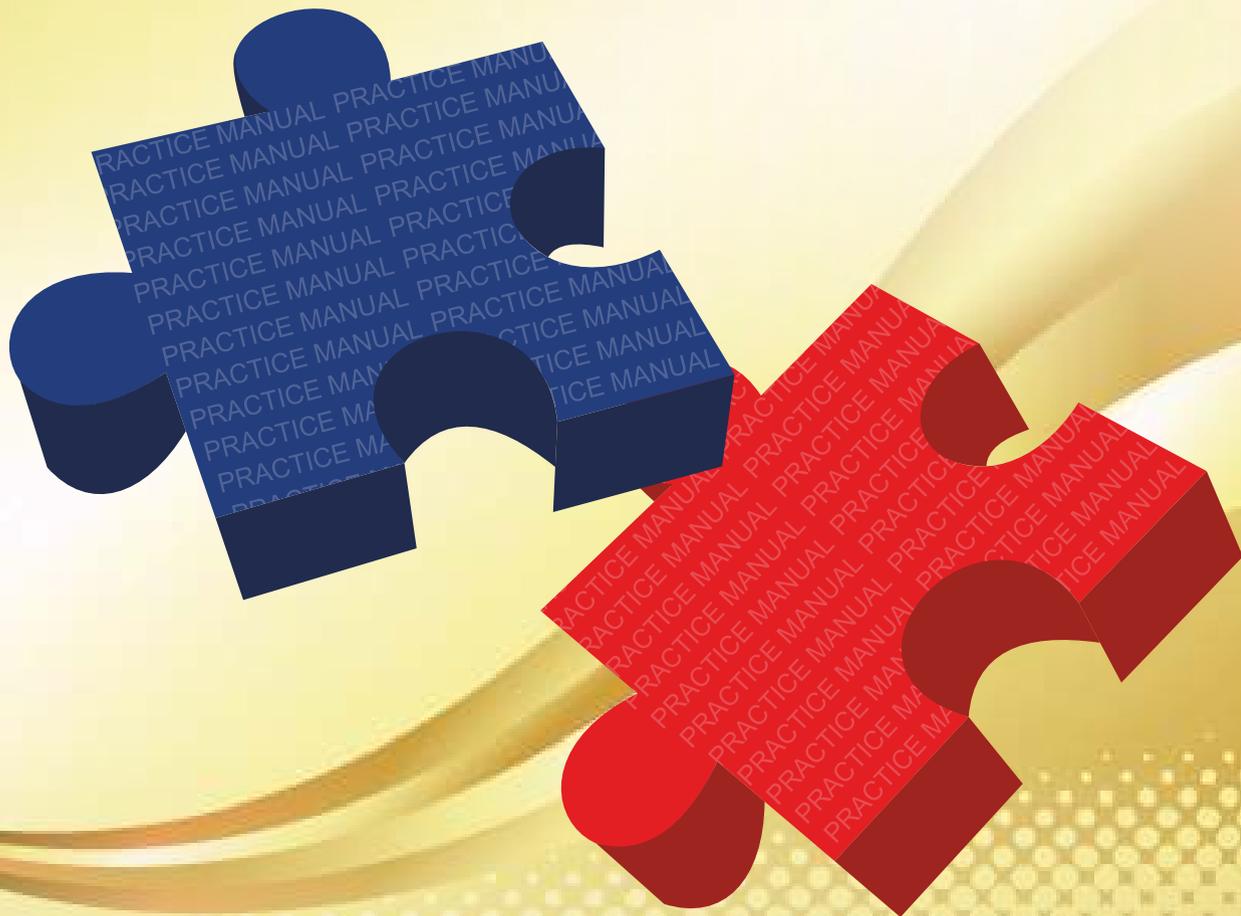




PROFESSIONAL PROGRAMME  
MODULE 2 PAPER 5

# PRACTICE MANUAL

FINANCIAL, TREASURY AND FOREX MANAGEMENT



PROFESSIONAL PROGRAMME  
MODULE 2 PAPER 5

**PRACTICE MANUAL**

FINANCIAL, TREASURY AND FOREX MANAGEMENT



**THE INSTITUTE OF  
Company Secretaries of India**  
IN PURSUIT OF PROFESSIONAL EXCELLENCE  
Statutory body under an Act of Parliament

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MODULE 2, PAPER 5

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The **PRACTICE MANUAL** has been prepared by competent persons and the Institute hopes that it will facilitate the students in preparing for the Institute's examinations. It is, however, to be noted that the answers are to be treated as model answers and not as exhaustive and there can be alternative solutions available for a questions provided in this practice manual. The Institute is not in any way responsible for the correctness or otherwise of the answers.

The Practice Manual contains the information based on the Laws/Rules applicable at the time of preparation. Students are expected to be well versed with the amendments in the Laws/Rules made upto six months prior to the date of examination.

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## **PREFACE**

With the continuous developments in the external environment, the role of Company Secretaries is being continuously redefined, which demand that our students - the prospective Company Secretaries, are better prepared, developed and trained by providing regular quality academic inputs, so that they are equipped to face the challenges of dynamic environment with ease and efficiency. To become competitive, a student need not only be aware of the basic theoretical provisions of subjects but also be conversant with the practical aspects of it.

Developing competency in practical papers is a little more challenging as mastering these subjects requires practicing more problems based on them. Although the study materials of the Institute contains a lot of numerical and scenario based problem solving inputs but nevertheless they can be supplemented further.

With the intent of developing our students in practical oriented subjects, the Institute has brought out "Practice Manual", a repository of solved questions, to build competency in practical oriented subjects by providing the students with a pool of solved practical problems. I am proudly presenting this practice manual prepared specifically for the subject "Financial, Treasury and Forex Management" to the students of professional programme.

Students learn best when they are shown how practical questions are framed and solved on variety of topics, in a step by step method with proper explanation. With this consistency, students would be able to see the underlying patterns clearly and will learn better. The manual has adopted an easy-to-understand method of providing solutions so that students can understand themselves without an aid of a teacher. It will prove to be a significant preparation resource for the students and will also serve as a self assessment tool in the preparation for examination.

I acknowledge with thanks all those experts authors and institutions whose material has been consulted and referred in preparation of this Practice Manual.

I place on record my sincere appreciation to Ms. Akansha Rawat, Assistant Education Officer in the Academic Team at the Institute headed by Ms. Sonia Baijal, Director for this new initiative under the overall supervision of CS Sutanu Sinha, Chief Executive and Officiating Secretary.

I will urge my students to take maximum benefit out of it by meticulously practicing the questions given therein. Practicing more will develop better understanding of the concepts and provide stronger grip on the subject, for which Practice Manual will certainly serve as a means.

My best wishes to you all!

New Delhi  
20<sup>th</sup> October, 2015

**CS Atul H. Mehta**  
*President, ICSI*

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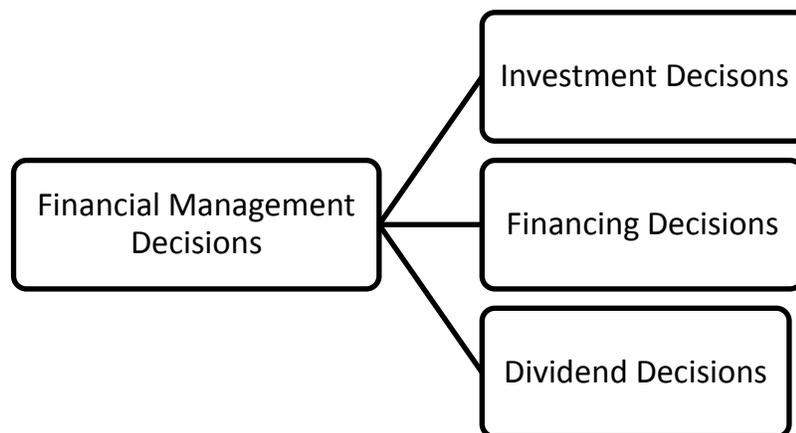
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# 1

## Nature, Significance and Scope of Financial Management

### INTRODUCTION

- Financial management can be defined as the management of flow of funds and deals with the financial decision making.
- Financial management deals with procurement of funds and their effective utilization in the business
- Financial Management is concerned with **investment, financing and dividend decisions** in relation to objectives of the company.



### Question 1

*Differentiate between Investment Decision and Financing Decision.*

### Answer

**Investment decisions** encompass wide and complex matters involving areas of capital budgeting, cost of capital, measuring risk, management of liquidity and current assets, expansion and contraction involving business failure and re-organisations, buy or hire or lease an asset etc. Investments lead to exchange of current funds for future benefits. Capital is a scarce resource and its supply cost is very high. Optimal investment decisions need to

be made taking into consideration such factors: (1) Estimation of capital outlays and the future earnings of the proposed project focusing on the task of value engineering and market forecasting; (2) availability of capital and considerations of cost of capital focusing attention on financial analysis; and (3) a set of standards by which to select a project for implementation and maximising returns there from focusing attention on logic and arithmetic.

**Financing decision** involves evaluation of the company's financial needs and raises the appropriate type of capital that best fits those needs. It is concerned with determining the appropriate proportion of equity and debt so as to obtain optimum capital structure. The firm's capital structure is considered optimum when the market value of shares is maximized. Therefore financial decision making is concerned more and more with the questions as to how cost of funds be measured, proposals for capital using projects be evaluated, or how far the financing policy influences cost of capital or should corporate funds be committed to or withheld from certain purposes and how the expected returns on projects be measured.

### Question 2

*Briefly explain Dividend decisions and what factors are to be considered while taking Dividend decision.*

### Answer

- The dividend decision is a major area of financial management. The financial manager must decide whether the firm should distribute all profits or retain them or distribute a portion and retain the balance.
- The proportion of profits distributed as dividend is called the **Dividend-payout ratio** and the retained portion of profit is known as the **retention ratio**.
- This decision depends on whether the company or its shareholders are in the position to better utilise the funds, and to earn a higher rate of return on funds.

### Question 3

*Investment, financing and dividend decisions are inter-related. Explain.*

### Answer

Financial Management is concerned with investment, financing and dividend decisions in relation to objectives of the company. Investment ordinarily means profitable utilization of funds. Investment decisions are concerned with the question whether adding to capital assets today will increase the net worth of the firm. Financing is next step in financial management for executing the investment decision once taken. Financial decision making is concerned with the question as to how funds requirements should be met keeping in view their cost, and how far the financing policy influences cost of capital. The dividend

decision is another major areas of financial management. The financial manager helps in deciding whether the firm should distribute all profits or retain them or distribute a portion and retain the balance.

#### **Question 4**

*The goal of profit maximisation does not provide us with an operationally useful criterion.  
Comment.*

#### **Answer**

Profit maximization goal ignores timing of returns, does not directly consider cash flows and ignores risk. In recent years, under the changed corporate environment, profit maximisation is regarded as unrealistic, difficult, inappropriate and socially not much preferred goal for business organisation. Profit maximisation as corporate goal is criticised by scholars mainly on the following grounds:

- (i) It is vague conceptually.
- (ii) It ignores timing of returns.
- (iii) It ignores the risk factor.
- (iv) It may tempt to make such decisions which may in the long run prove disastrous.
- (v) Its emphasis is generally on short run projects.
- (vi) It may cause decreasing share prices.
- (vii) The profit is only one of the many objectives and variables that a firm considers.

It follows from the above that an appropriate operational decision criterion for financial management should (i) be precise and exact, (ii) be based on 'bigger the better' principle, (iii) consider both quantity and quality dimensions of benefits, (iv) recognize time value of money, and (v) take into account risk factor associated with it.

Since all the factors are not present in profit maximization goal, thus we can conclude that goal of profit maximization does not provide us operationally useful criterion.

#### **Question 5**

*Distinguish between 'Financial distress' and 'insolvency'.*

#### **Answer**

The affairs of a firm should be managed in such a way that the total risk business as well as financial-borne by equity holders is minimized and is manageable; otherwise, the firm would obviously face difficulties. If cash inflow is inadequate the firm will face difficulties in payment of interest and repayment of principal. If the situation continues long enough, a time will come when the firm would face pressure from creditors. Failure of sales can also cause difficulties in carrying out production operations. The firm would find itself in a tight

spot. Investors would not invest further. Creditors would recall their loans. Capital market would heavily discount its securities. Thus, the firm would find itself in a situation called distress.

In general, insolvency occurs subsequent to a period of financial distress. Many a times, if financial distress is identified in time and remedial action taken, possibility of insolvency can be completely avoided. There is no accepted definition of financial distress but the key indicators of financial distress can be low interest coverage ratio, missed dividend payments, negative EBIT. Insolvency by contrast, is a decision which the business chooses to take to relieve itself from excess debt burden. It is a decision where the firm decides to sell its assets to discharge its obligations to outsiders at prices below their economic values i.e., resort to distress sale. So when the sale proceeds are inadequate to meet outside liabilities, the firm is said to have failed or become bankrupt or (after due processes of law are gone through) insolvent.

### Question 6

*Write Short notes on the following:*

- a) *Economic value added (EVA)*
- b) *Liquidity as a decision criterion*
- c) *Return on Investment*
- d) *Role and Functions of Financial sector.*

### Answer

- (a) Economic value added (EVA)** is the after tax operating profits generated by a business minus the cost of the capital deployed to generate that cash flow. Representing real profit versus accounting profit, EVA underlines shareholder value, increasingly the main target of leading companies' strategies.

There are two key components to EVA. The net operating profit after tax (NOPAT) and the capital charge, which is the amount of capital times the cost of capital. In other words, it is the total pool of profits available to provide cash return to those who provided capital to the firm. The capital charge is the product of the cost of capital times the capital tied up in the investment. In other words, the capital charge is the cash flow required to compensate investors for the riskiness of the business given the amount of capital invested. On the one hand, the cost of capital is the minimum rate of return on capital required to compensate debt and equity investors for bearing risk-a cut-off rate to create value and capital is the amount of cash invested in the business, net of depreciation

$$\text{EVA} = (\text{Operating Profit}) - (\text{Capital Charge})$$

$$\text{EVA} = \text{NOPAT} - (\text{Cost of Capital} * \text{Capital})$$

## (b) Liquidity as a decision criterion

Liquidity is defined as ability of the business to meet short-term obligations. It shows the quickness with which a business/company can convert its assets into cash to pay what it owes in the near future.

Liquidity, as a decision criterion, is widely used in financial management. It is used for managing liquid resources or current assets or near cash assets so as to enhance the effectiveness with which they are utilized with a view to minimising costs. It also focuses attention on the availability of funds. Enhancement of liquidity enables a corporate body to have more funds from the market.

Liquidity, as a decision criterion is an important tool in financial management. Financial decisions are affected by liquidity analysis of a company in the following areas:

1. Management of cash and marketable securities;
2. Credit policy of a firm and procedures for realisation;
3. Management and control of inventories;
4. Administration of fixed assets;
5. Taking decisions for efficient use of current assets at minimum cost; and

Decisions to keep the company's position on sound basis to avoid eventualities

## (c) Return on Investment

**Return on investment** (ROI) is an important profitability ratio from the point of view of shareholders and reflects on the ability of management to earn a return on resources put in by the shareholders. Under ROI ratio the earning of the company can be viewed from different angles so as to take decisions on different causes responsible, to reduce or to enhance the profitability of the company. One way of finding out rate of return on assets employed in the company is to find the ratio of earnings before interest and taxes (EBIT) to capital employed. This ratio indicates operating income to the assets used to produce income. Another way of computing the ROI ratio is through the assets turnover ratio and margin of profit which gives the same results, as EBIT to capital employed. It may be seen from the following:

$$\text{ROI} = \frac{\text{EBIT}}{\text{Sales}} \times \frac{\text{sales}}{\text{Assets}} = \frac{\text{EBIT}}{\text{Assets}}$$

A high ratio of ROI indicates efficient use of assets and low ratio reflects inefficient use of assets by a company.

#### **(d) Role and Functions of Financial sector**

The financial sector plays a major role in the mobilisation and allocation of savings. Financial institutions, instruments and markets which constitute the financial sector act as conduit for the transfer of financial resources from net savers to net borrowers.

The financial sector performs this basic economic function of intermediation essentially through four transformation mechanisms:

- (i) Liability-asset transformation (i.e., accepting deposits as a liability and converting them into assets such as loans);
- (ii) Size-transformation (i.e., providing large loans on the basis of numerous small deposits);
- (iii) Maturity transformation (i.e., offering savers alternate forms of deposits according to their liquidity preferences while providing borrowers with loans of desired maturities); and
- (iv) Risk transformation (i.e., distributing risks through diversification which substantially reduces risks for savers which would prevail while directly in the absence of financial intermediation).

#### **Question 7**

*With the evolution of finance from being mere a descriptive study to the one that is highly developed discipline, the role of financial managers has also undergone a sea change. In the view of the above explain various duties performed by financial manager.*

#### **Answer**

The financial manager performs mainly the following duties:

1. *Forecasting of Cash Flow:* This is necessary for the successful day to day operations of the business so that it can discharge its obligations as and when they arise. It involves matching of cash inflows against outflows and the manager must forecast the sources and timing of inflows from customers and use them to pay the liability.
2. *Raising Funds:* The Financial Manager has to plan for mobilising funds from different sources so that the requisite amount of funds are made available to the business enterprise to meet its requirements for short term, medium term and long term.
3. *Managing the Flow of Internal Funds:* The financial manager has to keep a track of the surplus in various bank accounts of the organisation and ensure that they are properly utilised to meet the requirements of the business. This will ensure

that liquidity position of the company is maintained intact with the minimum amount of external borrowings.

4. *To Facilitate Cost Control:* The Financial Manager is generally the first person to recognise when the costs for the supplies or production processes are exceeding the standard costs/budgeted figures. Consequently, he can make recommendations to the top management for controlling the costs.
5. *To Facilitate Pricing of Product, Product Lines and Services:* The Financial Manager can supply important information about cost changes and cost at varying levels of production and the profit margins needed to carry on the business successfully. In fact, financial manager provides tools of analysis of information in pricing decisions and contribute to the formulation of pricing policies jointly with the marketing manager.
6. *Forecasting Profits:* The Financial manager is usually responsible for collecting the relevant data to make forecasts of profit levels in future.
7. *Measuring Required Return:* The acceptance or rejection of an investment proposal depends on whether the expected return from the proposed investment is equal to or more than the required return. An investment project is accepted if the expected return is equal or more than the required return. Determination of required rate of return is the responsibility of the financial manager and is a part of the financing decision.
8. *Managing Assets:* The function of asset management focuses on the decision-making role of the financial manager. Finance personnel meet with other officers of the firm and participate in making decisions affecting the current and future utilisation of the firm's resources. The decision-making role crosses liquidity and profitability lines. Converting the idle equipment into cash improves liquidity. Reducing costs improves profitability.
9. *Managing Funds:* Funds may be viewed as the liquid assets of the firm. In the management of funds, the financial manager acts as a specialised staff officer to the Chief Executive of the company. The manager is responsible for having sufficient funds for the firm to conduct its business and to pay its bills.

