum ₹20 lakhs
Corporate tax rate 50%
Variable cost as the percentage of sales 60%
Prepare the income statement of the company. **10**

Solution

Operating Leverage = 3:1

Contribution / EBIT = 3

Contribution = 3 EBIT

Financial Leverage = 2:1

EBIT / EBT = 2

EBIT = 2 EBT

EBIT = 2 (EBIT – I)

EBIT = 2 (EBIT – ₹20,00,000)

EBIT = 2 EBIT – ₹40,00,000

EBIT = ₹40,00,000

So, Contribution = 3 EBIT = 3 × ₹40,00,000 = ₹1,20,00,000

Sales – Variable Cost = ₹1,20,00,000

Sales – 60% of sales = ₹1,20,00,000 [since Variable Cost is 60% of sales]

40% of sales = ₹1,20,00,000

Sales = ₹1,20,00,000/40% = ₹3,00,00,000

EBT = EBIT – I = ₹40,00,000 – ₹20,00,000 = ₹20,00,000

Further, we know that Contribution – Operating Fixed Cost = EBIT

₹1,20,00,000 – Operating Fixed Cost = ₹40,00,000

Hence, Operating Fixed Cost = ₹80,00,000

Income Statement of P Ltd.

Particulars	Amount (₹)
Sales	3,00,00,000
Less: Variable Cost	1,80,00,000
Contribution	1,20,00,000
Less: Fixed Cost	80,00,000
EBIT	40,00,000
Less: Interest on debentures	20,00,000
EBT	20,00,000
Less Corporate Tax @ 50%	10,00,000
EAT	10,00,000
Preference dividend	0
EATESH	10,00,000

Or

Critically discuss the NI approach of capital structure theory.

Solution

Refer to Page No. 4B.21 **10**

11. (a) *Z* Ltd. issued 10,000 12% preference share of ₹100 each at a premium of 10%. The floatation cost was 5% on issue price. The preference share will be redeemed at a premium of 20% after five years. The tax rate applicable to the company is 30%. The corporate dividend tax is 10%. Compute cost of preference share of *Z* Ltd. **4**

Solution

(a) Cost of preference share capital = $K_p = \dfrac{D(1+D_t)+\dfrac{\text{RV}-\text{NP}}{n}}{\dfrac{\text{RV}+\text{NP}}{2}}$

where,

D = Dividend per preference share = 12

D_t = Corporate dividend tax = 10%

RV = Redeemable value = 100 + 20% of 100 = 120

NP = Issue price = (100 + 10% of 100) – 5% of (100 + 10% of 100)

= 110 – 5% of 110 = 110 – 5.50 = 104.50

N = Number of years = 5 years

$$K_p = \frac{D(1+D_t)+\dfrac{\text{RV}-\text{NP}}{n}}{\dfrac{\text{RV}+\text{NP}}{2}} = \frac{12(1+0.10)+\dfrac{120-104.50}{5}}{\dfrac{120+104.50}{2}} = \frac{13.2+3.1}{112.25}$$

$$= 0.1452 = 14.52\%$$

Hence, cost of preference share capital = K_p = 14.52%.

(b) T Ltd. has the following capital structure:

	(₹ in lakh)
Equity Share capital (10 lakh shares)	100
Retained earnings	130
14% debentures (70,000 debentures)	70
16% Term loan	100
	400

The market price per equity share is ₹25. The next expected dividend per share is ₹2 and it is expected to grow at 8%. The debentures are redeemable after six years at par and the current market quotation is ₹90 per debenture. The tax rate applicable to the firm is 50%.

You are required to compute weighted average cost of capital of the company using market value as weights. **6**

Solution

Specific cost of capital of different sources:

Cost of Equity share = $K_e = \frac{D_1}{P_0} + g$

where,

D = Expected Dividend per share = ₹2

P_0 = Market price per share = ₹25

g = Expected growth rate in dividend = 8%

$$K_e = \frac{D_1}{P_0} + g = \frac{2}{25} + 0.08 = 0.08 + 0.08 = 0.16 \text{ or } 16\%$$

Cost of Debentures = $K_d = \dfrac{I(1-t) + \dfrac{\text{RV} - \text{NP}}{n}}{\dfrac{\text{RV} + \text{NP}}{2}}$

where,

I = Interest payment = 14% of 100 = 14

t = Tax rate = 50%

RV = Redeemable value of debenture = 100

NP = Current market price of debentures = 90

$$K_d = \frac{I(1-t) + \dfrac{\text{RV} - \text{NP}}{n}}{\dfrac{\text{RV} + \text{NP}}{2}} = \frac{14(1-0.50) + \dfrac{100-90}{6}}{\dfrac{100+90}{2}}$$

$$= \frac{7 + \dfrac{10}{6}}{\dfrac{190}{2}} = \frac{7 + 1.667}{95} = 0.0912 \text{ or } 9.12\%$$