\*\*\*

## 2

# Capital Budgeting

### BASIC CONCEPTS AND FORMULAE

1. Capital Budgeting	<ul style="list-style-type: none"><li>• Capital budgeting refers to long-term planning for proposed capital outlays and their financing. Thus, it includes both raising of long-term funds as well as their utilisation. It may, thus, be defined as the “firm’s formal process for acquisition and investment of capital.”</li></ul>
2. Independent versus Mutually Exclusive Projects	<ul style="list-style-type: none"><li>• <b>Independent projects</b> are those whose cash flows are unrelated to (or independent of) one another; the acceptance of one project <i>does not eliminate</i> the others from further consideration.</li><li>• <b>Mutually exclusive projects</b> are those that have the same function and therefore compete with one another.</li></ul>
3. Unlimited Funds versus Capital Rationing	<ul style="list-style-type: none"><li>• The availability of funds for capital expenditures affects the firm’s decisions. If a firm has <b>unlimited funds</b> for investment (or if it can raise as much money as it needs by borrowing or issuing stock), making capital budgeting decisions is quite simple: All independent projects that will provide an acceptable return can be accepted.</li><li>• Typically, though, firms operate under <b>capital rationing</b> instead. This means that they have only limited resources available for capital expenditures and that numerous projects will compete for these limited resources.</li></ul>
4. Payback period	<p>The <b>payback period</b> is the amount of time required for the firm to recover its initial investment in a project, as calculated from <i>cash inflows</i>.</p> <p>Payback period = Total initial capital investment/ Annual expected after tax cash inflow</p> <p><b>Decision Criteria</b></p> <p>If the payback period is <i>less than</i> the maximum acceptable payback period, <i>accept</i> the project.</p>

	<p>If the payback period is <i>greater than</i> the maximum acceptable payback period, <i>reject</i> the project.</p>
5. Net present value (NPV)	<p>The <b>net present value (NPV)</b> is found by subtracting a project's initial investment (<math>CF_0</math>) from the present value of its cash inflows (<math>CF_t</math>) discounted at a rate equal to the firm's cost of capital (<math>r</math>).</p> $NPV = \sum_{t=0}^n C_t / (1+r)^t - C_0$ <p>Where:</p> <p><math>C_t</math> is the cash flow in the year <math>t</math> and <math>r</math> is required rate of return, and <math>n</math> is project life and <math>C_0</math> is cash outflow.</p> <p><b>Decision Criteria</b></p> <p>If the NPV is <i>greater than 0</i>, <i>accept</i> the project.</p> <p>If the NPV is <i>less than 0</i>, <i>reject</i> the project.</p>
6. Profitability Index	<p>The profitability index (PI) is simply equal to the present value of cash inflows divided by the initial cash outflow</p> $PI = \frac{PV \text{ of cashFlow}}{\text{Investment}}$ <p><b>Decision Criteria</b></p> <p>If <math>PI &gt; 1</math> then accept the project</p> <p>If <math>PI &lt; 1</math> then reject the project</p>
7. Internal rate of return (IRR)	<p>The <b>internal rate of return (IRR)</b> refers to the rate which equates the present value of cash inflows and present value of cash outflow. In other words, it is the rate at which net present value of the investment is zero.</p> $\sum_{t=0}^n C_t / (1+r)^t = CF_0$ <p><b>Decision Criteria</b></p> <p>If the IRR is <i>greater than</i> the cost of capital, <i>accept</i> the project.</p> <p>If the IRR is <i>less than</i> the cost of capital, <i>reject</i> the project.</p>

## Question 1

*Why is money in hand today worth more than money that is expected to be received in the future?*

### Answer

The money in hand today is worth more than money that is expected to be received in the future. The reason for this is:

1. Presence of positive rates of **inflation** which reduce the purchasing power of rupees through time.
2. The **opportunity cost** of lost earnings — that is, it could have been invested and earned a return between today and a point in time in the future.
3. Thirdly, all future values are in some sense only promises, and contain some uncertainty about their occurrence. As a result of the **risk of default** or non-performance of an investment, a rupee in hand today is worth more than an expected rupee in the future.
4. Finally, **human preferences** typically involve impatience, or the preference to consume goods and services now rather than in the future.

## Question 2

*Why do you think the capital budgeting decisions are vital for any firm?*

### Answer

Capital budgeting is a process that attempts to determine the merits of an investment project. Before any large project begins, the capital budgeting process should be utilized. Capital budgeting is important because it creates accountability and measurability. Any business that seeks to invest its resources in a project, without understanding the risks and returns involved, would be held as irresponsible by its owners or shareholders. Furthermore, if a business has no way of measuring the effectiveness of its investment decisions, chances are that the business will have little chance of surviving in the competitive marketplace.

One of the main objectives of the businesses is to earn profits. The capital budgeting process is a measurable way for businesses to determine the long-term economic and financial profitability of any investment project. Capital budgeting is also vital to a business because it creates a structured step by step process that enables a company to:

1. Develop and formulate long-term strategic goals
2. Seek out new investment projects
3. Estimate and forecast future cash flows
4. Facilitate the transfer of information
5. Monitoring and Control of Expenditures
6. Creation of Decision

Unlike other business decisions that involve a singular aspect of a business, a capital budgeting decision involves two important decisions at once: a financial decision and an investment decision. By taking on a project, the business has agreed to make a financial commitment to a project, and that involves its own set of risks. Projects can run into delays, cost overruns and regulatory restrictions that can all delay or increase the projected cost of the project.

In addition to a financial decision, a company is also making an investment in its future direction and growth that will likely have an influence on future projects that the company considers and evaluates. So to make a capital investment decision only from the perspective of either a financial or investment decisions can pose serious limitations on the success of the project.

### Question 3

*What are different types of capital budgeting proposals?*

#### Answer

Basically, the firm may be confronted with three types of capital budgeting decisions:

1. **Independent proposals** : Independent projects are the projects that do not compete with one another in such a way that the acceptance of one precludes the possibility of acceptance of another. Therefore, 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.
2. **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.
3. **Capital rationing** takes place in 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 acceptable Investment projects. These projects can be ranked on the basis of a pre-determined criterion such as the rate of return.

### Question 4

*What do you mean by capital rationing? Illustrate some of its advantages.*

#### Answer

Capital rationing is a common practice in most of the companies as they have more profitable projects available for investment as compared to the capital available. In theory, there is no place for capital rationing as companies should invest in all the profitable projects. However, majority of companies follow capital rationing as a way to isolate and pick up the best projects under the existing capital restrictions.

Capital rationing is a technique of selecting the projects that maximizes the firm's value when the limited budget of company/firm is allocated optimally between different projects. This aims in choosing only the most profitable investments for capital investment decision.

This can be accomplished by putting restrictive limits on the budget or selecting a higher cost of capital as the hurdle rate for all the projects under consideration.

There are few advantages of practicing capital rationing:

- **Budgeting:** The first and an important advantage is that capital rationing introduces a sense of strict budgeting of corporate resources of a company. Whenever there is an injunction of capital in the form of more borrowings or stock issuance capital, the resources are properly handled and invested in profitable projects.
- **Less wastage:** Capital rationing prevents wastage of resources by not investing in each and every new project available for investment.
- **Fewer projects:** Capital rationing ensures that limited number of projects are selected by imposing capital restrictions. This helps in keeping the number of active projects to minimum and thus manages them well.
- **Higher returns on investments:** Through capital rationing, companies invest only in projects where the expected return is high, thus eliminating projects with lower returns on capital.
- **Stability:** As the company is not investing in every project, the finances are not over-extended. This helps in having adequate finances for tough times and ensures more stability and increase in the stock price of the company.

### Question 5

*What do you understand by Profitability Index? How it can be used in accepting or rejecting the projects?*

### Answer

**Profitability Index (PI)**, also known as Profit Investment Ratio (PIR) and Value Investment Ratio (VIR). It is the ratio of payoff to investment of a proposed project on the basis of which an investment should be accepted or rejected. It is a useful tool for ranking projects because it allows finance managers to quantify the amount of value created per unit of investment. It uses the time value of money concept and is arrived at as the ratio of discounted benefits over the discounted costs. It uses the time value of money concept and is calculated by the following formula.

$$PI = \frac{\text{PV of cashFlow}}{\text{Investment}}$$

Rules for selection or rejection of a project:

If  $PI > 1$  then accept the project

If  $PI < 1$  then reject the project

## Question 6

*What do you mean by sensitivity analysis? Explain with example.*

### Answer

Sensitivity analysis provides additional insight for the business to make the investment decision. Sensitivity analysis helps a business estimate what will happen to the project if the assumptions and estimates turn out to be unreliable. Sensitivity analysis involves changing the assumptions or estimates in a calculation to see the impact on the project's finances. In this way, it prepares the business's managers in case the project doesn't generate the expected results, so they can better analyze the project before making an investment. By conducting such analysis, a manager may come to know that which assumptions are more critical than others, thereby managing the whole project more efficiently.

In capital budgeting calculations, sensitivity analysis changes one assumption or estimate at a time to see how the results change. For example, a business may expect to earn Rs. 500, Rs. 1,000 and Rs. 1,000 in the first three years of a project. If the business makes an initial investment of Rs. 2,500, it will recoup its expenses in three years. However, the project may perform better than expected, generating Rs. 2,000 yearly in its second and third year. The business will then break even in two years.

## Question 7

*What do you mean by discounted payback period? How it can be used in accepting or rejecting the projects?*

### Answer

Discounted payback period is a variation of payback period which takes into account time value of money by discounting the cash inflows of the project. In discounted payback period we have to calculate the present value of each cash inflow taking the start of the first period as zero point. For this purpose the management has to set a suitable discount rate. The discounted cash inflow for each period is to be calculated using the formula.

$$\text{Discounted Cash Inflow} = \frac{\text{ActualCashInflow}}{(1+i)^n}$$

Where,

**i** is the discount rate;

**n** is the period to which the cash inflow relates.

### Rules for selection or rejection of a project:

If the discounted payback period is less than the target period, accept the project. Otherwise reject.

### Question 8

A firm is evaluating two projects for this year's capital budget. After-tax cash flows, including depreciation, are as follows:

Years	Project-A (Rs)	Project-B (Rs)
0	(6,000)	(18,000)
1	2,000	5,600
2	2,000	5,600
3	2,000	5,600
4	2,000	5,600
5	2,000	5,600

Calculate the payback period for both of these two projects. Which project should be chosen?

### Answer

Payback period in capital budgeting refers to the period of time required to recoup the funds expended in an investment, or to reach the break-even point. For example, a Rs.1000 investment which returned Rs. 500 per year would have a two-year payback period. The time value of money is not taken into account.

The cash flows of project A indicate that the capital investment of Rs 6000 can be recovered in exactly three years. While, the cash flows of project B indicate that the capital investment of Rs 18000 can be recovered in little more than three years. By extrapolation, we may compute the exact payback period.

Recovery up to Year-3 =  $5600 \times 3 = 16800$

Balance to be recovered =  $18000 - 16800 = 1200$

The approximate time required to recover the balance assuming uniform cash inflow during the third years:

$$= \frac{1200}{5600} \times 12 = 2.57 \text{ Months}$$

Therefore the payback period is three years and 2.57 months.

Therefore the project A should be accepted.

### Question 9

A firm with a 15% WACC is evaluating two projects for this year's capital budget. After-tax cash flows, including depreciation, are as follows:

Years	Project-M (Rs)	Project-N (Rs)
0	(350)	(350)
1	100	150
2	150	150
3	400	350
4	450	400
5	300	350

Calculate the discounted payback period for both of these two projects. Which project should be chosen?

### Answer

In discounted payback period we have to calculate the present value of each cash inflow taking the start of the first period as zero point. The table below shows the calculation:

Years	Project-M (Rs)	PVF at 15%	Present value of cash inflow	Project-N (Rs)	PVF at 15%	Present value of cash inflow
0	-350	1	-350	-350	1	-350
1	100	0.8696	86.96	150	0.8696	130.44
2	150	0.7561	113.42	150	0.7561	113.42
3	400	0.6575	263	350	0.6575	230.13
4	450	0.5718	257.31	400	0.5718	228.72
5	300	0.4972	149.16	350	0.4972	174.02

The cash flows of project M indicate that the capital investment of Rs 350 can be recovered in more than 2 years. By extrapolation, we may compute the exact discounted payback period.

Recovery up to Year-2 = 86.96+113.42= 200.38

Balance to be recovered = 350-200.4 = 149.6

The approximate time required to recover the balance assuming uniform cash inflow during the third years:

$$= \frac{149.6}{263} \times 12 = 6.83 \text{ months}$$

Therefore the payback period is 2 years and 6.83 months

While, the cash flows of project N indicate that the capital investment of Rs 350 can be recovered in little more two years. By extrapolation, we may compute the exact discounted payback period.

Recovery up to Year-2 = 130.44+113.42= 243.86

Balance to be recovered = 350-243.86 = 106.14

The approximate time required to recover the balance assuming uniform cash inflow during the third years:

$$= \frac{106.1}{230.1} \times 12 = 5.5 \text{ months}$$

Therefore the payback period is 2 years and 5.5 months

Therefore the project N should be accepted.

### Question 10

*XYZ Ltd. is considering an investment proposal requiring an outlay Rs 2 crore providing uniform cash inflow of Rs 50 lakh over next eight years. If the cost of capital is 15%, find out the NPV of the project. Also comment whether the project should be accepted or not?*

### Answer

A project can only be accepted when the value of NPV is more than zero.

Let us first calculate the NPV. The NPV is calculated by using following formulae:

$$NPV = \sum_{t=0}^n C_t / (1+r)^t$$

Where:

$C_t$  is the cash flow in the year  $t$  and  $r$  is required rate of return, which is 15 percent in this case.

The table below shows the calculation:

Years	Project-M (Rs Lakh)	PVF at 15%	Present value of cash inflow (Cash flow X PVF)
0	-200	1	-200
1	50	0.8696	43.5
2	50	0.7561	37.8
3	50	0.6575	32.9
4	50	0.5718	28.6
5	50	0.4972	24.9
6	50	0.4323	21.6
7	50	0.3795	19.0
8	50	0.3269	16.3
<b>NPV</b>			24.6

Since the NPV is more than zero therefore the project is accepted.

### Question 11

*A firm is planning to buy one sewing machine. The machines would cost Rs 18,000 and would yield a cash flow of Rs 5,300 for next five years. If the cost of capital for the firm is 14%, find out the NPV of the project.*

### Answer

The NPV is calculated by using following formulae:

$$NPV = \sum_{t=0}^n C_t / (1+r)^t$$

Where:

$C_t$  is the cash flow in the year  $t$  and  $r$  is required rate of return, which is 14 percent in this case.

The table below shows the calculation:

Initial cash out flow	Rs. 18000
Cash inflow: Annuity for five years of	Rs. 5300
Discount rate	14%

Years	Project- (Rs)	PVF at 14%	Present value of cash inflow
0	-18000	1	-18000
1	5300	0.8772	4649.1
2	5300	0.7695	4078.2
3	5300	0.6750	3577.3
4	5300	0.5921	3138.0
5	5300	0.5194	2752.7
<b>NPV</b>			195.3

### Question 12

A firm with a 20% WACC is evaluating two projects for this year's capital budget. Post tax cash flows are shown as follows:

Years	Project-A (Rs)	Project-B (Rs)
0	(600)	(600)
1	200	180
2	250	150
3	400	250
4	350	300
5	350	350

Calculate the NPV for both of these two projects. Which project is better?

### Answer

The table below shows the calculation:

Years	Project-A (Rs lakh)	PVF at 20%	Present value of cash inflow	Project-B (Rs lakh)	PVF at 20%	Present value of cash inflow
0	-600	1	-600	-600	1	-600
1	200	0.8333	166.7	180	0.8333	150
2	250	0.6944	173.6	150	0.6944	104.2
3	400	0.5787	231.5	250	0.5787	144.7
4	350	0.4823	168.8	300	0.4823	144.7
5	350	0.4019	140.7	350	0.4019	140.7
<b>NPV</b>			281.2			84.2

Since the NPV of project A is more than the project B, therefore the project A is better.

### Question 13

A firm is planning to buy a machine that will cost Rs 10 lakh. It would provide a cash flow of Rs 3 lakh for next five years with a salvage value of Rs 1 lakh towards the end of fifth year. If the cost of capital for the firm is 15%, find out the IRR of the machine. Whether the company should buy the machine or not?

#### Answer

Internal Rate of Return (IRR) is the return that is offered by the cash flows. Mathematically, we find the IRR or 'r' by solving following equations

$$\sum_{t=0}^n C_t / (1+r)^t = CF_0$$

We can also define IRR as the rate at which the NPV is zero.

Here, we will find out the IRR by Trial and Error method. We start with some discount rate to find out NPV. Finally we end up getting that rate at which the NPV becomes zero. That rate is said to be the IRR.

At r=18%, NPV= **-18137.8**

At r=17%, the NPV= **5415**

This means that the actual r lies between 17% and 18%.

Further, we will use interpolation to find out the exact value of r.

Therefore

$$IRR = 17\% + \frac{5415 - 0}{5415 - (-18137.8)} \times (18 - 17) = 17.23$$

The below table shows the calculation

Years	Project-M (Rs)	PVF at 18%	Present value of cash inflow	PVF at 17%	Present value of cash inflow
0	-1000000	1	-1000000	1	-1000000
1	300000	0.8475	254237.3	0.8547	256410.3
2	300000	0.7182	215455.3	0.7305	219154.1
3	300000	0.6086	182589.3	0.6244	187311.2
4	300000	0.5158	154736.7	0.5337	160095.0
5	400000	0.4371	174843.7	0.4561	182444.5
<b>NPV at 18%</b>			<b>-18137.8</b>		
<b>NPV at 17%</b>					<b>5415.0</b>
<b>NPV at 17.23%</b>					<b>0</b>
<b>IRR</b>	<b>17.23%</b>				

**Acceptance criteria :**

Project should only be accepted when  $IRR > \text{cost of capital}$ .

Since the IRR of the project is higher than the cost of capital, therefore, the project should be accepted.

**Question 14**

*A firm with a 16% WACC is evaluating two projects for this year's capital budget. Post tax cash flows are shown as follows:*

Years	Project-A (Rs)	Project-B (Rs)
0	(1000)	(1500)
1	100	800
2	250	600
3	450	300
4	650	300
5	750	150

*Calculate the IRR for both of these two projects. Which project is better?*

**Answer**

The project with higher IRR is better. Following table shows the calculation for project-A.

Years	Project-M (Rs)	PVF at 25%	Present value of cash inflow	PVF at 23%	Present value of cash inflow
0	-1000	1	-1000	1	-1000
1	100	0.8000	80.0	0.8130	81.3
2	250	0.6400	160.0	0.6610	165.2
3	450	0.5120	230.4	0.5374	241.8
4	650	0.4096	266.2	0.4369	284.0
5	750	0.3277	245.8	0.3552	266.4
<b>NPV at 25%</b>			<b>-17.6</b>		
<b>NPV at 23%</b>					<b>38.8</b>
<b>NPV at 24.36%</b>					<b>0</b>
<b>IRR</b>	<b>24.36%</b>				

Following table shows the calculation for project-B.

Years	Project-M (Rs)	PVF at 25%	Present value of cash inflow	PVF at 26%	Present value of cash inflow
0	-1000	1	-1000	1	-1000
1	600	0.8000	480.0	0.7937	476.2
2	500	0.6400	320.0	0.6299	314.9
3	200	0.5120	102.4	0.4999	100.0
4	150	0.4096	61.4	0.3968	59.5
5	150	0.3277	49.2	0.3149	47.2
<b>NPV at 25%</b>			<b>13.0</b>		
<b>NPV at 26%</b>					<b>-2.1</b>
<b>NPV at 25.86%</b>					<b>0</b>
<b>IRR</b>	<b>25.86%</b>				

Looking at the IRR, project B looks better.

### Question 15

*ABC Ltd. is planning to buy a factory that will cost Rs 100 crore. It would provide a cash flow of Rs 30 crore for next six years with a salvage value of Rs 10 crore towards the end of sixth year. If the cost of capital for the firm is 17%, find out the Profitability Index of the factory. Whether the company should buy the factory or not?*

### Answer

Profitability index is a financial tool which tells us whether an investment should be accepted or rejected. It uses the time value of money concept and is calculated by the following formula.

$$\text{Profitability index} = \frac{\text{PV of future cashflows}}{\text{Initial investment}}$$

Rules for selection or rejection of a project: If  $PI > 1$  then accept the projects, and if  $PI < 1$  then reject the projects. Following table shows the calculation:

Years	Project-A (Rs. Lakh)	PVF at 17%	Present value of cash inflow
0	-100	1	-100
1	30	0.8547	25.6
2	30	0.8547	25.6
3	30	0.8547	25.6
4	30	0.8547	25.6
5	30	0.8547	25.6
6	40	0.8547	34.2
<b>PV of cash flow</b>			128.2
<b>Initial Investment</b>			100
<b>PI</b>			1.28

Since the Profitability Index is more than one, therefore the company should buy the factory.

#### Question 16

*X Ltd. is planning to purchase a machine costing Rs 220 lakhs. It has an estimated life of 10 years with salvage value of Rs 20 lakhs. Over a period of 10 years X Ltd. expects a profit before tax of Rs. 30 lakhs every year. It pays a tax of 35% and charges depreciation on SLM basis. Find out whether X Ltd. should buy machine if the cost of capital for them is 10%. Ignore changes in working capital*

#### Answer

	<i>Rs. (lakh)</i>
Cost of the machine	220
Salvage value	20
Annual depreciation	20
<b>Computation of cash flow and NPV</b>	<i>Rs. (lakh)</i>
Profit before taxes	30
Taxes @ 35%	10.5
Profit after tax	19.5
Add : Depreciation	20
Cash flow after taxes	<u>39.5</u>
<b>Present value of operational cash flows</b>	39.5 x PVAF <sub>(0.1,10)</sub>
	= 39.5 x 5.6502 = 223.18

Salvage value realized at 10th year	20
<b>Present value of the salvage value</b>	<b>20 x PVF<sub>(0.1,10)</sub></b> <b>= 39.5 X 0.3220 = 6.44</b>
<b>Total present value of cash inflows</b>	<b>229.62</b>
Less : Initial cost	220
<b>NPV</b>	<b><u>9.62</u></b>

Since the NPV is positive, therefore, X Ltd. should buy machine.

### Question 17

*A project is costing Rs 120 crore. The life of the project is 8 years. The annual cost including depreciation is Rs 50 crore. If the required rate of return is 15% find out what minimum revenue the project must generate to make it viable. Assume depreciation at SLM and tax rate of 40%.*

### Answer

	<i>Rs. (crore)</i>
Cost of the project	120
Life of the project	8 years
Annual depreciation	15
Present value of annuity at 15% and 8 years	PVAF (15% , 8) = 4.4873
Equivalent annual cost of the project	120/4.4873 = 26.74
Taxes rate	40%
Cost including depreciation	50
Post tax cost	30
Depreciation	15
Net annual cash out flow	15
Total of equivalent annual capital cost and recurring cost	41.74
<b>Pre tax revenue required to have positive NPV</b>	<b>= 41.74/0.6 = 69.57</b>

So, minimum revenue the project must generate to make it viable is Rs 69.57 crore.

### Question 18

*Mintex Limited has a machine that is considered not up to the standard. The component produced on it can be ordered to a third party. If done so the increase in cost of purchase net of the in-house manufacturing expenses would be Rs 40,000 per annum. The machine can be sold for Rs 80,000 while its book value is Rs 1,10,000 with five years of remaining life. The depreciation policy of the firm is SLM while the tax rate is 35%. Examine if the machine should be sold or not. The cost of capital is 15%.*

## Answer

When the machine is sold the differential cash flow would constitute of net cash realized on selling of the machine and increase in cost.

<b>Cash inflow on selling of the machine</b>	<b>Rs.</b>
Cash realized on selling	80000
Remaining life- 5 years	
Book value	110000
Profit/(loss)	-30000
Tax saved @ 35%	10500
Post tax cash flow	90500
<b>Annual cash flow</b>	
Increase in cost	40000
Post tax increase in cost	26000
Tax shield on depreciation on machine foregone	7700
Increase in operating cost	33700
Present value of the cost = $33700 \times \text{PVAF}(15\%,5) = 33700 \times 3.3522 = 112969$	
NPV of the proposal to sell the machine = $-112969 + 90500$	

Since NPV on the selling the machine is negative the firm should not sell the machine.

## Question 19

*A firm has two mutually exclusive proposals A and B under consideration requiring an initial outlay of Rs 1,000 each. Both the projects have life of 7 years with following cash flows:*

<i>Years</i>	<i>Project-A (Rs)</i>	<i>Project-B (Rs)</i>
<i>0</i>	<i>(1000)</i>	<i>(1000)</i>
<i>1</i>	<i>50</i>	<i>500</i>
<i>2</i>	<i>100</i>	<i>350</i>
<i>3</i>	<i>250</i>	<i>250</i>
<i>4</i>	<i>300</i>	<i>60</i>
<i>5</i>	<i>400</i>	<i>100</i>
<i>6</i>	<i>450</i>	<i>100</i>
<i>7</i>	<i>500</i>	<i>150</i>

*Find out the NPVs of both the projects at discount rates between 12% and 18% at intervals of 2%.*

**Answer**

The net present values of the projects A and B with the given cash flows at 12%, 14%, 16%, and 18% are as computed below:

<i>Project-A</i>		<i>Discount rate</i>			
<i>Years</i>	<i>Cash flow</i>	<i>12%</i>	<i>14%</i>	<i>16%</i>	<i>18%</i>
0	-1000	-1000	-1000	-1000	-1000
1	50	44.6	43.9	43.1	42.4
2	100	79.7	76.9	74.3	71.8
3	250	177.9	168.7	160.2	152.2
4	300	190.7	177.6	165.7	154.7
5	400	227.0	207.7	190.4	174.8
6	450	228.0	205.0	184.7	166.7
7	500	226.2	199.8	176.9	157.0
NPV		174.1	79.8	-4.7	-80.4

<b>Project-B</b>		<b>Discount rate</b>			
<b>Years</b>	<b>Cash flow</b>	<b>12%</b>	<b>14%</b>	<b>16%</b>	<b>18%</b>
0	-1000	-1000	-1000	-1000	-1000
1	500	446.4	438.6	431.0	423.7
2	350	279.0	269.3	260.1	251.4
3	250	177.9	168.7	160.2	152.2
4	60	38.1	35.5	33.1	30.9
5	100	56.7	51.9	47.6	43.7
6	100	50.7	45.6	41.0	37.0
7	150	67.9	59.9	53.1	47.1
NPV		116.8	69.6	26.2	-14.0

### Question 20

*In question-19 above, find out the internal rate of returns (IRRs) for both the projects. Which of the project is preferable based on rule of IRR?*

### Answer

The project with higher IRR is better. Following two tables show the calculation of IRR for project-A and project B respectively.

<i>Years</i>	<i>Project-A (Rs)</i>	<i>PVF at 15%</i>	<i>Present value of cash inflow</i>	<i>PVF at 16%</i>	<i>Present value of cash inflow</i>
0	-1000	1	-1000	1	-1000
1	50	0.8696	43.5	0.8621	43.10344828
2	100	0.7561	75.6	0.7432	74.31629013
3	250	0.6575	164.4	0.6407	160.1644184
4	300	0.5718	171.5	0.5523	165.6873294
5	400	0.4972	198.9	0.4761	190.4452062
6	450	0.4323	194.5	0.4104	184.6990146
7	500	0.3759	188.0	0.3538	176.9147649
<b>NPV at 15%</b>			36.38		
<b>NPV at 16%</b>					-4.67
<b>NPV at 15.88%</b>					0
<b>IRR</b>	15.88%				

Years	Project-B (Rs)	PVF at 17%	Present value of cash inflow	PVF at 18%	Present value of cash inflow
0	-1000	1	-1000	1	-1000
1	500	0.8547	427.4	0.8475	423.7
2	350	0.7305	255.7	0.7182	251.4
3	250	0.6244	156.1	0.6086	152.2
4	60	0.5337	32.0	0.5158	30.9
5	100	0.4561	45.6	0.4371	43.7
6	100	0.3898	39.0	0.3704	37.0
7	150	0.3332	50.0	0.3139	47.1
<b>NPV at 17%</b>			<b>5.7</b>		
<b>NPV at 18%</b>					<b>-14.0</b>
<b>NPV at 17.29%</b>					<b>0</b>
<b>IRR</b>	<b>17.29%</b>				

Since the project B offers higher IRR, therefore, Project B should be accepted.

### Question 21

*In question-19 above, find out the discount rate at which the two projects would be equally preferable? And what does this discount rate mean?*

### Answer

The point of indifference can be computed by finding IRR of the differential cash flow.

Cash Flows			Rs.
Year	Project A	Project B	Differential
0	-1000	-1000	0
1	50	500	-450
2	100	350	-250
3	250	250	0
4	300	60	240
5	400	100	300
6	450	100	350
7	500	150	350
<b>IRR of differential cash flow</b>		<b>14.47%</b>	

At discount rate of 14.47% the NPVs of both the projects would be equal. When the discount rate is less than 14.47% the NPV of Project A would be higher and it would be preferable project as compared to Project B. However situation would reverse when the discount rate exceeds 14.47% and Project B becomes preferable.

### Question 22

*Ima Inc. is considering expansion into manufacture of product-A or product-B. Though both the projects can be undertaken but due to capital constraints only one of them can be implemented now. The product-A project involves an outlay of Rs. 25 crore while product-B project can be implemented with Rs. 20 crore. The markets are uncertain and the estimates of NPV for both the projects with corresponding probabilities are as below :*

*Rs. Lakhs*

<i>Product-A</i>		<i>Product-B</i>	
<i>Probability</i>	<i>NPV</i>	<i>Probability</i>	<i>NPV</i>
<i>0.20</i>	<i>400.00</i>	<i>0.10</i>	<i>250.00</i>
<i>0.30</i>	<i>650.00</i>	<i>0.40</i>	<i>500.00</i>
<i>0.30</i>	<i>850.00</i>	<i>0.30</i>	<i>750.00</i>
<i>0.20</i>	<i>155.00</i>	<i>0.20</i>	<i>250.00</i>

- (i) *What is the expected NPV of each project?*  
(ii) *What is the risk of each project, as measured from standard deviation and co-efficient of variation ?*

### Answer

The expected NPV, standard deviation, and co-efficient of variation of both the projects are computed below:

<i>Figures in Rs Lakhs except CV</i>				
<i>Product-A</i>		<i>Outlay = 2500</i>		
<i>Prob</i>	<i>NPV</i>	<i>p x NPV</i>	<i>Dev<sup>2</sup></i>	<i>p x dev<sup>2</sup></i>
0.20	400.00	80.00	25,921.00	5,184.20
0.30	650.00	195.00	7,921.00	2,376.30
0.30	850.00	255.00	83,521.00	25,056.30
0.20	155.00	31.00	164,836.00	32,967.20
Expected NPV		$\sum p \times NPV =$	561.00	

Variance	$\sum p \times Dev^2$			65,584.00
Standard Deviation	$\sqrt{\text{variance}}$	=		256.09
Coefficient of Variation = Standard Deviation / Expected NPV				
CV = 0.46				
Product-B	Outlay =		2000	
Prob	NPV	$p \times NPV$	$Dev^2$	$p \times dev^2$
0.10	250.00	25.00	62,500.00	6,250.00
0.40	500.00	200.00	0.00	0.00
0.30	750.00	225.00	62,500.00	18,750.00
0.20	250.00	50.00	62,500.00	12,500.00
Expected NPV	$\sum p \times NPV =$	500		
Variance	$\sum p \times Dev^2$			37,500.00
Standard Deviation	$\sqrt{\text{variance}}$	=		193.65
Coefficient of Variation, CV = Standard Deviation / Expected NPV				
= 0.39				

### Question 23

SMC Limited has a project on hand costing Rs 20 crore with a life of 10 years. The expected revenue is Rs 21 crore per annum with variable cost estimated at 50%. The fixed costs are Rs 5 crore while depreciation is on the basis of SLM. The tax rate is 40% and the cost of capital for the firm is 14%.

The management of SMC Limited is apprehensive of the cash flow estimates. The apprehension comes from uncertainty of revenue and the proportion of the variable cost. Due to inherent risk in the projections the management also believes that the suppliers of capital for the project may not be very comfortable with the returns equal to the current cost of capital.

Find out the following:

- The estimated annual cash flows of the project.
- Assuming uniform cash flows of the project for entire life and current cost of capital as appropriate discount rate find the net present value of the project.
- Find out the NPV of the project assuming the revenues can change from 80% to 120% of the expected revenue and plot the NPV with respect to the level of revenue.

**Answer**

a) The annual cash flow of the project is estimated below:

	<i>Rs. (Crore)</i>
Revenue	21
Variable Cost (50%)	10.5
Fixed Cost	5
Depreciation	2
Total Cost	17.5
PBT	3.5
Taxes @ 40%	1.40
PAT	2.10
Cash Accruals (PAT + Dep)	4.10

b) The NPV of the project is as under:

Life	10 years
Cost of capital	14%
Present value annuity factor	5.2161
PV of cash flow	$4.10 \times 5.2161 = 21.39$
Capital Investment	20
NPV	1.39

c) Sensitivity with respect to revenue can be found out as follows:

*Sensitivity with respect to revenue (Rs crore)*

<i>Change in revenue</i>	<i>80%</i>	<i>90%</i>	<i>100%</i>	<i>110%</i>	<i>120%</i>
Revenue	16.8	18.9	21	23.1	25.2
Variable Cost (50%)	8.4	9.45	10.5	11.55	12.6
Fixed Cost	5	5	5	5	5
Depreciation	2	2	2	2	2
Total Cost	15.4	16.45	17.5	18.55	19.6
PBT	1.4	2.45	3.5	4.55	5.6
Taxes @ 40%	0.56	0.98	1.4	1.82	2.24
PAT	0.84	1.47	2.1	2.73	3.36
Cash Accruals (PAT + Dep)	2.84	3.47	4.1	4.73	5.36
PV of cash flow @ 14% for 10 years	14.81	18.10	21.39	24.67	27.96
Capital Investment	20	20	20	20	20
<b>Revised NPV</b>	-5.19	-1.90	1.39	4.67	7.96

### Question 24

Refer to question-19. Find out the NPV of the project assuming that the variable cost can change from 40% to 60% of the expected revenue and plot the NPV with respect to the variable cost as proportion of expected revenue.

### Answer

Sensitivity with respect to variable cost can be found out as follows:

<i>Change in variable cost</i>	40%	45%	50%	55%	60%
Revenue	21	21	21	21	21
Variable Cost (50%)	8.4	9.45	10.5	11.55	12.6
Fixed Cost	5	5	5	5	5
Depreciation	2	2	2	2	2
Total Cost	15.4	16.45	17.5	18.55	19.6
PBT	5.6	4.55	3.5	2.45	1.4
Taxes @ 40%	2.24	1.82	1.4	0.98	0.56
PAT	3.36	2.73	2.1	1.47	0.84
Cash Accruals (PAT + Dep)	5.36	4.73	4.1	3.47	2.84
PV of cash flow @ 14% for 10 years	27.96	24.67	21.39	18.10	14.81
Capital Investment	20	20	20	20	20
<b>Revised NPV</b>	7.96	4.67	1.39	-1.90	-5.19

### Question 25

Refer to question-23. Find out the NPV of the project for cost of capital ranging between 12% and 16% and plot the NPV with respect to cost of capital.

### Answer

Sensitivity with respect to cost of capital can be found out as follows:

<b>Change in cost of capital</b>	12%	13%	14%	15%	16%
Revenue	21	21	21	21	21
Variable Cost (50%)	10.5	10.5	10.5	10.5	10.5
Fixed Cost	5	5	5	5	5
Depreciation	2	2	2	2	2
Total Cost	17.5	17.5	17.5	17.5	17.5
PBT	3.5	3.5	3.5	3.5	3.5
Taxes @ 40%	1.4	1.4	1.4	1.4	1.4

PAT	2.1	2.1	2.1	2.1	2.1
Cash Accruals (PAT + Dep)	4.1	4.1	4.1	4.1	4.1
PV of cash flow for 10 years	23.17	22.25	21.39	20.58	19.82
Capital Investment	20	20	20	20	20
<b>Revised NPV</b>	3.17	2.25	1.39	0.58	-0.18

### Question 26

ABC Ltd. is considering a capital investment of Rs 40 lacs for a project that has life of 3 years. The cash flows are dependent upon the general economic conditions. The project team has considered 4 different scenarios of poor, average, good and excellent with respective probabilities of 20%, 30%, 30% and 20% respectively. The cash flows for three years under 4 different scenarios are given below:

(Rs Lakhs)

Scenario	Prob.	Year 1	Year 2	Year 3
Poor	0.20	12.00	15.00	18.00
Average	0.30	15.00	19.00	24.00
Good	0.30	20.00	25.00	35.00
Excellent	0.20	27.00	35.00	44.00

If the cost of capital is 12%, find out the NPV of the project under different scenarios of poor, average, good and excellent.