Cost of long term loan = $K_l = r(1-t)$

where,

r = Rate of interest = 16%

t = tax rate = 50%

$K_l = r(1-t) = 16(1-0.50) = 8\%$

Total Market Value of Equity Shares = 10,00,000 shares @ ₹25 = ₹250 lakh

Ratio between Equity shares and Retained earnings = 10:13

Market value equity = $250 \times \frac{10}{23}$ = ₹108.6957 lakh

Market value of retained earnings = $250 \times \frac{13}{23}$ = 141.3043 lakh

Computation of WACC of T Ltd.
(Weights under Market Value)

Sources of Finance	Market-value (₹ In Lakh)	Weights	Specific Cost	Weighted Cost (%)
Equity shares capital	108.6957	0.2588	16.00%	4.1408
Retained earnings	141.3043	0.3364	16.00%	5.3824
14% Debentures	70.0000	0.1667	9.12%	1.5203
16% Term Loan	100.0000	0.2381	8.00%	1.9048
	420.0000	1.000		12.9483

Therefore, Weighted Average Cost of Capital under Market Value is **12.9483%**.

12. XYZ Ltd. has a capital of ₹10,00,000 in equity shares of ₹100 each. The shares are currently quoted at par. The company proposes to declare a dividend of ₹10 per share at the end of the current financial year. The capitalization rate for the risk class to which the company belongs is 12%. What will be the market price of the share at the end of the year if:
    (a) Dividend is not declared?
    (b) Dividend is declared?
    (c) Assuming that the company pays the dividend and has net profits of ₹5,00,000 and makes new investments of ₹10,00,000 during the period. How many new shares must be issued. Use M-M model. **3 + 3 + 4**

Solution

Given,

Current market price per share (P_0) = ₹100

We know that, as per M-M, current market price per share (P_0) = $\frac{D_1 + P_1}{1 + K}$ where D_1 = Dividend per share at the end of the year, P_1 = Price (Terminal value) per share at the end of the year

(a) Price per share at the end of the year when dividend is not declared (i.e. $D_1 = 0$):

$$\text{Conditionally, } 100 = \frac{0 + P_1}{1 + 0.12}$$

$$P_1 = 100 \times 1.12$$

$$P_1 = 112$$

(b) Price per share at the end of the year when dividend is declared (i.e. D_1 = ₹10):

$$\text{Conditionally, } 100 = \frac{10 + P_1}{1 + 0.12}$$

$$10 + P_1 = 100 \times 1.12$$

$$P_1 = 112 - 10$$

$$P_1 = 102$$

(c) New shares to be issued when dividend is distributed:
Given,

I = amount of investment required = ₹10,00,000
E = Earnings i.e. net profit available = ₹5,00,000
D_1 = Dividend per share at the end of the year = ₹10
P_1 = Price per share at the end of the year = ₹102
n = existing number of shares = 10,000
m = Number of new shares to be issued

Conditionally, $mP_1 = I - (E - nD_1)$

$$m \times 102 = 10,00,000 - (5,00,000 - 10,000 \times 10)$$

$$m \times 102 = 6,00,000$$

$$m = \frac{6,00,000}{102} = 5,883 \text{ (app.)}$$

Or

(a) What are the factors to be considered for paying cash dividend?

Solution

Refer to Page No. 9.6

(b) Give a brief note on Gordon's Dividend Policy.