### Answer

Following is the NPV under different scenarios:

Year	0	1	2	3
PV factor@ 12% cost of capital	1.0000	0.8929	0.7972	0.7118
<b>Poor</b>				
Cash flow	-40.00	12.00	15.00	18.00
Present value	-40.00	10.71	11.96	12.81
NPV	<b>-4.52</b>			

<b>Average</b>				
Cash flow	-40.00	15.00	19.00	24.00
Present value	-40.00	13.39	15.15	17.08
NPV		<b>5.62</b>		
<b>Good</b>				
Cash flow	-40.00	20.00	25.00	35.00
Present value	-40.00	17.86	19.93	24.91
NPV		<b>22.70</b>		
<b>Excellent</b>				
Cash flow	-40.00	27.00	35.00	44.00
Present value	-40.00	24.11	27.90	31.32
NPV		<b>43.33</b>		

### Question 27

*Simple Travel is a steadily growing company that follows a rather conservative approach to its capital expenditure plans due to inherent risks involved. The firm normally does not take capital expenditure that lasts more than 5 years and follows a policy of converting the risky cash flows to their certainty equivalents by assigning certainty equivalent factors of 0.9, 0.8, 0.7, 0.6 and 0.5 for the cash flows of Year 1 to Year 5 respectively.*

*The post tax cash flows of two such mutually exclusive projects A and B, are given below:*

<i>Estimated cash flows (Rs lakhs)</i>		
<i>Year</i>	<i>Project A</i>	<i>Project B</i>
<i>0</i>	<i>-250</i>	<i>-250</i>
<i>1</i>	<i>60</i>	<i>100</i>
<i>2</i>	<i>70</i>	<i>120</i>
<i>3</i>	<i>80</i>	<i>100</i>
<i>4</i>	<i>120</i>	<i>20</i>
<i>5</i>	<i>120</i>	<i>40</i>

*The cost of capital for the firm is 17% while the risk free return is 6%.*

- i) Which project should be undertaken based on NPV rule?*
- ii) Which project must be undertaken if certainty equivalent approach is followed?*

**Answer**

i) The net present values of the Projects A and B at cost of capital are as below:

<i>Years</i>	<i>Project-A (Rs Lakh)</i>	<i>PVF at 17%</i>	<i>Present value of cash inflow</i>	<i>Project-B (Rs lakh)</i>	<i>PVF at 17%</i>	<i>Present value of cash inflow</i>
0	-250	1	-250	-250	1	-250
1	60	0.8547	51.3	100	0.8696	87.0
2	70	0.7305	51.1	120	0.7561	90.7
3	80	0.6244	49.9	100	0.6575	65.8
4	120	0.5337	64.0	20	0.5718	11.4
5	120	0.4561	54.7	40	0.4972	19.9
<b>NPV</b>			271.1			24.8

Based on NPV rule the firm must undertake Project A having higher NPV.

ii) Using certainty equivalent (CE) approach we may find the equivalent cash flows that are certain by using the certainty equivalent factor for each year, and then discounting these certain cash flows at risk free rate.

<i>Years</i>	<i>Project-A (Rs Lakh)</i>	<i>CE factor</i>	<i>Adjusted Cash flow</i>	<i>PVF at 6%</i>	<i>Present value of cash inflow</i>	<i>Project-B (Rs lakh)</i>	<i>Adjusted Cash flow</i>	<i>Present value of cash inflow</i>
0	-250	1	-250	1	-250	-250	-250	-250
1	60	0.9	54	0.9434	50.9	100	90	84.9
2	70	0.8	56	0.8900	49.8	120	96	85.4
3	80	0.7	56	0.8396	47.0	100	70	58.8
4	120	0.6	72	0.7921	57.0	20	12	9.5
5	120	0.5	60	0.7473	44.8	40	20	14.9
<b>NPV</b>					-0.3			3.6

Based on the certain cash flows as modified by the certainty equivalent factor Project B is preferable since it has positive NPV while Project A has negative NPV.

## Question 28

Refer to question-27. Find out the IRR of each project based on risky and certain cash flows? Also discuss which project would you recommend.

### Answer

The calculation of IRR under certain cash flow is shown as under:

Years	Project-A (Rs Lakh)	CE factor	Adjusted Cash flow	PVF at 6%	Present value of cash inflow	Project-B (Rs lakh)	Adjusted Cash flow	Present value of cash inflow
0	-250	1	-250	1	-250	-250	-250	-250
1	60	0.9	54	0.9434	50.9	100	90	84.9
2	70	0.8	56	0.8900	49.8	120	96	85.4
3	80	0.7	56	0.8396	47.0	100	70	58.8
4	120	0.6	72	0.7921	57.0	20	12	9.5
5	120	0.5	60	0.7473	44.8	40	20	14.9
<b>IRR</b>	<b>20.2%</b>		<b>5.95%</b>			<b>20.1%</b>	<b>6.7%</b>	

The IRR of both the projects is almost same at about 20%. Both projects are equally preferable. However IRR of the certain cash flows for Project B is higher than the cut off i.e. risk free rate of return, while for Project A it is less than the risk free rate of return. Therefore, the project B would be acceptable.

## Question 29

Z Ltd. intends to establish a warehouse so as to exploit the present market situation. The initial cost of project is expected to be Rs.30 lakh and the life of such warehouse will be 5 years. The funds will be provided by the business house, required to be repaid over a period of 5 years at an interest rate of 15% per annum. The operating cost is estimated at Rs.6 lakh in the first year and is expected to increase at the rate of Rs.50,000 every year.

It is proposed to fix storage charges rate in such a way that income over a period of five years covers the initial investment of Rs.30 lakh as well as the operating cost.

The occupancy of the warehouse is expected to be 9,000 MT in the initial year and will increase by 250 MT in each of the following year.

You are required to find out storage rate to be charged per MT/month so as to break-even in this project. Ignore income-tax. Residual value of the project is estimated to be Rs. 3,60,000.

**Answer**

Year	Capital	OP Cost	PV Factor @15%	NPV	Occupancy	NPV Occupancy
0	30,00,000	0	1	(30,00,000)		
1		6,00,000	0.8695	5,21,700	9,000	7,826
2		6,50,000	0.7561	4,91,465	9,250	6,994
3		7,00,000	0.6575	4,60,250	9,500	6,246
4		7,50,000	0.5717	4,28,775	9,750	5,574
5		8,00,000	0.4971	3,97,680	10,000	4,971
				22,99,870		31,611

NPV of Inflow

(Salvage)  $3,60,000 \times 0.4971 = 1,78,956$

Calculation of Rate/TON/month

Initial Investment	30,00,000
Operating Cost	22,99,870
Total Cost	52,99,870
Less NPV of Inflow	1,78,596
Balance	51,20,914
Occupancy	31,611
Rate/TON/p.a.	161.99
Storage Rate/ton/m	13.50

**Question 30**

*A company is considering two mutually exclusive projects. The company uses certainty equivalent approach. Estimated cash flows and certainty equivalents for each project are as follows:*

Year	Project 1		Project 2	
	Cash flow (Rs.)	Certainty equivalent	Cash flow (Rs.)	Certainty equivalent
0	- 30,000	1.00	- 40,000	1.00
1	15,000	0.95	25,000	0.90

2	15,000	0.85	20,000	0.80
3	10,000	0.70	15,000	0.70
4	10,000	0.65	10,000	0.60

Which project should be accepted, if the risk free discount rate is 15% ?

**Answer**

*Project 1:*

$$\begin{aligned}
 NPV &= 1(-30,000) + \frac{0.95(15,000)}{(1.15)} + \frac{0.85(15,000)}{(1.15)^2} + \frac{0.70(10,000)}{(1.15)^3} + \frac{0.65(10,000)}{(1.15)^4} \\
 &= -30,000 + \frac{14250}{1.15} + \frac{12750}{1.3225} + \frac{7000}{1.5208} + \frac{6500}{1.749} \\
 &= -30,000 + 12,391 + 9,641 + 4,603 + 3,716 \\
 &= \text{Rs. } 351
 \end{aligned}$$

*Project 2*

$$\begin{aligned}
 NPV &= 1(-40,000) + \frac{0.90(25,000)}{(1.15)} + \frac{0.85(20,000)}{(1.15)^2} + \frac{0.70(15,000)}{(1.15)^3} + \frac{0.65(10,000)}{(1.15)^4} \\
 &= -40,000 + \frac{22500}{1.15} + \frac{16000}{1.3225} + \frac{10500}{1.5208} + \frac{6000}{1.749} \\
 &= -40,000 + 19,565 + 12,098 + 6,904 + 3,431 \\
 &= \text{Rs. } 1,998
 \end{aligned}$$

As NPV of project 2 is higher therefore Project 2 should be preferred.

**Question 31**

*An existing machine in B Ltd. can be sold today for Rs.1,00,000 net. The cash flow after tax (CFAT) for the balance life of 4 years is Rs.30,000 per annum. At the end of the 4th year, the existing machine can be sold for Rs.20,000 net. A new machine can replace the existing machine at a net cash outflow of Rs.1,50,000 and will generate annual CFAT of Rs.46,000. The scrap value at the end of its useful life will be Rs. 25,000 net. If the discount rate is 10%, decide whether the existing machine should be replaced with a new machine.*

**Answer**

**NPV of continuing option (Dis. Fac. 10%)**

Year	Cash flow (Rs.)	Discount Factor @10%	PV (Rs.)
0	(1,00,000)	1,000	(1,00,000)
1	30,000	0.9091	27,273

2	30,000	0.8264	24,792
3	30,000	0.7513	22,539
4	30,000	0.6830	20,490
5	20,000	0.6830	13,660
		<b>NPV</b>	8,754

**NPV of New machine (Dis. Fac. 10%)**

<i>Year</i>	<i>Cash flow (Rs.)</i>	<i>Discount Factor @10%</i>	<i>PV (Rs.)</i>
0	(1,50,000)	1,000	(1,50,000)
1	46,000	0.9091	41,819
2	46,000	0.8264	38,011
3	46,000	0.7513	31,560
4	46,000	0.6830	31,413
5	25,000	0.6830	17,075
		<b>NPV</b>	12,886

Both “continuing” and “buying” have positive NPV. Since NPV of the new machine is greater, replace the old machine and buy the new one.

**Question 32**

*P Ltd. is a manufacturer of variety of electrical equipments. The existing machine is based on old technology. In order to improve the quality of the product and bring down operating cost, the management is planning to replace the existing machine with a new one based on latest technology. Following are the relevant information :*

*Existing machine :*

- Purchased* – *5 years ago*
- Remaining life* – *5 years*
- Salvage value* – *Rs. 20,000*
- Depreciation* – *Straight line basis*
- Current book value* – *Rs. 3,00,000*
- Realisable market value* – *Rs. 3,50,000*
- Annual depreciation* – *Rs. 28,000*

*New replacement machine :*

- Capital cost* – *Rs. 10,00,000*
- Estimated useful life* – *5 years*
- Estimated salvage value* – *Rs. 1,00,000*

The replacement machine would permit an output expansion. As a result, sales is expected to increase by Rs.1,00,000 per year, operating expenses would decline by Rs. 2,00,000 per year. It would require an additional inventory of Rs. 2,00,000 and would cause an increase in accounts payable by Rs. 50,000.

Assuming a corporate tax rate of 30% and cost of capital of 12%, advise the company about replacement of the existing machine.

**Answer**

**Initial Cash Outlay**

	<i>Rupees</i>	
<i>Cost of New Machine</i>		10,00,000
<i>Less : Sale of old machine</i>	3,50,000	
<i>Less : Tax on profit on sale of machine 30% of Rs. 50,000</i>	15,000	(3,35,000)
<i>Add : Increase in Working Capital (2,00,000 - 50,000)</i>		1,50,000
<b>Initial Cash Outlay</b>		<b>8,15,000</b>
<i>Additional Depreciation</i>		
<i>New Machine (10,00,000 – 1,00,000) / 5 years</i>	1,80,000	
<i>Old machine Annual Depreciation</i>	28,000	
<b>Increase in Depreciation</b>		<b>1,52,000</b>
<i>Annual Cash Inflow</i>		
<i>Increase in sales</i>		1,00,000
<i>Reduction in operating expenses</i>		2,00,000
		<b>3,00,000</b>
<i>Less increase in depreciation</i>		(1,52,000)
<b>Increase in Profit before Tax</b>		<b>1,48,000</b>
<i>Lease Tax @ 30%</i>		(44,400)
<b>Net Savings after tax</b>		<b>1,03,600</b>
<i>Add : Depreciation</i>		<b>1,52,000</b>

Net Cash Inflow p.a.		2,55,600
Terminal Inflow		
Salvage	1,00,000	
Release of Working Capital	1,50,000	2,50,000

### Net Present Value

Year	Net Cash Inflow (Rs.)	PVIF	PV
0	-8,15,000	1,000	-8,15,000
1-5	2,55,600	3,6048 (12%, 5)	9,21,387
5	2,50,000	0.5674	1,41,850
NPV			2,48,237

Since NPV of the proposal is positive, it is advisable to replace the old machine with new machine.

*Note :* Interest cost on additional investment, etc. has been ignored because it is a financial cost.

### Question 33

*FMCG Ltd. is evaluating to spend Rs. 4 lakhs on a project to manufacture and sell a new product. The unit variable cost of the product is Rs. 6. It is expected that the new product can be sold at Rs.10 per unit. The annual fixed cost (only cash) will be Rs. 20,000. The project will have a life of six years with a scrap value of Rs.20,000. The cost of capital of the company is 15%. The only uncertain factor is the volume of sales. To start with, the company expects to sell at least 40,000 units during the first year.*

*You are required to find out (ignoring tax):*

- (i) Net Present Value of the project based on the sales expected during the first year and on the assumption that it will continue at the same level during the remaining years.*
- (ii) The minimum volume of sales required to justify the project.*

### Answer 33

#### (i) Calculation of Contribution

Selling Price (per unit)	Rs.10
Less : Variable cost (per unit)	6
Contribution (per unit)	<u>4</u>

### Calculation of NPV

Total Contribution (Annual) (40,000 units x Rs. 4)	Rs. 1,60,000
Less : Fixed Cost	20,000
Net Cash inflow (Annual)	<u>Rs. 1,40,000</u>
PVAF(15%,6)	3.784
Total present value of net cash inflows	5,29,760
Present Value of scrap (Rs. 20,000 x 0.432)	8,640
Present value of total cash inflows	<u>5,38,400</u>
Less : Initial investment	4,00,000
Net Present Value	<u>1,38,400</u>

### (ii) Calculation of minimum volume of sales required to justify the Project

Let No. of units to be sold be 'x'. At this level, NPV should be zero. This can be presented as follows:

$$\{[(4 'x' - \text{Rs. } 20,000) \times 3.784] + \text{Rs. } 8,640\} - \text{Rs. } 4,00,000 = 0$$

$$15.136 'x' = - 75,680 + 8,640 - 4,00,000 = 0$$

$$15.136 'x' - 4,67,040 = 0$$

$$15.136 'x' = 4,67,040$$

$$'x' = 4,67,040/15.136$$

$$= 30,856 \text{ units}$$

If the firm is expecting a sale of 30,856 units, the project is justified, otherwise not. This can be verified as follows:

Sales (Units)	30,856
Contribution @Rs.4 per unit	Rs.1,23,424
Less : Fixed Cost	20,000
Net Profit	<u>1,03,424</u>
PVAF(15%,6)	3.784
PV of Annual Inflows	Rs. 3,91,356
PV of Scrap	8,640
Total Present Value	<u>3,99,996</u>
Initial Investment	4,00,000

The difference of Rs.4 is appearing because of approximation.

The question specifically asks to ignore the tax effect. Therefore, the tax shield of depreciation has been ignored.

### Question 34

*ABC Machine Tool Company Ltd. is considering the acquisition of a large equipment to set up its factory in a backward region for Rs.12,00,000. The equipment is expected to have an economic useful life of 8 years. The equipment can be financed either with an 8 year term loan at 14 per cent interest, repayable in equal installments of Rs.2,58,676 per year, or by an equivalent amount of lease rent per year. In both cases, payments are due at the end of the year. The equipments is subject to the straight line method of depreciation for tax purposes. Assuming no salvage value after the 8-years useful life and 50 per cent tax rate, which of the financing alternatives should it select ?*

### Answer 34

#### PV of cash inflows under leasing alternative

Year end	Lease payment after taxes (L) (1-0.5)	PV factor at 0.07( $K_d$ )	Total PV
1-8	Rs. 1,29,338	5.971	Rs. 7,72,277

#### Determination of interest and principal components of loan installment

Year End	Loan installment	Loan at the beginning of the year	Payment of		Principal outstanding at the end of the year
			interest (Col.3 x 0.14)	principal (Col. 2- Col.4)	(Col. 3 - Col. 5)
1	2	3	4	5	6
1	Rs. 2,58,676	Rs.12,00,000	Rs.1,68,000	Rs.90,676	Rs.11,09,324
2	2, 58,676	11,09,324	1,55,305	1,03,371	10,05,953
3	2, 58,676	10,05,953	1,40,833	1,17,843	8,88,110
4	2, 58,676	8,88,110	1,24,335	1,34,341	7,53,769
5	2, 58,676	7,53,769	1,05,528	1,53,148	6,00,621
6	2, 58,676	6,00,621	84,087	1,74,589	4,26,032
7	2, 58,676	4,26,032	59,644	1,99,032	2,27,000
8	2, 58,676	2,27,000	31,676	2,27,000	—

**PV of cash outflows under buying alternative**

Year	Loan installment	Tax advantage on		Cash outflows after taxes	PV factor at 0.07	Total PV
		interest	depreciation			
		(1 x t)	(D x t)			
1	2	3	4	5	6	7
1	Rs. 2, 58,676	Rs. 84,000	Rs. 75,000	Rs.99,676	0.935	Rs. 93,197
2	2, 58,676	77,652	75,000	1, 06,024	0.873	92,559
3	2, 58,676	70,416	75,000	1, 13,260	0.816	92,420
4	2, 58,676	62,167	75,000	1, 21,509	0.763	92,711
5	2, 58,676	52,764	75,000	1, 30,912	0.713	93,340
6	2, 58,676	42,043	75,000	1, 41,633	0.666	93,328
7	2, 58,676	29,822	75,000	1, 53,854	0.623	95,851
8	2, 58,676	15,838	75,000	1, 67,838	0.582	97,682
						7,52,088

*Recommendation* : The borrowing (buying) alternative of financing the purchase of the large equipment should be selected.

**Question 35**

*Gujarat Industries has received an order from a new potential customer from HP Industries for 5000 staplers at a unit price of Rs. 17.50. Gujarat Industries' terms of sale are 10% initial deposit, payable with order, with the balance payable in 180 days. The 10% deposit has been received with the order.*

*In the past customers from Northern India have usually taken approximately one year's credit before making payment, and several have defaulted on payment. On the basis of past experience, Gujarat Industries' management estimates that there is 35% chance of new customer defaulting on payment if the order is accepted, and only a 50% chance of payment within a year.*

*Incremental costs associated with the production and delivery of staplers would be Rs.12.50 per unit and, in addition, there is an estimated cost of Rs.500 for special attempts to collect an overdue debt, this cost is incurred one year after the sale is made. When this extra cost is incurred there is a 30% chance of obtaining quick payment of the debt. If, after this action, payment is not received, the debt is written off.*

*Gujarat Industries currently has some surplus funds which could be used to finance the trade credit: Prices, costs and interest rates are not expected to change significantly in the*

foreseeable future. Gujarat Industries' stapler production facilities have a large amount of spare capacity.

The company considers the granting of credit to be a form of investment decision, with 14% per year as the appropriate discount rate.

Evaluate whether Gujarat Industries should accept the order from the new customer:

- (i) On the basis of the above information
- (ii) If there is a 50% chance that the order will be repeated at the same time next year. Following payment for a first order, the probability of default for repeat orders is 15% and no special attempt to collect an overdue debt would be made at the end of year 2.
- (iii) If HP Industries has stated that it will definitely repeat the order in the second year.

**Answer 35**

(i) The probabilities events are as follows:

	<i>Probability</i>
1. Customer pays without special attempts to collect overdue debt	0.50
2. Customer pays after special attempts to collect overdue debt	0.15
3. Customer does not pay after special attempts to collect overdue debt	0.35

The cash flows associated with probabilities are:

1. 0.50 (-62,500 + 8,750 + 78,750/1.14 )	= - Rs. 7,670
(Total Variable Cost) (Initial deposit) (Discounted value of credit sales)	
2. 0.50 (-62,500 + 8,750 + 78,750/1.14 - 5,000/1.14)	= - Rs. 1,640
(Discounted cost of special collection attempts)	
3. 0.50 (-62,500 + 8,750 - 5,000/1.1 )	= - Rs. 20,350
Expected NPV	= - Rs. 11,040

The order should not be accepted

(ii) If there is a 50% chance of a repeat order next year. A repeat order would only be accepted if default did not occur in the first year.

The possible outcomes are:

	<i>Probability</i>
1. Default in year 1	=. 35

2. Payment in year 2 after special attempts,  
 Payment in year 2  $0.15 \times 0.85 = 0.1275$
3. Payment in year 3 without special attempts,  
 Payment in a year 2  $0.50 \times 0.85 = 0.4250$
4. Payment in year 4 after special attempts  
 Default in year 2  $0.15 \times 0.15 = 0.0225$
5. Payment in year 5 without special attempts,  
 Default in year 2  $0.50 \times 0.15 = 0.0750$

- (1) Expected returns = - Rs. 20,350
- (2)  $0.1275[-62,500+8,750+78,750/1.14-5,0(00/1.14 + 0.5 (-62,500/1.14 + 8,750/1.14 + 78,750/(1.14)^2)]$   
 $= 0.1275 [10,940+0.5 (13,450)]$  = Rs. 2,250
- (3)  $0.4250 [-62,500+8,750+78,750/1.14 + 0.5(13,450)]$   
 $= 0.4250[15,330 + 0.5 (13,450)]$  = Rs. 9,370
- (4)  $0.0225 [10,940+0.5 (-62,500/1.14 + 8,750/1.14)]$   
 $= 0.0225 [10,940 - 0.5 (47,150)]$  = - Rs. 280
- (5)  $0.0750 [15,330 - 0.5 (47,150)]$  = Rs. 620
- Expected NPV is - Rs.9.630

The order should not be accepted.

(iii) If the order in year 2 is definite, the results are:

	Rs.
1.	- 20,350
2. $0.1275 (10,940 + 13,450)$	= 3,110
3. $0.4250 (15,330 + 13,450)$	= 12,230
4. $0.0225 (10,940 - 47,150)$	= - 810
5. $0.0750 (15,330 - 47,150)$	= - 2,390
<b>Expected NPV</b>	<b>= - 8,210</b>

### Question No. 36

*The Projects Consultants (P) Ltd is a consultancy firm. Its main business is to conduct market studies, surveys and techno-economic feasibility and industry reviews. Its final product is in the form of a printed report. The normal procedure is to produce handwritten drafts of the report and get it printed through an independent word*

processing service agency. Three copies of each report are prepared for submission to the clients.

On an average 35 studies are completed every year. The average size of the report is 100 pages. In addition, about 50 proposals are sent in duplicate to various companies every year, the average size of these being 20 pages. The reports as well as the proposals are in laser print on bond paper. The handwritten drafts (printed 3 times for reports and 2 times for proposals) are on ordinary paper.

The external word processing is done at a rate of Rs.10 per page with one draft free of cost. The variable overheads are 2 telephone calls a day to the word processing agency for 300 days @ Re 1 per call.

Recently, the firm has been offered a computer system with software and laser printer for Rs.1,20,000. The system would have no salvage value at the end of 5 years. The maintenance cost of the system would include Rs.5,000 on account of annual maintenance contract and Rs.15,000 for spares. The annual insurance of the system is likely to be 1 per cent of the cost. The other associated annual costs are expected to be as follows:

- Cost of bond paper, Re 0.35 per sheet; cost of ordinary paper @ Re 0.18 per sheet. The experience has been that there is 10 per cent wastage of both bond and ordinary paper sheets;
- Laser toner, Re.0.10 per sheet;
- Draft print at Re.0.05 per sheet;
- Power charges, Rs.3,000;
- Telephone charges, Rs.1,00;
- Manpower charges, Rs.3,000 per month as salary of a part-time computer operator;
- Additional working capital requirement, Rs.25, 000.

The firm is in the 35 per cent tax bracket. Assuming it would use written down value method of depreciation at the rate of 25 per cent and its required rate of return is 10 per cent, should the Projects Consultants (P) Ltd install its own computer system as an alternative to hiring word processing service from an outside agency. Assume further that the company does not have any other asset in the 25 per cent block.

### **Answer 36**

Financial analysis to purchase computer system

#### **Cash outflows**

Cost of computer system	Rs.1,20,000
Increased working capital required	25,000
Initial investment required	1,45,000

### Incremental CFAT and NPV

<i>Particulars</i>	<i>Year</i>				
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
	<i>Rs</i>	<i>Rs</i>	<i>Rs</i>	<i>Rs</i>	<i>Rs</i>
<b>Savings in word processing cost:</b>					
- Reports (35 x 3 x 100 x Rs.10)	1,25,000	1,25,000	1,25,000	1,25,000	1,25,000
- Proposals (50 x 20 x 2 x Rs.10)					
Savings in telephone costs	500	500	500	500	500
<i>Less: incremental costs:</i>	1,200	1,200	1,200	1,200	1,200
Insurance (0.01 x Rs.1,20,000)	20,000	20,000	20,000	20,000	20,000
<b>Maintenance Costs</b>					
<b>Paper costs:</b>					
- Bond paper (12,500 x Re. 0.35 x 101)					
- Ordinary paper (12,500 x Re. 0.18 x 1.1)	7,288	7,288	7,288	7,288	7,288
Toner cost (Laser) (12,500 x 0.1 x 1.1)	1,375	1,375	1,375	1,375	1,375
Toner cost(Draft) (12,500 x 0.05 x 1.1)	688	688	688	688	688
Power charges	3,000	3,000	3,000	3,000	3,000
Manpower charges	36,000	36,000	36,000	36,000	36,000
Depreciation	30,000	22,500	16,875	12,656	NIL
Earnings before taxes	25,949	33,449	39,074	43,293	55,949
<i>Less : Taxes</i>	9,082	11,707	13,616	15,152	19,582
Earnings after Taxes	16,867	21,742	25,398	28,141	36,367
<b>CFAT</b>					
Tax benefit on short-term Capital loss (Rs. 37,969 x 0.35)					13,289
Working capital recovery (x) PV factor (0.10)	0.909	0.826	0.751	0.683	0.621
Present Value	42,602	36,544	31,747	27,864	46,361
Total present value (t = 1-5)					1,85,118
<i>Less : Cash outflows</i>					1,45,000
<b>NPV</b>					40,118

### Question 37

Proposal X requires an initial capital outlay of Rs.2,00,000, with no salvage value, and will be depreciated on a straight line basis for tax purposes. The earnings before depreciation and taxes (EBDT) during its 5 year life are:

Year	1	2	3	4	5
	Rs.	Rs.	Rs.	Rs.	Rs.
EBDT	70,000	76,000	80,000	60,000	52,000

The corporate tax rate is 35 per cent and the company evaluates its capital budgeting projects at 12 per cent cost of capital. Advise the company whether the project should be accepted. (i) when there is no inflation and (ii) when there is inflation at the rate of 15 per annum, and the stated gross earnings are also expected to grow at this rate of inflation.

### Answer 37

#### Determination of NPV (when There is No Inflation)

(Amount in thousand rupees)

Year	EBDT	Depreciation (200 ÷ 5)	Taxable income (Col.2-3)	EAT (Col.4x0.65)	CFAT (Col.5 +3)	PV factor	Total PV
1	2	3	4	5	6	7	8
1	70	40	30	19.5	59.5	0.893	53.13
2	76	40	36	23.4	63.4	0.797	50.53
3	80	40	40	26.0	66.0	0.712	46.99
4	60	40	20	13.0	53.0	0.636	33.71
5	52	40	12	7.8	47.8	0.567	27.10
Gross present Value							211.46
Less : Cash outflows							200.00
Net present value							11.46

Since the net present value is positive, the project is worth accepting in a non-inflationary scenario.

In an inflationary situation, EBDT are expected to grow at 15 per cent. EBDT can be determined (reflecting 15 per cent compound rate of growth). As amount of depreciation remains unchanged, taxable profits as well as taxes would go up as exhibited below:

### Determination of CFAT in Inflationary Situation

*(Amount in thousand rupees)*

Year	EBDT	Compound factor at 0.15	Revised EBDT (Col.2x3)	Depreciation	Taxable income (Col.4-5)	EAT (Col.6x0.65)	CFAT (Col.7+5)
1	2	3	4	5	6	7	8
1	70	1.150	80.50	40	40.50	26.32	66.32
2	76	1.322	100.47	40	60.47	39.31	79.31
3	80	1.521	121.68	40	81.68	53.09	93.09
4	60	1.749	104.94	40	64.94	42.21	82.21
5	52	2.011	104.57	40	64.57	41.97	81.97

Since CFAT are inflated sums, they are to be deflated at the rate of inflation (15 per cent) to determine real cash flows. The relevant calculations are as follows:

### Determination of Real Cash Flows

*(Amount in thousand rupees)*

Year	CFAT	Discount / deflated factor at 0.15	Real cash inflows (CFAT) (Col. 2x3)
1	2	3	4
1	66.32	0.870	57.70
2	79.31	0.756	59.96
3	93.09	0.658	61.25
4	82.21	0.572	47.02
5	81.97	0.497	40.74

### NPV of Real CFAT

*(Amount in thousand rupees )*

Year	Real CFAT	PV factor at 12%	Total PV (Col. 3 x 4)
1	2	3	4
1	57.70	0.893	51.53
2	59.96	0.797	47.79
3	61.25	0.712	43.61
4	47.02	0.636	29.90
5	40.74	0.567	23.10
<i>Gross present value</i>			195.93
<i>Less : Cash outflows</i>			200.00
<i>Net present value</i>			(4.07)

*Recommendation* : NPV is Negative under inflation situations, the investment proposal is not acceptable.

### Question 38

*A Company is considering whether it should spend Rs.4 lacs on a project to manufacture and sell a new product. The unit variable cost of the product is Rs.6. It is expected that the new product can be sold at Rs.10 per unit. The annual fixed costs (only cash) will be Rs.20,000. The project will have a life of six years with a scrap value of Rs.20,000. The cost of capital of the company is 15%. The only uncertain factor is the volume of sales. To start with the company expects to sell at least 40,000 units during the first year.*

*You are required to find out:*

- (i) Net Present Value of the project based on the sales expected during the first year and on the assumption that it will continue at the same level during the remaining years.*
- (ii) The minimum volume of sales required to justify the project.*

### Answer 38

Units	40,000
Selling Price (1)	10
Variable cost (2)	6
Contribution (3)=(1-2)	4
Total contribution (1x3)	160,000
Less : Fixed Cost :	
Depreciation*	NA
Other fixed Cost	20,000
Cash inflow p.a.	140,000
Cumulative PV Factor @ 15%	3.784
Present Value of Inflow	529,760.00
Add : PV of scrap value at the end of 6th Year @ 15%	8,647
Total Inflow	538,407
Total Outflow	400,000.00
NPV	138,407.00
*Not Considered because there is no tax	

### Answer 38

(ii) Required NPV = zero, Present value of Cash inflow must be equal to Rs. 4,00,000.

<i>Particulars</i>	<i>Rs.</i>
Required Present Value of Inflow	4,00,000
Less: PV of scrap value at the end of 6th Year @ 15%	8,647

Further required Inflow	3,91,353
Cumulative PV Factor @ 15%	3.784
Cash flow per annual required $391,353/3.784$	103423
+ Fixed cost	20,000
Per annual contribution required	1,23,423
Contribution per unit	Rs.4
No. of unit (rounded off)	30,855

### Question 39

*Twinkle Ltd. is planning to have an access to a machine for a period of 5 years. The company can either have an access through the leasing arrangement or it can borrow money at 14% to buy the machine. The company is in 50% tax bracket.*

*In case of leasing, the company will be required to pay annual year-end lease rent of Rs.1,20,000 for 5 years. All maintenance, insurance and other costs are to be borne by the lessee.*

*In case of purchasing the machine (which costs Rs.3,43,300); the company would have to repay 14% five-year loan in 5 equal annual instalments; each instalment becoming due at the end of each year. Machine would be depreciated on a straight line basis, with no salvage value. Advise the company which option it should go for, assuming lease rents are paid at the end of the year.*

### Answer 39

#### Lease option

Lease rent	1,20,000
Tax-50%	60,000
After Tax cash flow	60,000
CPVF at 14%, 5 year	3.433
Outflow	2,05,985

#### Loan Option

Year (1)	Principal O/s (2)	Interest @ 14% (3)=(2) x 14%	Installment (4)	Principal repaid (5)=(4)-(3)	Balance O/s (6)=(2)-(5)
1	3,43,300	48,062	1,00,000	51,938	2,91,362
2	2,91,362	40,791	1,00,000	59,209	2,32,153
3	2,32,153	32,501	1,00,000	67,499	1,64,654
4	1,64,654	23,052	1,00,000	76,948	87,706
5	87,706	12,294 (bf)	1,00,000	87,706	Nil

Amount of installment  
 = 3,43,300/3.433 =1,00,000

Present value of Outflow

<i>Installment</i>	<i>Depreciation</i>	<i>Interest @ 14%</i>	<i>Total of Dep &amp; interest</i>	<i>Tax Benefit @ 50%</i>	<i>Outflow net of tax benefit</i>	<i>PVfactor @ 14%</i>	<i>Present value</i>
1,00,000	68,660	48,062	1,16,722	58,361	41,639	.877	36,517
1,00,000	68,660	40,791	1,09,451	54,726	45,274	.769	34,816
1,00,000	68,660	32,50	11,01,161	50,580	49,420	.675	33,358
1,00,000	68,660	23,052	91,712	45,856	54,144	.592	32,053
1,00,000	68,660	12,294 (bf)	80,954	40,477	59,523	.519	30,892
<b>Total</b>							<b>167,636</b>

Present value of outflow is as under:

Lease option      2,05,985

Buy option        167,636

Since present value of outflow is lower under buy option, hence it is better to buy machine.

#### **Question 40**

*The initial investment outlay for a capital investment project of Priyanka Ltd. consists of 100 lakh for plant and machinery and 40 lakh for working capital. Other details are summarised as follows :*

*Sales : 1 lakh units of output per year for years 1 to 5*

*Selling price : 120 per unit of output*

*Variable cost : 60 per unit of output*

*Fixed overheads*

*(excluding depreciation) : 15 lakh per year for years 1 to 5*

*Rate of depreciation on plant and machinery : 25% on written down value method*

*Salvage value of plant and machinery : Equal to the written down value at the end of year 5*

*Applicable tax rate : 40%*

*Time horizon : 5 years*

Post-tax cut-off rate : 12%.

You are required to —

- (i) Calculate the NPV and indicate the financial viability of the project.  
(ii) Determine the sensitivity of the project's NPV under each of the conditions –  
(a) decrease in selling price by 5%; and (b) increase in variable cost by 10%.

**Answer 40**

**Statement of Net Cash Flows**

(Rs. in lakhs)

Particulars	Year 1	Year 2	Year 3	Year 4	Year 5
Profit before depreciation and tax (See Working Note-1)	45.00	45.00	45.00	45.00	45.00
Less : Depreciation (See Working Note-2)	25.00	18.75	14.06	10.55	7.91
Profit before tax	20.00	26.25	30.94	34.45	37.09
Less : Tax (40%)	8.00	10.50	12.38	13.78	14.84
Profit after tax	12.00	15.75	18.56	20.67	22.25
Add : Depreciation	5.00	18.75	14.06	10.55	7.91
Recovery of Working Capital	–	–	–	–	40.00
Salvage Value	–	–	–	–	23.73
Net Cash Flow	37.00	34.50	32.62	31.22	93.89
PV factor at 12%	0.8929	0.7972	0.7118	0.6355	0.5674
PV of Net Cash Flow	33.04	27.50	23.22	19.84	53.27

*Calculation of Net Present Value*

(Rs. in lakhs)

Present Value of Net Cash flow (33.04 + 27.50 + 23.22 + 19.84 + 53.27)	156.87
Less : Initial investment Outlay-	
Plant & Machinery Rs. 100	
Working Capital Rs. 40	140.00
Net Present value (NPV)	16.87

As the NPV is 16.87 lakhs, the project is to be said financially viable.

*Working Notes:*

1. *Profit before depreciation and tax (Per year)* *(Amount in Rs.)*

<i>Particulars</i>	<i>Per unit (Rs.)</i>	<i>Total (1,00,000 units per year)</i>
Sales	120	120,00,000
Less : variable Cost	60	60,00,000
Contribution (S-VC)	60	60,00,000
Less : Fixed Cost (excluding depreciation)		15,00,000
Profit before depreciation and tax (Per year)		45,00,000

2. *Calculation of Depreciation* *(Rs. in Lakhs)*

<i>Particulars</i>	<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>	<i>Year 4</i>	<i>Year 5</i>
Opening Balance (Plant and machinery)	100.00	75.00	56.25	42.19	31.64
Less : Depreciation @ 25% on WDM	25.00	18.75	14.06	10.55	7.91
Closing Balance (Plant and machinery)	75.00	56.25	42.19	31.64	23.73

**Question 41**

*Surya Manufacturers is planning to start a new manufacturing process. Following are the estimated net cash flows and probabilities of the new manufacturing process :*

<i>Year</i>	<i>Net Cash Flows (Rs.)</i>		
	<i>P=0.2</i>	<i>P=0.6</i>	<i>P=0.2</i>
<i>0</i>	<i>(-) 2,00,000</i>	<i>(-) 2,00,000</i>	<i>(-) 2,00,000</i>
<i>1</i>	<i>40,000</i>	<i>60,000</i>	<i>80,000</i>
<i>2</i>	<i>40,000</i>	<i>60,000</i>	<i>80,000</i>
<i>3</i>	<i>40,000</i>	<i>60,000</i>	<i>80,000</i>
<i>4</i>	<i>40,000</i>	<i>60,000</i>	<i>80,000</i>
<i>5</i>	<i>40,000</i>	<i>60,000</i>	<i>80,000</i>
<i>5 (Salvage)</i>	<i>0</i>	<i>40,000</i>	<i>60,000</i>

*Surya Manufacturers cost of capital for an average risk project is 10%.*

*(a) The project has average risk. Find the project's NPV.*

- (b) Find the best case and worst case NPVs. What is the probability of occurrence of the worst case if the cash flows are perfectly dependent (perfectly positively correlated) over time and if they are independent over time ?
- (c) Assume that all the cash flows are perfectly positively correlated, that is, there are only three possible cash flow streams over time : (i) the worst case; (ii) the most likely or base case; and (iii) the best case with probabilities 0.2, 0.6 and 0.2 respectively. These cases are represented by each of the columns in the given table. Find the expected NPV, the standard deviation and co-efficient of variation.