Solution

Refer to Page No. 9.13 **5 + 5**

13. Explain briefly Return on Investment and Zero Base Budgeting as a tool of financial control. **10**

Solution

Refer to Page No. 10.3, 10.7

Appendices

Future Value of a Lump Sum

Future Value Interest Factor of ₹1 per period at *i*% for *n* periods, FVIF(*i*, *n*)																				
Period	**1%**	**2%**	**3%**	**4%**	**5%**	**6%**	**7%**	**8%**	**9%**	**10%**	**11%**	**12%**	**13%**	**14%**	**15%**	**16%**	**17%**	**18%**	**19%**	**20%**
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100	1.110	1.120	1.130	1.140	1.150	1.160	1.170	1.180	1.190	1.200
2	1.020	1.040	1.061	1.082	1.103	1.124	1.145	1.166	1.188	1.210	1.232	1.254	1.277	1.300	1.323	1.346	1.369	1.392	1.416	1.440
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331	1.368	1.405	1.443	1.482	1.521	1.561	1.602	1.643	1.685	1.728
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464	1.518	1.574	1.630	1.689	1.749	1.811	1.874	1.939	2.005	2.074
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611	1.685	1.762	1.842	1.925	2.011	2.100	2.192	2.288	2.386	2.488
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772	1.870	1.974	2.082	2.195	2.313	2.436	2.565	2.700	2.840	2.986
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949	2.076	2.211	2.353	2.502	2.660	2.826	3.001	3.185	3.379	3.583
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144	2.305	2.476	2.658	2.853	3.059	3.278	3.511	3.759	4.021	4.300
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358	2.558	2.773	3.004	3.252	3.518	3.803	4.108	4.435	4.785	5.160
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594	2.839	3.106	3.395	3.707	4.046	4.411	4.807	5.234	5.695	6.192
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853	3.152	3.479	3.836	4.226	4.652	5.117	5.624	6.176	6.777	7.430
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.518	2.813	3.138	3.498	3.896	4.335	4.818	5.350	5.936	6.580	7.288	8.064	8.916
13	1.138	1.294	1.469	1.665	1.886	2.133	2.410	2.720	3.066	3.452	3.883	4.363	4.898	5.492	6.153	6.886	7.699	8.599	9.596	10.699
14	1.149	1.319	1.513	1.732	1.980	2.261	2.579	2.937	3.342	3.797	4.310	4.887	5.535	6.261	7.076	7.988	9.007	10.147	11.420	12.839
15	1.161	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177	4.785	5.474	6.254	7.138	8.137	9.266	10.539	11.974	13.590	15.407
16	1.173	1.373	1.605	1.873	2.183	2.540	2.952	3.426	3.970	4.595	5.311	6.130	7.067	8.137	9.358	10.748	12.330	14.129	16.172	18.488
17	1.184	1.400	1.653	1.948	2.292	2.693	3.159	3.700	4.328	5.054	5.895	6.866	7.986	9.276	10.761	12.468	14.426	16.672	19.244	22.186
18	1.196	1.428	1.702	2.026	2.407	2.854	3.380	3.996	4.717	5.560	6.544	7.690	9.024	10.575	12.375	14.463	16.879	19.673	22.901	26.623
19	1.208	1.457	1.754	2.107	2.527	3.026	3.617	4.316	5.142	6.116	7.263	8.613	10.197	12.056	14.232	16.777	19.748	23.214	27.252	31.948
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.727	8.062	9.646	11.523	13.743	16.367	19.461	23.106	27.393	32.429	38.338
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.835	13.585	17.000	21.231	26.462	32.919	40.874	50.658	62.669	77.388	95.396
30	1.348	1.811	2.427	3.243	4.322	5.743	7.612	10.063	13.268	17.449	22.892	29.960	39.116	50.950	66.212	85.850	111.065	143.371	184.675	237.376
35	1.417	2.000	2.814	3.946	5.516	7.686	10.677	14.785	20.414	28.102	38.575	52.800	72.069	98.100	133.176	180.314	243.503	327.997	440.701	590.668
40	1.489	2.208	3.262	4.801	7.040	10.286	14.974	21.725	31.409	45.259	65.001	93.051	132.782	188.884	267.864	378.721	533.869	750.378	1,051.668	1,469.772
50	1.645	2.692	4.384	7.107	11.467	18.420	29.457	46.902	74.358	117.391	184.565	289.002	450.736	700.233	1,083.657	1,670.704	2,566.215	3,927.357	5,988.914	9,100.438