**Answer 41**

(a) Table showing expected cash flows :

	0.2	0.6	0.2	
Year	(P x Cash Flow)	(P x Cash Flow)	(P x Cash Flow)	Expected Cash Flow
	Rs.	Rs.	Rs.	Rs.
	(A)	(B)	(C)	(A + B + C)
0	0.2 (-2,00,000)	0.6 (-2,00,000)	0.2 (-2,00,000)	= 2,00,000
1	0.2 (40,000)	0.6 ( 60,000)	0.2 (80,000)	= 60,000
2	0.2 (40,000)	0.6 (60,000)	0.2 (80,000)	= 60,000
3	0.2 (40,000)	0.6 (60,000)	0.2 (80,000)	= 60,000
4	0.2 (40,000)	0.6 (60,000)	0.2 (80,000)	= 60,000
5	0.2 (40,000)	0.6 (60,000)	0.2 (80,000)	= 60,000
5*	0.2 (0)	0.6 (40,000)	0.2 (60,000)	= 36000

NPV of expected Cash Flows at 10%

$$\begin{aligned}
 \text{NPV} &= -2,00,000 + \frac{60,000}{(1.10)^1} + \frac{60,000}{(1.10)^2} + \frac{60,000}{(1.10)^3} + \frac{60,000}{(1.10)^4} + \frac{96,000}{(1.10)^5} \\
 &= -2,00,000 + 60,000 \times .9091 + 60,000 \times 0.8264 + 60,000 \times \\
 &\quad 0.7513 + 60,000 \times 0.6830 + 96,000 \times .6209 \\
 &= -2,00,000 + 54,546 + 49,584 + 45,078 + 40,980 + 59,606 \\
 &= -2,00,000 + 2,49,794 \\
 &= \text{Rs. } 49,794
 \end{aligned}$$

(b) NPV of Worst Case at 10%

$$\begin{aligned}
 \text{NPV} &= -2,00,000 + \frac{40,000}{(1.10)^1} + \frac{40,000}{(1.10)^2} + \frac{40,000}{(1.10)^3} + \frac{40,000}{(1.10)^4} + \frac{40,000}{(1.10)^5} + \text{zero salvage value} \\
 &= -2,00,000 + 1,51,632 = -\text{Rs.} 48,368
 \end{aligned}$$

NPV of base Case at 10%

$$= -2,00,000 + \frac{60,000}{(1.10)^1} + \frac{60,000}{(1.10)^2} + \frac{60,000}{(1.10)^3} + \frac{60,000}{(1.10)^4} + \frac{60,000}{(1.10)^5} + \text{salvage value of } 40,000$$

$$= -\text{Rs.}2,00,000 + 2,27,448 + 24,836 = \text{Rs.}52,284$$

NPV of Best Case

$$= -2,00,000 + \frac{80,000}{(1.10)^1} + \frac{80,000}{(1.10)^2} + \frac{80,000}{(1.10)^3} + \frac{80,000}{(1.10)^4} + \frac{80,000}{(1.10)^5} + \text{salvage value of } 60,000 -$$

$$= -\text{Rs.}2,00,000 + 30,32,264 + 37,254 = \text{Rs.}1,40,158$$

If the cash flows are perfectly dependent, then the low cash flows in the first year will mean a low cash flows in every year. Thus the probability of the worst case occurring is the probability of getting Rs.40,000 net cash flow in year 1 or 20%.

If the cash flows are independent, the cash flows in each can be low, high or average and probability of getting all low cash flow will be :

$$0.2(0.2)(0.2)(0.2)(0.2) - 0.25 = .00032 \text{ or } 32\%$$

(c) The base case NPV is found using the most likely cash flows and is equal to Rs.52,284. This value differs from the expected NPV of Rs.49,800, because the year 5 cash flows are not symmetric. Under these conditions NPV distribution is as follows:

Case	P	NPV (Rs.)
Worst Case	0.2	- 48,368
Base Case	0.6	52,284
Best Case	0.2	1,40,518

$$\text{The expected NPV} = 0.2 (-48,368) + 0.6 (52,284) + 0.2 (1,40,518)$$

$$= -9,673.6 + 31,370.4 + 28,103.6$$

$$= 49,800.4 \text{ or } \text{Rs.}49,800$$

As is generally the case the expected NPV is the same as the NPV of the expected cash flows in part (a). The standard deviation is :

$$\sigma^2 \text{ NPV} = 0.2 (-48,368 - 49,800)^2 + 0.6 (52,284 - 49,800)^2$$

$$+ 0.2 (140,518 - 49,800)^2$$

$$\sigma^2 \text{ NPV} = 1927391244.8 + 3702153.6 + 1645951104.8$$

$$= 3577044503$$

$$\sigma \text{ NPV} = \sqrt{3577044503}$$

$$= 59808$$

$$\text{Co-efficient of variation} = 59808 / 49800 = 1.2$$

\*\*\*

# 3

## Capital Structure

### BASIC CONCEPTS AND FORMULAE

1. Capital Structure	<ul style="list-style-type: none"><li>• Capital structure can be defined as mix of various types of capital acquired by the firm to finance its operations and assets. Capital can be divided broadly as<ol style="list-style-type: none"><li>i) Debt capital</li><li>ii) Preference capital</li><li>iii) Equity capital and retained earnings</li></ol></li><li>• Capital structure decision is one of the key decisions that focuses on finding the capital structure with the objective of maximization of value of the firm</li></ul>
2. Operating Leverage	<ul style="list-style-type: none"><li>• operating leverage can be defined as company's ability to use fixed operating costs to magnify the effects of changes in sales on its earnings before interest and taxes (<i>EBIT</i>).</li><li>• Fixed operating costs are costs that the firm must pay in a given period regardless of the sales volume achieved during that period. Rent, insurance premium, salary of executives are some of the examples of fixed operating costs</li><li>• Degree of operating leverage: Degree of Operating Leverage (<i>DOL</i>) is a relationship between the % changes in <i>EBIT</i> with % change in sales. <math display="block">DOL = \text{Percentage change in } EBIT / \text{Percent change in Sales}</math></li><li>• Alternatively; The degree of operating leverage (<i>DOL</i>) at base sales level, <i>Q</i>, can be measured by following formula: <math display="block">DOL = \frac{Q \times (P - VC)}{Q \times (P - VC) - FC}</math><p>Where <i>Q</i> = sales in units <i>P</i> = sales price</p></li></ul>

	<p><math>VC</math> = variable cost per unit</p> <p><math>FC</math> = fixed operating cost</p> <p>Larger the Degree of Operating Leverage larger is the change in earnings. This makes earnings riskier too. It is a measure of business risk.</p>
3. Financial Leverage	<ul style="list-style-type: none"> <li>Financial leverage can be defined as the use of fixed charge sources of funds such as debt to magnify the effects of changes in earnings before interest and taxes (<math>EBIT</math>) on the earning per share (<math>EPS</math>).</li> <li>If the firm has no fixed financial charges, then any change in the levels of <math>EBIT</math> will be transferred to shareholders as it is. The change in the shareholders' wealth would be identical to that of the change in <math>EBIT</math>. In such a case, all the business risk is borne by the shareholders.</li> <li>Degree of Financial Leverage (<math>DFL</math>): It can be measured by following formula:  <math display="block">DFL = \text{Percentage change in } EPS / \text{Percent change in } EBIT</math> Whenever the percentage change in <math>EPS</math> resulting from a given percentage change in <math>EBIT</math> is greater than the percentage change in <math>EBIT</math>, financial leverage exists. This means that as long as the <math>DFL</math> is greater than 1, there is financial leverage.</li> <li>The degree of financial leverage (<math>DFL</math>) at base level of <math>EBIT</math> can be measured by following formula:  <math display="block">DFL = \frac{EBIT}{EBIT - I}</math> Where  <math>I</math> = interest expenses  <math>T</math> = tax rate</li> </ul>
4. Degree of Combined Leverage (DCL)	<p>It reflects the combined impact of operating and financial leverage on the firm. High operating leverage and high financial leverage will cause total leverage to be high. The opposite will also be true. The relationship between operating leverage and financial leverage is multiplicative rather than additive. The relationship between the degree of combined leverage (<math>DCL</math>) and the degrees operating leverage (<math>DOL</math>) and financial leverage (<math>DFL</math>) is given by :</p> $DCL = DOL \times DFL$
5. Net Income (NI) Approach	<p>NI approach assumes that capitalization of the firm is based on the net income derived by each supplier of capital discounted at fixed rates irrespective of levels of debt.</p>

	Net Income approach assumes that capitalisation rates are constant and increasing debt would reduce overall capitalization rate (WACC), and increase the value of the firm.
6. Net Operating Income (NOI) Approach	<p>Net operating income approach states that value of the firm is determined by the earning capacities of the assets and not by how are they acquired.</p> <p>Under net operating income approach the cost of equity rises and compensate the reduced cost of debt keeping the overall capitalisation rate constant.</p>
7. Optimal capital structure	<p>Optimal capital structure is that mix of debt and equity which maximizes the value of the firm or minimizes the cost of capital. In other words, optimal capital structure is that mix of debt and equity at which the weighted average cost of capital, <math>K</math>, is minimized and the value of the firm is maximized. Because the value of the firm, <math>V</math>, is defined by the following equation:</p> $V = \frac{NOPAT}{K}$ <p>Where</p> <p><math>NOPAT</math> = net operating profits after taxes, which is the after-tax operating earnings available to the debt and equity holders, <math>EBIT \times (1 - T)</math></p> <p><math>K</math> = weighted average cost of capital</p>
8. Modigliani and Miller approach	<p>According to Modigliani and Miller approach the value of a firm depends solely on its future earnings stream, and hence its value is unaffected by its debt/equity mix. The basic M&amp;M proposition is based on these assumptions:</p> <ul style="list-style-type: none"> <li>• No taxes</li> <li>• No transaction costs</li> <li>• No bankruptcy costs</li> <li>• Equivalence in borrowing costs for both companies and investors</li> <li>• Symmetry of market information, meaning companies and investors have the same information</li> <li>• No effect of debt on a company's earnings before interest and taxes</li> </ul>

**Without taxes:** Market value of the firm is independent of its capital structure and is given by capitalising its expected return at a rate appropriate to its class. Here, the value of unlevered firm is equal to the value of levered firm.

**Cost of capital, WACC =  $K_e (E/E+D) + K_d (D/E+D)$**

Where;  $K_e$ - cost of equity,  $K_d$ - cost of debt, E- value of equity, D- value of debt

However, in real world there are taxes, and other costs that significantly affect company's stock price. Therefore, cost of capital has to be calculated as under:

- **With taxes:** The market value of the levered firm would be greater than the value of unlevered firm by the amount of present value of tax shield of debt.

**Cost of capital, WACC =  $K_e (E/E+D) + K_d \{D(1-T)/(E+D)\}$**

Where;  $K_e$ - cost of equity,  $K_d$ - cost of debt, E- value of equity, D- value of debt, T- tax rate

**The value of unlevered firm,  $V_u = \frac{NOPAT}{K}$**

The value of levered firm,  $V_L = V_u + \text{Tax shield} = V_u + T \times D$

Where; T – Tax rate, D- the value of debt.

## Question 1

*How operating leverage and financial leverage are associated with income statements?*

### Answer

Leverage can be defined as influence of fixed costs over the operating cash flow or earnings of the firm. Here, fixed costs mean costs that do not rise and fall with changes in firm's sales. Firms have to pay these fixed costs whether business conditions are good or bad. These fixed costs may be operating costs, such as the cost incurred on purchasing and operating plant and equipment, or they may be financial cost such as the fixed costs of paying debt charges.

These leverages are associated with income statement. This associations are shown in the table below.

S.N.	Income Statement	
1	Sales revenue	Operating leverage
2	<i>Less</i> : Cost of goods sold	
3	Gross profits	
4	<i>Less</i> : Operating expenses	
5	Earnings before interest and taxes ( <i>EBIT</i> )	
6	<i>Less</i> : Interest	Financial leverage
7	Net profit before tax	
8	Less: Taxes	
9	Net profit	
10	<i>Less</i> : dividend for preference share holders	
11	Profit for equity holders	
12	Earnings per share ( <i>EPS</i> )	

As can be seen from the table above, the operating leverage is concerned with the relationship between the firm's sales revenue and its *EBIT*. When cost of operations is fixed high, small changes in revenue will lead to large change in *EBIT*.

Financial leverage is concerned with the relationship between the firm's *EBIT* and its earnings per share (*EPS*). When the debt portion in the capital structure is high (that is, when the firm has high financial leverage), small changes in *EBIT* result larger changes in *EPS*. And total leverage is the combined effect of operating and financial leverage. It is concerned with the relationship between the firm's sales revenue and its *EPS*.

### Question 2

*What is the general relationship among operating leverage, financial leverage, and the combined leverage of the firm? Do these types of leverage complement one another? Why or why not?*

### Answer

Combined leverage reflects the combined impact of operating and financial leverage on the firm. High operating leverage and high financial leverage will cause combined leverage to be high. The opposite will also be true. The relationship between operating leverage and financial leverage is multiplicative rather than additive. The relationship between the

degree of combined leverage (*DCL*) and the degrees of operating leverage (*DOL*) and financial leverage (*DFL*) is given by Equation (1):

$$DCL = DOL \times DFL \quad \text{..... (1)}$$

These types of leverages complement each other. *DCL* helps in striking a balance between operating leverage and financial leverage. A firm normally assumes a particular pre-defined level of risk in its business. If the same firm decides to undertake riskier projects, the risk of the firm as single entity will increase due to an increase in *DOL*. In order to keep the total risk at the same level, the firm can tilt its financial leverage more in favor of equity when financing a new venture. In this way, firm can play with *DOL* and *DFL* in favor of equity holders.

### Question 3

*A higher financial leverage is better than higher operating leverage. Comment.*

#### Answer

Operating leverage indicates the proportion of fixed operating charges. Higher operating leverage indicates higher quantum of fixed operating charges. If a business firm has a lot of fixed costs as compared to variable costs, then the firm is said to have high operating leverage.

The financial leverage indicates the proportion of fixed financial charges, in the form of interest cost. Higher financial leverage indicates higher quantum of fixed financial charges.

The company can differ or somewhat convince the financial institution and banks, to accept the delay in payment, which cannot be possible in the case of provider of operating activities. Hence we can say that higher financial leverage is better than higher operating leverage.

### Question 4

*How do the cost of debt, the Cost of Equity, and the Weighted Average Cost of Capital (WACC) behave as the firm's financial leverage increases from zero? Where is the optimal capital structure? What is its relationship to the firm's value at that point?*

#### Answer

Broadly, cost of capital can be classified as under:

- i) Cost of debt,
- ii) Cost of equity, and
- iii) Weighted average cost of capital.

These costs are the function of financial leverage measured by the debt ratio (debt to total assets). The cost of debt,  $K_d$ , remains low because of the tax shield, but it slowly increases as leverage increases, to compensate lenders for increasing risk. The cost of equity,  $K_e$  is above the cost of debt. It increases as financial leverage increases, but it generally increases more rapidly than the cost of debt. The cost of equity rises because the shareholders require a higher return as leverage increases, to compensate for the higher degree of financial risk.

The weighted average cost of capital,  $K$ , results from a weighted average of the firm's debt and equity capital costs. At a debt ratio of zero, the firm is 100 percent equity financed. As debt is substituted for equity and as the debt ratio increases, the  $K$  declines because the after-tax debt cost is less than the equity cost ( $K_d < K_e$ ).

In this range, the tax benefits of additional debt outweigh the costs of borrowing more. However, as the debt ratio continues to increase, the increased debt and equity costs eventually cause the  $K$  to rise.

In other words, the bankruptcy costs, agency costs, and other costs associated with higher debt levels eventually outweigh the additional tax benefits that the firm could generate by borrowing even more.

Optimal capital structure is that at which the weighted average cost of capital,  $K$ , is minimized and the value of the firm is maximized. Because the value of the firm,  $V$ , is defined by the following equation:

$$V = \frac{NOPAT}{K} \quad \dots (1)$$

Where

$NOPAT$  = net operating profits after taxes, which is the after-tax operating earnings available to the debt and equity holders,  $EBIT \times (1 - T)$

$K$  = weighted average cost of capital

So clearly, the value of the firm is **maximized at optimal capital structure.**

### Question 5

*What are business risk and financial risk? How does each of them influence the firm's capital structure decisions?*

### Answer

#### Business Risk

Business risk is inherent in any company's operations. If a firm is unable to cover its operating costs, it is exposed to business risk. In general, the greater the firm's operating leverage- the use of fixed operating costs-the higher its business risk. Although operating leverage is an important factor affecting business risk, two other factors also affect it.

- i) revenue stability and
- ii) cost stability

Revenue stability reflects the relative variability of the firm's sales revenues. Firms with stable levels of demand and product prices tend to have stable revenues. The result is low levels of business risk. Firms with highly volatile product demand and prices have unstable revenues that result in high levels of business risk. Cost stability reflects the relative predictability of input prices such as those for labour and materials. The more predictable

and stable these input prices are, the lower the business risk; the less predictable and stable they are, the higher the business risk.

Business risk varies among firms, regardless of their lines of business, and is not affected by capital structure decisions. The higher a firm's business risk, the more cautious the firm must be in establishing its capital structure. Firms with high business risk therefore tend toward less highly leveraged capital structures, and firm with low business risk tend toward more highly leveraged capital structures.

### **Financial Risk**

If a firm is unable to cover its required financial obligations, it is exposed to financial risk. In general, the greater the firm's financial leverage- the use of fixed charge source of funds - the higher its financial risk.

The firm's capital structure directly affects its financial risk which is the risk to the firm of being unable to cover required financial obligations. The penalty for not meeting financial obligations is bankruptcy. The more fixed cost financing-debt (including financial leases) and preferred stock firm has in its capital structure, the greater its financial leverage and risk. Financial risk depends on the capital structure decision made by the management and, that decision is affected by the business risk the firm faces.

### **Question 6**

*"A firm's stock price is not related to its mix of debt and equity financing." Do you agree with the statement? Give reasons.*

### **Answer**

According to theory of modern financial management by Modigliani and Miller, the value of a firm depends solely on its future earnings stream, and hence its value is unaffected by its debt/equity mix. They concluded that a firm's value stems from its assets, regardless of how those assets are financed.

MM Hypothesis was based on restrictive set of assumptions, including perfect capital markets (which implies zero taxes). They used an arbitrage proof to demonstrate that capital structure is irrelevant. If debt financing resulted in a higher value for the firm than equity financing, then investors who owned shares in a leveraged (debt-financed) firm could increase their income by selling those shares and using the proceeds, plus borrowed funds, to buy shares in an unleveraged (all equity-financed) firm. The simultaneous selling of shares in the leveraged firm and buying of shares in the unleveraged firm would drive the prices of the stocks to the point where the values of the two firms would be identical. Thus, according to MM Hypothesis, a firm's stock price is not related to its mix of debt and equity financing.

However, according to according to Net income approach given by Durand, the capital structure decision is relevant to the valuation of the firm. As such a change in the capital structure causes an overall change in the cost of capital and also in the total value of the firm. A higher debt content in the capital structure means a high financial leverage and this result in decline in the overall or weighted average cost of capital. This results in increase in the value of the firm and also increase in the value of the equity shares. In an opposite

situation, the reverse condition prevails. Assumptions of this approach are: 1. Corporate taxes do not exist 2. Debt content does not change the risk perception of the investors. 3. Cost of debt is less than cost of equity i.e., debt capitalization rate is less than the equity capitalization rate.

### Question 7

*Gem Ltd. has fixed operating costs of Rs. 12,500 and variable operating costs of Rs. 15 per unit and sells its paintings for Rs 25 each. At what level of unit sales will the company break even in terms of EBIT?*

### Answer

Break even analysis is used to indicate the level of operations necessary to cover all costs and to evaluate the profitability associate with various levels of sales. The firm's operating breakeven point is the level of sales necessary to cover all cost and at this point the earnings before interest and taxes (*EBIT*) become zero.

The operating breakeven point (*BEP*) in can be calculated using following formula:

$$BEP \text{ (units)} = \frac{FC}{(SP - VC)} \quad \dots (1)$$

Where:

*FC* = total fixed cost, which is Rs 12,500

*SP* = selling price per unit, which is Rs 25

*VC* = variable cost per unit, which is Rs 15

Putting the value of *FC*, *SP* and *VC* in Equation (1), we get:

$$BEP(\text{units}) = \frac{12,500}{(25 - 15)}$$

$$= 1250 \text{ units}$$

### Question 8

*Contact has sales of 15,000 units at a price of Rs 20 per unit. The firm incurs fixed operating costs of Rs 30,000 and variable operating costs of Rs 12 per unit. What is Intec's degree of operating leverage (DOL) at a base level of sales of 15,000 units? What is your interpretation of DOL?*

### Answer

The degree operating leverage (DOL) provides the sensitivity of the EBIT with respect to change in sales. Higher the operating leverage greater is the proportion of fixed cost.

The degree of operating leverage (*DOL*) at base sales level, *Q*, can be measured by following formula:

$$DOL = \frac{Q \times (P - VC)}{Q \times (P - VC) - FC} \quad \dots (1)$$

Where

$Q$  = sales in units

$P$  = sales price

$VC$  = variable cost per unit

$FC$  = fixed operating cost

Substituting  $Q = 15,000$  units,  $P = \text{Rs } 20$ ,  $FC = \text{Rs } 30,000$ ,  $VC = \text{Rs } 16$  in Equation (1), we get

$$\text{DOL} = \frac{15,000(20-12)}{15,000(20-12) - 30,000}$$

$$= \frac{120,000}{90,000}$$

$$= 1.33$$

**Interpretations:** DOL of 1.33 indicate that the EBIT is more sensitive with respect to change in sales. If sales increase by 10% then the EBIT will increases by 13.3%. Similarly, if sales decrease by 10% then the EBIT will also decreases by 13.3%.

### Question 9

*The following data is available for XYZ Industries:*

	Rs.
<i>Sales</i>	<i>2,00,000</i>
<i>Variable cost @ Rs. 30</i>	<i>60,000</i>
<i>Contribution</i>	<i>1,40,000</i>
<i>Fixed cost</i>	<i>1,00,000</i>
<i>EBIT</i>	<i>40,000</i>
<i>Interest</i>	<i>5,000</i>
<i>Profit before tax</i>	<i>35,000</i>

*Find out:*

- (i) Using the concept of financial leverage, by what percentage will the taxable income increase if EBIT increases by 6%.*
- (ii) Using the concept of operating leverage, by what percentage will EBIT increase if there is 10% increase in sales.*

### Answer

$$\begin{aligned} \text{Degree of Operating Leverage (DOL)} &= \text{Contribution/EBIT} \\ &= 1,40,000 / 40,000 \\ &= 3.50 \end{aligned}$$

$$\begin{aligned} \text{Degree of Financial leverage (DFL)} &= \text{EBIT} / \text{PBT} \\ &= 40,000 / 35,000 \\ &= 1.1429 \end{aligned}$$

- (i) If EBIT increases by 6%, the taxable income would increase by  
 $6 \times 1.1429 = 6.86\%$
- (ii) If sales increase by 10%, the EBIT would increase by  
 $10 \times 3.5 = 35\%$

### Question 10

*Sutanu Enterprises has fixed operating costs of Rs. 380,000, variable operating costs of Rs. 16 per unit, and a selling price of Rs. 63.50 per unit.*

- Calculate the firm's EBIT at 9,000, 10,000, and 11,000 units, respectively.*
- With 10,000 units as a base, what is the percentage changes in units sold and EBIT as sales move from the base to the other sales levels used in part a?*
- Use the percentages computed in part b to determine the degree of operating leverage (DOL).*
- Use the formula for degree of operating leverage to determine the DOL at 10,000 units.*

### Answer

- a) The earnings before interest and taxes (*EBIT*) can be calculated as under:

$$EBIT = \text{Sales} - FC - TVC \quad \dots (1)$$

Where

*Sales* = sales revenue which is the product of sales price per unit (Rs 63.5) and sales volume.

*FC* = total fixed operating cost which is Rs 380,000

*TVC* = total variable cost which is the product of variable cost per unit (Rs 16) and sales volume.

Now, at different level of sales volume, we can calculate EBIT. The EBIT at different level of sales volume is shown in the table below.

	<i>Volume at base level</i>	<i>New Volume</i>	<i>New Volume</i>
Sales volume (Units)	10,000	9,000	11,000
Sales price (Rs )	63.5	63.5	63.5
Sales Revenue (Volume *Sales price)(Rs)	635,000	571,500	698,500

FC (Rs)	380,000	380,000	380,000
Variable cost per unit (Rs)	16	16	16
TVC (Rs)	160,000	144,000	176,000
<i>EBIT (Sales Revenue - FC - TVC) (Rs)</i>	95,000	47,500	142,500

- b) The percentage change in sales and the EBIT from the 10,000 unit base level to 9,000 units and 11,000 units can be shown in the table given below.

	<i>Volume at base level</i>	<i>New Volume</i>	<i>New Volume</i>	<i>% change (volume changes from 10,000 units to 9,000 units)</i>	<i>% change (volume changes from 10,000 units to 11,000 units)</i>
Sales volume (Units)	10,000	9,000	11,000	-10	10
Sales Revenue (Rs)	635,000	571,500	698,500	-10	10
<i>EBIT (Rs)</i>	95,000	47,500	142,500	-50	50

- c) Operating leverage can be defined as the use of fixed operating costs to magnify the effects of changes in sales on the firm's earnings before interest and taxes (*EBIT*).

The degree of operating leverage (*DOL*) can be measured by following formula:

$$DOL = \text{Percentage change in } EBIT / \text{Percent change in Sales}$$

Now, from the table in part b, we can use the figure to calculate *DOL* as follows:

$$DOL = \frac{50\%}{10\%}$$

$$= 5$$

- d) The degree of operating leverage (*DOL*) at base sales level, *Q*, can be measured by following formula:

$$DOL = \frac{Q \times (P - VC)}{Q \times (P - VC) - FC} \quad \dots\dots (2)$$

Where

*Q* = sales in units

*P* = sales price

$VC$  = variable cost per unit

$FC$  = fixed operating cost

Substituting  $Q = 10,000$  units,  $P = \text{Rs } 63.50$ ,  $FC = \text{Rs } 380,000$ ,  $VC = \text{Rs } 16$  in Equation (2), we get

$$\begin{aligned} \text{DOL} &= \frac{10,000(63.50 - 16)}{10,000(63.50 - 16) - 380,000} \\ &= \frac{475,000}{95,000} \\ &= 5 \end{aligned}$$

**Interpretations:** This means that the percentage change in *EBIT* is five times higher resulting from a given percentage change in sales.

### Question 11

*XYZ Ltd. has following cost and revenue structure:*

*Installed capacity, 4,000 units*

*Actual production and sales- 75 per cent of the capacity*

*Selling price- Rs 30 per unit*

*Variable cost- Rs 15 per unit*

*Fixed cost:*

*Case-1 Rs 15,000*

*Case-2 Rs 20,000*

*You are required to:*

- a) Calculate the degree of operating leverage (DOL) from the data under case-1 and 2.*
- b) Which case should be chosen if the sales are expected to fall from its current level in future?*

### Answer

- a) Operating leverage provides the sensitivity of the *EBIT* with respect to change in sales.

Higher the operating leverage greater is the proportion of fixed cost. The operating leverage can be calculated as under:

<i>Particulars</i>	<i>Case</i>	
	<i>1</i>	<i>2</i>
Sales (0.75*4000*30) (Rs)	90000	90000
Less variable cost (Rs)	(45000)	(45000)
Contribution (Rs)	45000	45000
Less fixed cost (Rs)	(15000)	(20000)
EBIT (Rs)	30000	25000
Operating leverage= (Contribution/EBIT)	1.5	1.8

- b) Case-2 is more sensitive to changing level of sales and is therefore more risky. In good times it would outperform, but in bad times it would be worse. Since the expected sales are going to fall from its current level, therefore, case-1 should be considered. Under case-1, the expected fall in EBIT would be less as compared to case-2.

### Question 12

*AB Ltd. is planning to manufacture product A with a capacity of 1200 lakh units. The project cost is estimated to be Rs 100 crore. There are three technologies X, Y and Z available to them from three different plant manufacturers that offer similar quality but with different degrees of automation. While the overall cost of manufacture remains same for all the technologies the composition of cost is different and is as follows:*

<i>Technology</i>	<i>X</i>	<i>Y</i>	<i>Z</i>
<i>Variable cost (Rs/unit)</i>	<i>10</i>	<i>9</i>	<i>8</i>
<i>Fixed cost (Rs lakh)</i>	<i>1000</i>	<i>2000</i>	<i>3000</i>

*The selling price estimated by the management is Rs 15 per unit while projecting a sales of 10 crore units annually. Being a new project the management also believes that the sales may face a decline by as much as 50%. Do you think that selection of technology would have a role to play in mitigating the risk of losing sales? What would you do in the circumstances?*

## Answer

Selection of technology is dependent upon the ability of management to assume the amount of risk.

(Rs. in crore)

<i>Particulars</i>	<i>Project</i>		
	<i>X</i>	<i>Y</i>	<i>Z</i>
Sales (10Cr.*Rs 15)	150	150	150
Less variable cost	100	90	80
Contribution	50	60	70
Less fixed cost	10	20	30
EBIT	40	40	40
DOL = (Contribution/EBIT)	1.25	1.5	1.75
% change in EBIT with 50% decline in sales	-62.5	-75	-87.5

For the same level of profit the management must consider the technology that has least variability of operating profit with changing level of sales. It must opt for Technology X since it has least degree of operating leverage. A 50% decline in sales would result in 62.5% decline in profit. The revised levels of operating profit for the three technologies are worked out below:

(Rs. in crore)

<i>Particulars</i>	<i>Project</i>		
	<i>X</i>	<i>Y</i>	<i>Z</i>
Sales (5Cr.*Rs 15)	75	75	75
Less variable cost	50	45	40
Contribution	25	30	35
Less fixed cost	10	20	30
EBIT	15	10	5

### Question 13

*Amteck Industries has Rs 60,000 of 16% (annual interest) bonds outstanding, 1,500 shares of preferred stock paying an annual dividend of Rs 5 per share, and 4,000 shares of common stock outstanding. If the corporate tax rate is 30%, compute earnings per share (EPS) at EBIT of Rs 24,600.*

### Answer

Earnings per share (EPS) is the earnings available to common share holders. EPS is calculated as under:

$$\text{EPS} = \frac{[(\text{EBIT} - \text{Interest})(1 - T) - \text{PD}]}{N} \quad \dots (1)$$

Where :

EBIT = Earnings before interest and taxes which is Rs 24,600

Interest = amount paid to debt holders which is Rs 9,600 (Rs 60,000\*0.16)

T = tax rate which is 0.30

PD = preference dividend paid to preference stock holders which is Rs 7,500 (1,500\*Rs. 5)

N = number of common shares outstanding which is 4,000

Now, putting the value of EBIT, Interest, T, PD and N in Equation (1) we get,

$$\begin{aligned} \text{EPS} &= \frac{[(24,600 - 9,600)(1 - 0.3) - 7,500]}{4,000} \\ &= \frac{[(15,000)(0.7) - 7,500]}{4,000} \\ &= \frac{3,000}{4,000} \\ &= 0.75 \end{aligned}$$

### Question 14

*Kalpesh Inc. has EBIT of Rs 30,000, interest expense of Rs 4,000, and preferred dividends of Rs 4,000. If it pays taxes at a rate of 30%, what is Kalpesh Inc's degree of financial leverage (DFL) at a base level of EBIT of Rs 30,000? How do you interpret the level of DFL for Kalpesh Inc. ?*

### Answer

Financial leverage can be defined as the use of fixed charge sources of funds such as debt to magnify the effects of changes in earnings before interest and taxes (EBIT) on the earning

per share (*EPS*). The degree of financial leverage (*DFL*) at base level of EBIT (Rs 30,000) can be measured by following formula:

$$DFL = \frac{EBIT}{EBIT - I - (PD \times \frac{1}{1 - T})} \quad \dots (1)$$

Where

*I* = interest expenses

*PD* = preference dividend

*T* = tax rate

Substituting EBIT = Rs. 30,000, *I* = Rs. 4,000, *PD* = Rs. 4,000 and *T* = 0.30 in Equation (1), we get *DFL* at base level of *EBIT* of Rs 30,000 as under:

$$DFL = \frac{30,000}{30,000 - 4,000 - (4,000 \times 1.428)}$$

$$= 1.48$$

**Interpretations:** *DFL* of 1.48 indicate that the *EPS* is more sensitive with respect to change in *EBIT*. If *EBIT* increase by 10% then the *EPS* will increase by 14.8%. Similarly, if *EBIT* decrease by 10% then the *EPS* will also decrease by 14.8%.

### Question 15

*Ram Swaroop Ltd.* has a current capital structure consisting of Rs 250,000 of 16% (annual interest) debt and 2,000 shares of common stock. The firm pays taxes at the rate of 30%.

- i) Using *EBIT* values of Rs 80,000 and Rs 120,000, determine the associated earnings per share (*EPS*).
- ii) Using Rs 80,000 of *EBIT* as a base, calculate the degree of financial leverage (*DFL*).

### Answer

- i) Following table shows the calculation of *EPS* at various level of *EBIT*

EBIT	80,000	120,000
Less : Interest (Rs 250,000*0.16)	40,000	40,000
Profit before tax ( <i>EBIT</i> - Interest)	40,000	80,000
Less : Taxes ( <i>T</i> = 0.3)	12,000	24,000
Profit after taxes ( <i>EBIT</i> - Interest)(1- <i>T</i> )	28,000	56,000

Less: Preference Dividend (PD)	0	0
N (Number of common shares outstanding)	2,000	2,000
Profit for equity holders (EBIT - Interest)(1-T) - PD	28,000	56,000
EPS	14	28

- ii) The degree of financial leverage (*DFL*) at base level of EBIT (Rs 80,000) can be measured by following formula:

$$DFL = \frac{EBIT}{EBIT - I} \quad \dots (1)$$

Where

*I* = interest expenses

Substituting EBIT = Rs 80,000, *I* = Rs 40,000 in Equation (1), we get *DFL* at base level of *EBIT* of Rs 80,000 as under:

$$DFL = \frac{80,000}{80,000 - 40,000}$$

$$= 2$$

### Question 16

Calculate the financial leverage from the following data under case-1 and 2 and financial plan A and B.

Installed capacity, 5,000 units

Actual production and sales, 80 per cent of the capacity

Selling price, Rs 40 per unit

Variable cost, Rs 20 per unit

Fixed cost:

Case-1 Rs 20,000

Case-2 Rs 30,000

Capital structure:

Particulars	Financial plan	
	A	B
Debt @ 20%	20000	10000
Equity	20000	30000

## Answer

Financial leverage can be defined as the use of fixed charge sources of funds such as debt to magnify the effects of changes in earnings before interest and taxes (*EBIT*) on the earning per share (*EPS*). The financial leverage can be calculated as under:

	<i>Case-1</i>		<i>Case-2</i>	
<i>Particulars</i>	<i>Plan A</i>	<i>Plan B</i>	<i>Plan A</i>	<i>Plan B</i>
Sales (0.80*5000*40) (Rs)	160000	160000	160000	160000
Less variable cost (Rs)	80000	80000	80000	80000
Contribution (Rs)	80000	80000	80000	80000
Less fixed cost (Rs)	20000	20000	30000	30000
EBIT (Rs)	60000	60000	50000	50000
Less Interest on Debt	4000	2000	4000	2000
EBT	56000	58000	46000	48000
Financial leverage = EBIT/EBT	1.07	1.03	1.09	1.04

DFL implies that with 1% change in EBIT level the EPS would change by 1.07% in Plan A under Case-1 and 1.03% in plan B under case-1.

## Question 17

*Simplex Ltd. has following cost, revenue and capital structure:*

*Installed capacity, 8,000 units*

*Actual production and sales, 50 per cent of the capacity*

*Selling price, Rs 30 per unit*

*Variable cost, Rs 15 per unit*

*Fixed cost:*

*Case-1 Rs 30,000*

*Case-2 Rs 50,000*

*Capital structure:*

<i>Particulars</i>	<i>Financial plan</i>	
	<i>A</i>	<i>B</i>
<i>Debt @ 20%</i>	<i>10000</i>	<i>5000</i>
<i>Equity</i>	<i>10000</i>	<i>15000</i>

Find out the followings:

- i) Degree of operating leverage (DOL)
- ii) Degree of financial leverage (DFL)
- iii) Degree of combined leverage (DCL)

**Answer**

i) The operating leverage can be calculated as under:

Particulars	Case	
	1	2
Sales (0.50*8000*30) (Rs)	120000	120000
Less variable cost (0.50*8000*15) (Rs)	60000	60000
Contribution (Rs)	60000	60000
Less fixed cost (Rs)	30000	50000
EBIT (Rs)	20000	10000
Operating leverage= (Contribution/EBIT)	3	6

ii) The financial leverage can be calculated as follows:

Particulars	Case-1		Case-2	
	Plan A	Plan B	Plan A	Plan B
EBIT (Rs)	20000	20000	10000	10000
Less Interest on Debt (Rs.)	2000	1000	2000	1000
EBT (Rs.)	18000	19000	8000	9000
Financial leverage = EBIT/EBT	1.11	1.05	1.25	1.11

iii) The degree of combined leverage (DCL) can be calculated as follows:

$$DCL = DOL \times DFL$$

	Financial plan	
	A	B
<b>Case-1</b>	3 x 1.1 = 3.3	3 x 1.05 = 3.15
<b>Case-2</b>	6 x 1.25 = 7.5	6 x 1.11 = 6.66

### Question 18

Firm A has sales of 200,000 units at Rs. 2.00 per unit, variable operating costs of Rs. 1.70 per unit, and fixed operating costs of Rs. 6,000. Interest is Rs. 10,000 per year. Firm B has sales of 200,000 units at Rs. 2.50 per unit, variable operating costs of Rs 1.00 per unit, and fixed operating costs of Rs 62,500. Interest is Rs. 10,000 per year. Assume that both firms are in the 40% tax bracket.

- i) Compute the degree of operating, financial, and combined leverage for firm A.
- ii) Compute the degree of operating, financial, and combined leverage for firm B.
- iii) Compare the relative risks of the two firms.