Present Value of a Lump Sum

Present Value Interest Factor of ₹1 per period at *i*% for *n* periods, PVIF (*i*, *n*)																				
Period	**1%**	**2%**	**3%**	**4%**	**5%**	**6%**	**7%**	**8%**	**9%**	**10%**	**11%**	**12%**	**13%**	**14%**	**15%**	**16%**	**17%**	**18%**	**19%**	**20%**
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826	0.812	0.797	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751	0.731	0.712	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683	0.659	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621	0.593	0.567	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513	0.482	0.452	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467	0.434	0.404	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424	0.391	0.361	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386	0.352	0.322	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350	0.317	0.287	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319	0.286	0.257	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290	0.258	0.229	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263	0.232	0.205	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239	0.209	0.183	0.160	0.140	0.123	0.108	0.095	0.084	0.074	0.065
16	0.853	0.728	0.623	0.534	0.458	0.394	0.339	0.292	0.252	0.218	0.188	0.163	0.141	0.123	0.107	0.093	0.081	0.071	0.062	0.054
17	0.844	0.714	0.605	0.513	0.436	0.371	0.317	0.270	0.231	0.198	0.170	0.146	0.125	0.108	0.093	0.080	0.069	0.060	0.052	0.045
18	0.836	0.700	0.587	0.494	0.416	0.350	0.296	0.250	0.212	0.180	0.153	0.130	0.111	0.095	0.081	0.069	0.059	0.051	0.044	0.038
19	0.828	0.686	0.570	0.475	0.396	0.331	0.277	0.232	0.194	0.164	0.138	0.116	0.098	0.083	0.070	0.060	0.051	0.043	0.037	0.031
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149	0.124	0.104	0.087	0.073	0.061	0.051	0.043	0.037	0.031	0.026
25	0.780	0.610	0.478	0.375	0.295	0.233	0.184	0.146	0.116	0.092	0.074	0.059	0.047	0.038	0.030	0.024	0.020	0.016	0.013	0.010
30	0.742	0.552	0.412	0.308	0.231	0.174	0.131	0.099	0.075	0.057	0.044	0.033	0.026	0.020	0.015	0.012	0.009	0.007	0.005	0.004
35	0.706	0.500	0.355	0.253	0.181	0.130	0.094	0.068	0.049	0.036	0.026	0.019	0.014	0.010	0.008	0.006	0.004	0.003	0.002	0.002
40	0.672	0.453	0.307	0.208	0.142	0.097	0.067	0.046	0.032	0.022	0.015	0.011	0.008	0.005	0.004	0.003	0.002	0.001	0.001	0.001
50	0.608	0.372	0.228	0.141	0.087	0.054	0.034	0.021	0.013	0.009	0.005	0.003	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000

Future Value of an Annuity

Future Value Interest Factor of an Ordinary Annuity of ₹1 per period at i% for n periods, FVIFA (i, n)																				
Period	**1%**	**2%**	**3%**	**4%**	**5%**	**6%**	**7%**	**8%**	**9%**	**10%**	**11%**	**12%**	**13%**	**14%**	**15%**	**16%**	**17%**	**18%**	**19%**	**20%**
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.010	2.020	2.030	2.040	2.050	2.060	2.070	2.080	2.090	2.100	2.110	2.120	2.130	2.140	2.150	2.160	2.170	2.180	2.190	2.200
3	3.030	3.060	3.091	3.122	3.153	3.184	3.215	3.246	3.278	3.310	3.342	3.374	3.407	3.440	3.473	3.506	3.539	3.572	3.606	3.640
4	4.060	4.122	4.184	4.246	4.310	4.375	4.440	4.506	4.573	4.641	4.710	4.779	4.850	4.921	4.993	5.066	5.141	5.215	5.291	5.368
5	5.101	5.204	5.309	5.416	5.526	5.637	5.751	5.867	5.985	6.105	6.228	6.353	6.480	6.610	6.742	6.877	7.014	7.154	7.297	7.442
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716	7.913	8.115	8.323	8.536	8.754	8.977	9.207	9.442	9.683	9.930
7	7.214	7.434	7.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487	9.783	10.089	10.405	10.730	11.067	11.414	11.772	12.142	12.523	12.916
8	8.286	8.583	8.892	9.214	9.549	9.897	10.260	10.637	11.028	11.436	11.859	12.300	12.757	13.233	13.727	14.240	14.773	15.327	15.902	16.499
9	9.369	9.755	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.579	14.164	14.776	15.416	16.085	16.786	17.519	18.285	19.086	19.923	20.799
10	10.462	10.950	11.464	12.006	12.578	13.181	13.816	14.487	15.193	15.937	16.722	17.549	18.420	19.337	20.304	21.321	22.393	23.521	24.709	25.959
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560	18.531	19.561	20.655	21.814	23.045	24.349	25.733	27.200	28.755	30.404	32.150
12	12.683	13.412	14.192	15.026	15.917	16.870	17.888	18.977	20.141	21.384	22.713	24.133	25.650	27.271	29.002	30.850	32.824	34.931	37.180	39.581
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523	26.212	28.029	29.985	32.089	34.352	36.786	39.404	42.219	45.244	48.497
14	14.947	15.974	17.086	18.292	19.599	21.015	22.550	24.215	26.019	27.975	30.095	32.393	34.883	37.581	40.505	43.672	47.103	50.818	54.841	59.196
15	16.097	17.293	18.599	20.024	21.579	23.276	25.129	27.152	29.361	31.772	34.405	37.280	40.417	43.842	47.580	51.660	56.110	60.965	66.261	72.035
16	17.258	18.639	20.157	21.825	23.657	25.673	27.888	30.324	33.003	35.950	39.190	42.753	46.672	50.980	55.717	60.925	66.649	72.939	79.850	87.442
17	18.430	20.012	21.762	23.698	25.840	28.213	30.840	33.750	36.974	40.545	44.501	48.884	53.739	59.118	65.075	71.673	78.979	87.068	96.022	105.93
18	19.615	21.412	23.414	25.645	28.132	30.906	33.999	37.450	41.301	45.599	50.396	55.750	61.725	68.394	75.836	84.141	93.406	103.74	115.27	128.12
19	20.811	22.841	25.117	27.671	30.539	33.760	37.379	41.446	46.018	51.159	56.939	63.440	70.749	78.969	88.212	98.603	110.28	123.41	138.17	154.74
20	22.019	24.297	26.870	29.778	33.066	36.786	40.995	45.762	51.160	57.275	64.203	72.052	80.947	91.025	102.44	115.38	130.03	146.63	165.42	186.69
25	28.243	32.030	36.459	41.646	47.727	54.865	63.249	73.106	84.701	98.347	114.41	133.33	155.62	181.87	212.79	249.21	292.10	342.60	402.04	471.98
30	34.785	40.568	47.575	56.085	66.439	79.058	94.461	113.28	136.31	164.49	199.02	241.33	293.20	356.79	434.75	530.31	647.44	790.95	966.71	1,181.9
35	41.660	49.994	60.462	73.652	90.320	111.43	138.24	172.32	215.71	271.02	341.59	431.66	546.68	693.57	881.17	1,120.7	1,426.5	1,816.7	2,314.2	2,948.3
40	48.886	60.402	75.401	95.026	120.80	154.76	199.64	259.06	337.88	442.59	581.83	767.09	1,013.7	1,342.0	1,779.1	2,360.8	3,134.5	4,163.2	5,529.8	7,343.9
50	64.463	84.579	112.80	152.67	209.35	290.34	406.53	573.77	815.08	1,163.9	1,668.8	2,400.0	3,459.5	4,994.5	7,217.7	10,436	15,090	21,813	31,515	45,497

Present Value of an Annuity

Present Value Interest Factor of an (Ordinary) Annuity of ₹1 per period at *i*% for *n* periods, PVIFA (*i*, *n*)																				
Period	**1%**	**2%**	**3%**	**4%**	**5%**	**6%**	**7%**	**8%**	**9%**	**10%**	**11%**	**12%**	**13%**	**14%**	**15%**	**16%**	**17%**	**18%**	**19%**	**20%**
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.061	7.606	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824	7.379	6.974	6.604	6.265	5.954	5.668	5.405	5.162	4.938	4.730
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022	7.549	7.120	6.729	6.373	6.047	5.749	5.475	5.222	4.990	4.775
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201	7.702	7.250	6.840	6.467	6.128	5.818	5.534	5.273	5.033	4.812
19	17.226	15.678	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365	7.839	7.366	6.938	6.550	6.198	5.877	5.584	5.316	5.070	4.843
20	18.046	16.351	14.877	13.590	12.462	11.470	10.594	9.818	9.129	8.514	7.963	7.469	7.025	6.623	6.259	5.929	5.628	5.353	5.101	4.870
25	22.023	19.523	17.413	15.622	14.094	12.783	11.654	10.675	9.823	9.077	8.422	7.843	7.330	6.873	6.464	6.097	5.766	5.467	5.195	4.948
30	25.808	22.396	19.600	17.292	15.372	13.765	12.409	11.258	10.274	9.427	8.694	8.055	7.496	7.003	6.566	6.177	5.829	5.517	5.235	4.979
35	29.409	24.999	21.487	18.665	16.374	14.498	12.948	11.655	10.567	9.644	8.855	8.176	7.586	7.070	6.617	6.215	5.858	5.539	5.251	4.992
40	32.835	27.355	23.115	19.793	17.159	15.046	13.332	11.925	10.757	9.779	8.951	8.244	7.634	7.105	6.642	6.233	5.871	5.548	5.258	4.997
50	39.196	31.424	25.730	21.482	18.256	15.762	13.801	12.233	10.962	9.915	9.042	8.304	7.675	7.133	6.661	6.246	5.880	5.554	5.262	4.999