### Answer

- i) The degree of operating leverage (*DOL*) of firm A at base sales level, *Q*, can be measured by following formula:

$$DOL = \frac{Q \times (P - VC)}{Q \times (P - VC) - FC} \quad \dots (1)$$

Where

*Q* = sales in units

*P* = sales price

*VC* = variable cost per unit

*FC* = fixed operating cost

Substituting *Q* = 200,000 units, *P* = Rs 2, *FC* = Rs 6,000, *VC* = Rs 1.7 in Equation (1), we get *DOL* of Firm A at 200,000 units.

$$\begin{aligned} DOL &= \frac{200,000(2 - 1.7)}{200,000(2 - 1.7) - 6,000} \\ &= \frac{60,000}{54,000} \\ &= 1.11 \end{aligned}$$

The degree of financial leverage (*DFL*) at base level of EBIT can be measured by following formula:

$$DFL = \frac{EBIT}{EBIT - I - (PD \times \frac{1}{1 - T})} \quad \dots (2)$$

Where

*I* = interest expenses

*PD* = preference dividend

*T* = tax rate

Now, first we have to calculate *EBIT*. The *EBIT* can be calculated as under:

$$EBIT = Sales - FC - TVC \quad \dots (3)$$

Where

$$Sales = 2 * 200,000 = \text{Rs } 400,000.$$

$$FC = \text{total fixed operating cost which is Rs } 6,000$$

$$TVC = 200,000 * 1.7 = 340,000$$

Putting the figure of Sales, *FC* and *TVC* in Equation (3) we get,

$$EBIT = 400,000 - 6,000 - 340,000$$

$$= \text{Rs. } \mathbf{54,000}$$

Now, substituting *EBIT* = Rs 54,000, *I* = Rs 10,000 *PD* = Rs 0 and *T* = 0.40 in Equation (2), we get *DFL* at base level of *EBIT* of Rs 24,000 as under:

$$DFL = \frac{54,000}{54,000 - 10,000 - (0)}$$

$$= \mathbf{1.23}$$

*DCL* can be calculated as under:

$$DCL = DOL \times DFL \quad \dots (4)$$

$$= 1.11 \times 1.23$$

$$= 1.36$$

ii) Similarly, we can calculate *DOL*, *DFL* and *DTL* of firm B.

Now, substituting *Q* = 200,000 units, *P* = Rs. 2.5, *FC* = Rs. 62,500, *VC* = Rs. 1 in Equation (1), we get *DOL* of firm B at 200,000 units.

$$DOL = \frac{200,000(2.5 - 1)}{200,000(2.5 - 1) - 62,500}$$

$$= \frac{300,000}{237,500}$$

$$= \mathbf{1.26}$$

The degree of financial leverage (*DFL*) at base level of *EBIT* can be measured by Equation (2).

But, first we have to calculate *EBIT*. The *EBIT* can be calculated using Equation (3).

Where

$$Sales = \text{Rs. } 500,000.$$

$$FC = \text{Rs. } 62,500$$

$$TVC = \text{Rs. } 200,000$$

Putting the figure of Sales, *FC* and *TVC* in Equation (3) we get,

$$EBIT = 500,000 - 62,500 - 200,000$$

$$= \text{Rs. } 237,500$$

Now, substituting  $EBIT = \text{Rs } 237,500$ ,  $I = \text{Rs } 10,000$ ,  $PD = \text{Rs } 0$  and  $T = 0.40$  in Equation (2), we get *DFL* at base level of *EBIT* of Rs 87,500 as under:

$$DFL = \frac{237,500}{237,500 - 10,000 - (0)}$$

$$= 1.04$$

*DCL* can be calculated using Equation (4) as under:

$$DCL = DOL \times DFL$$

$$= 1.26 \times 1.04$$

$$= 1.31$$

iii) *DOL*, *DFL*, and *DCL* of firm A and firm B can be summarized as follows:

Firms	DOL	DFL	DCL
Firm-A	1.11	1.23	1.36
Firm-B	1.26	1.04	1.31

So, it can be concluded that the firm A is having higher financial risk and firm B is having a higher operating risk. But, when it comes to total risk, both the firms have almost identical total risk.

### Question 19

*The capital structure of Safe Hands Ltd consists of an ordinary share capital of Rs 100000 (Rs 10 par value) and Rs 10,00,000 of 10% debentures. The unit sales increased by 30 per cent from 1,00,000 units to 1,30,000 units. The selling price of the product is Rs 10 per unit, and the variable costs is Rs 6 per unit. The fixed expenses amount to Rs 2,00,000. If the corporate tax rate is 35 per cent, find out the following:*

- (i) *The percentage increase in earnings per share.*
- (ii) *The degree of financial leverage (DFL) at 1,00,000 units and 1,30,000 units.*
- (iii) *The degree of operating leverage (DOL) at 1,00,000 units and 1,30,000 units.*
- (iv) *Comment on the behavior of operating and financial leverage in relation to increase of production from 1,00,000 to 1,30,000 units.*

## Answer

The following table shows the calculation:

<i>Particulars</i>	<i>Case-1</i>	
Sales (units) Q	<b>100000</b>	<b>130000</b>
Sales (Q*10) (Rs)	1000000	1300000
Less variable cost (Q*6)(Rs)	(600000)	(780000)
Contribution	400000	520000
Less fixed cost (Rs)	(200000)	(200000)
EBIT (Rs)	200000	320000
Less Interest on Debt	(100000)	(100000)
EBT	100000	220000
Less tax @ 35%	(35000.00)	(77000.00)
PAT	65000.00	143000.00
Number of equity shares (N)	10000	10000
EPS = PAT/N	6.5	14.3

- i) Percentage increase in EPS =  $14.3 - 6.5 / 6.5 = 1.2 = 120\%$
- ii) DFL (at 1,00,000 units) =  $EBIT/EBT = Rs\ 2,00,000/Rs\ 100000 = 2$   
DFL (at 130,000 units) =  $EBIT/EBT = Rs\ 320000/Rs\ 220000 = 1.45$
- iii) DOL (at 1,00,000 units) =  $Contribution/EBIT = Rs\ 400000/Rs\ 200000 = 2$   
DOL (at 130,000 units) =  $Contribution/EBIT = Rs\ 520000/Rs\ 320000 = 1.62$
- iv) When production increased from 1,00,000 units to 1,30,000 units, the EPS also increased by 120 per cent. Moreover, there has also been a decrease in both types of leverages. This indicates that the total risk of the company has declined with the increase in sales.

## Question 20

*Sales and earnings before interest and taxes (EBIT) for Ramswaroop Co. Ltd. during 2014 were Rs. 17,50,000 and Rs. 4,50,000 respectively. During 2013, interest expenses were Rs. 4,000 and preference dividends were Rs. 10,000. These fixed charges are expected to*

continue during 2015. An expansion is planned which will require Rs. 1,75,000 and is expected to increase EBIT by Rs. 1,00,000 to Rs. 5,50,000.

The company is considering the following financing alternatives :

Alt.-1 Issue 5,000 shares of common stock to net the firm 35 per share. The firm currently has 40,000 shares of common stock outstanding.

Alt.-2 Issue Rs. 1,75,000 of fifteen year bonds at 8%. Sinking fund payments on these bonds commence in 2014.

Alt.-3 Issue Rs. 1,75,000 of 8.5% preferred stock. Assume a 50% tax rate.

You are required to —

- (i) Calculate the EPS for 2015 at the expected earnings before interest and taxes level of Rs. 5,50,000 for each financing alternative.
- (ii) Calculate the equivalency level of earnings before interest and taxes between the debt and common stock alternatives.
- (iii) Calculate the equivalency level of earnings before interest and taxes between the preferred stock and the common stock alternatives.

**Answer:**

(i) Determination of EPS at EBIT of Rs. 5,50,000

Particulars	Alt-1: Equity share	Alt 2: Bonds	Alt 3: Preference shares
EBIT	5,50,000	5,50,000	5,50,000
Less : Interest	<u>4,000</u>	<u>18,000</u>	<u>4,000</u>
Taxable income	5,46,000	5,32,000	5,46,000
Less : taxes @ 50%	<u>2,73,000</u>	<u>2,66,000</u>	<u>2,73,000</u>
Income after taxes	2,73,000	2,66,000	2,73,000
Less : dividend on preference shares	10,000	10,000	24,875
Earnings available for equity shareholders	2,63,000	2,56,000	2,48,125
No. of equity shares	45,000	40,000	40,000
<b>EPS</b>	<b>Rs. 5.84</b>	<b>Rs. 6.40</b>	<b>Rs. 6.20</b>

(ii) Equivalency level of Earnings between Common stock and Debt plan:

$$\frac{(X-I_1)(1-t)-P_1}{N_1} = \frac{(X-I_1-I_2)(1-t)-P_1}{N_2}$$

Where X = EBIT

I = Interest rate

t= tax rate

P = Dividend to preference shareholders

N= no. of equity shares

$$\text{or, } \frac{(X - \text{Rs.}4,000)(0.5) - \text{Rs.}10,000}{45,000} = \frac{(X - \text{Rs.}4,000 - \text{Rs.}14,000)(0.5) - \text{Rs.}10,000}{40,000}$$

$$\text{or, } \frac{0.5X - \text{Rs.}12,000}{45,000} = \frac{0.5X - \text{Rs.}19,000}{40,000}$$

$$\text{or, } 20,000 X - \text{Rs. } 48,00,00,000 = 22,500 X - \text{Rs. } 85,50,00,000$$

$$X (\text{EBIT}) = \text{Rs. } 1,50,000$$

(iii) Equivalency level of Earnings between preferred stock and common stock plan:

$$\frac{(X - I_1)(1 - t) - P_1 - P_2}{N_2} = \frac{(X - I_1)(1 - t) - P_1}{N_1}$$

$$\text{Or, } \frac{(X - \text{Rs.}4,000)(0.5) - \text{Rs.}24,875}{40,000} = \frac{(X - \text{Rs.}4,000)(0.5) - \text{Rs.}10,000}{45,000}$$

$$\text{or, } 22,500 X - \text{Rs. } 1209375000 = 20,000 X - \text{Rs. } 480000000$$

$$X (\text{EBIT}) = \text{Rs. } 2,91,750$$

### Question 21

*Lime Software Ltd has appointed you as its finance manager. The company wants to implement a project for which Rs 60 lakh is required to be raised from the market as a means of financing the project. The company is considering following financing plans:*

	Cases		(in thousands)
<i>Financial plan-1</i>	<i>A</i>	<i>B</i>	<i>C</i>
<i>All Equity Shares</i>	<i>60</i>	<i>60</i>	<i>60</i>
<i>Financial plan-2</i>			
<i>Equity Shares</i>	<i>30</i>	<i>40</i>	<i>20</i>
<i>12% preference shares</i>	<i>0</i>	<i>20</i>	<i>20</i>
<i>10% non convertible debentures</i>	<i>30</i>	<i>0</i>	<i>20</i>

*Assuming corporate tax to be 35 per cent and the face value of all the shares and debentures to be Rs 100 each, calculate the indifference points and earnings per share (EPS) for each of the financing plans. Which plan should be accepted by the company?*

## Answer

The level of EBIT at which both financial plan 1 and 2 intersect each other is called indifference point. At this point the EPS for both the plans are same. The indifference point can be calculated as under:

**Case-A:** Suppose the indifference point exists at EBIT of X. At this point the EPS of both the financing plans would be same. Therefore, following equation has to be satisfied.

$$X(1-t)/N_1 = (X - \text{Int})(1-t)/N_2 \quad \text{-----(1)}$$

Where:

X – EBIT at which the indifference point exist

N<sub>1</sub>: number of equity shares in plan-1

N<sub>2</sub>: number of equity shares in plan-2

Int: Interest amount

t: tax rate

Putting the values of each of these variables in equation-1, we will get:

$$X(1-0.35)/60000 = (X-300000) * (1-0.35)/30000$$

Or

$$X = 2X - 600000$$

$$\text{Or } X = \text{Rs } 600000$$

Therefore, the indifference point exists at EBIT of Rs 600000. Similarly, we can find out the indifference point for other cases.

**Conclusion :** If EBIT increases from Rs 600000, in that case financial plan-2 will be better because it will enhance the EPS much higher as compared to financial plan-1. However, if EBIT decreases from Rs 600000, financial plan-1 will be better with low financial leverage.

**Case-B :** Suppose the indifference point exists at EBIT of X. At this point the EPS of both the financing plans would be same. Therefore, following equation has to be satisfied.

$$X(1-t)/N_1 = \{X(1-t) - \text{PD}\}/N_2 \quad \text{-----(2)}$$

Where:

X – EBIT at which the indifference point exist

N<sub>1</sub>: number of equity shares in plan-1

N<sub>2</sub>: number of equity shares in plan-2

PD: Preference Dividend

t: tax rate

Putting the values of each of these variables in equation-2, we will get:

$$X(1-0.35)/60000 = X(1-0.35) - 240000 / 40000 \text{ Or}$$

$$X = 1107692.3$$

Therefore, the indifference point exists at EBIT of Rs 1107692.3.

**Conclusion:** If EBIT increases from Rs 1107692, in that case financial plan-2 will be better because it will enhance the EPS much higher as compared to financial plan-1. However, if EBIT decreases from Rs 1107692, financial plan-1 will be better with low financial leverage.

**Case-C:** Suppose the indifference point exists at EBIT of X. At this point the EPS of both the financing plans would be same. Therefore, following equation has to be satisfied.

$$X(1-t)/N_1 = \{(X-Int)(1-t) - PD\}/N_2 \quad \text{-----(3)}$$

Where:

X – EBIT at which the indifference point exist

N<sub>1</sub>: number of equity shares in plan-1

N<sub>2</sub>: number of equity shares in plan-2

Int: Interest amount

PD: Preference Dividend

t: tax rate

Putting the values of each of these variables in equation-3, we will get:

$$X(1-0.35)/60000 = (X-200000)(1-0.35) - 240000/20000$$

Or

$$X = 853846$$

Therefore, the indifference point exists at EBIT of Rs 853846.

**Conclusion:** If EBIT increases from Rs 853846, in that case financial plan-2 will be better because it will enhance the EPS much higher as compared to financial plan-1. However, if EBIT decreases from Rs 853846, financial plan-1 will be better with low financial leverage.

## Question 22

*ABC Ltd is considering a major expansion of its production facilities and the following alternatives financial plans are available:*

	<i>Financial plans</i>		
	<i>A</i>	<i>B</i>	<i>C</i>
<i>Equity Shares</i>	<i>50</i>	<i>20</i>	<i>10</i>
<i>12% debentures</i>	<i>0</i>	<i>20</i>	<i>15</i>
<i>16% loan from Bank</i>	<i>0</i>	<i>10</i>	<i>25</i>

*The expected rate of return before interest and tax is 25 per cent. The rate of dividend of the company is not less than 20 per cent. The company at present has no debt. The corporate tax rate is assumed to be 35 per cent. Which of the alternative would you choose, assuming maximizing ROE (return on equity) as the objective of the firm?*

## Answer

Return on Equity (ROE) under proposed different financial alternatives are shown as under.

<i>Particulars</i>	<i>Plans</i>		
	<i>A</i>	<i>B</i>	<i>C</i>
EBIT (Rs 5000000 x 0.25)	1250000	1250000	1250000
Less Interest on Debentures (12%)	0	240000	180000
Less Interest on Loan (16%)	0	160000	400000
EBT	1250000	850000	670000
Less tax (35%)	437500	297500	234500
PAT	812500	552500	435500
Equity Capital (Rs)	5000000	2000000	1000000
ROE = (PAT / Equity Capital)*100 (%)	16.25	27.625	43.55

Therefore, alternative C would be preferable.

## Question 23

*Sophie Interiors has made the forecast of sales shown in the following table. Also given is the probability of each level of sales.*

<i>Sales</i>	<i>Probability</i>
<i>Rs. 200,000</i>	<i>0.20</i>
<i>300,000</i>	<i>0.60</i>
<i>400,000</i>	<i>0.20</i>

*The firm has fixed operating costs of Rs. 75,000 and variable operating costs equal to 70% of the sales level. The company pays Rs. 12,000 in interest per period. The tax rate is 40%.*

- Compute the earnings before interest and taxes (EBIT) for each level of sales.*
- Compute the earnings per share (EPS) for each level of sales, the expected EPS, the standard deviation of the EPS, and the coefficient of variation of EPS, assuming that there are 10,000 shares of common stock outstanding.*
- Sofie Interiors has the opportunity to reduce its leverage to zero and pay no interest. This will require that the number of shares outstanding be increased to 15,000. Repeat part b under this assumption.*
- Compare your findings in parts b and c, and comment on the effect of the reduction of debt to zero on the firm's financial risk.*

**Answer**

- a) The earnings before interest and taxes (*EBIT*) is calculated under the different level of sales revenue in the table below:

**Table 1**  
**Sales and associated EBIT calculation**

<i>Probability</i>	<i>0.2</i>	<i>0.6</i>	<i>0.2</i>
Sales revenue (Rs. )	2,00,000	3,00,000	4,00,000
Less: Fixed operating cost (Rs. )	75,000	75,000	75,000
Less: variable operating cost (70 % of the sales) (Rs. )	140000	210000	280000
Earnings before interest and taxes ( <i>EBIT</i> )	-15,000	15,000	45,000

The table shows that there is a 20% chance that the *EBIT* will be - Rs. 15,000, 60% chance that it will be Rs. 15,000, and a 20% chance that it will be Rs. 45,000.

- b) The calculation of *EPS*, Expected *EPS*, Standard Deviation, and Coefficient of Variation for Tower Interiors have been shown in the table below.

**Table 2**

**Expected *EPS*, Standard Deviation and Coefficient of Variation for Sophie Interiors**

<i>Probability</i>	<i>0.2</i>	<i>0.6</i>	<i>0.2</i>
Earnings before interest and taxes ( <i>EBIT</i> )	-15,000	14,999	45,000
Less : Interest (Rs. )	12,000	12,000	12,000
Net profit before taxes	-27,000	2,999	33,000
Less : Taxes ( $T = 0.40$ )	-10,800.08	1199.76	13199.92
Net profit after taxes (Rs. )	-16,200	1,799.6	19,799.9
Number of shares ( <i>N</i> )	10,000	10,000	10,000
<i>EPS</i>	-1.62	0.18	1.98

Expected EPS $E(\text{EPS}) = \sum P_i \times \text{EPS}_i$	0.18		
Standard Deviation of EPS $\sigma = \sqrt{\sum P_i \times (\text{EPS}_i - E(\text{EPS}))^2}$	1.138		
Coefficient of variation of EPS $\frac{\sigma}{E(\text{EPS})}$	6.32		

- c) The calculation of *EPS*, Expected EPS, Standard Deviation, and Coefficient of Variation for Tower Interiors, when the debt has been removed, have been shown in the table below

**Table 3**  
**Expected EPS, Standard Deviation, and Coefficient of Variation for Sophie Interiors with no debt**

<b>Probability (Pi)</b>	<b>0.2</b>	<b>0.6</b>	<b>0.2</b>
Earnings before interest and taxes ( <i>EBIT</i> )	-15,000	14,999	45,000
<i>Less</i> : Interest (Rs. )	0	0	0
Net profit before taxes	-15,000	14,999	45,000
<i>Less</i> : Taxes ( $T = 0.40$ )	-6,000.08	5999.76	17999.92
Net profit after taxes (Rs. )	-9,000	8,999.6	26,999.9
Number of shares ( <i>N</i> )	15,000	15,000	15,000
<i>EPS</i>	-0.60	0.60	1.80
Expected EPS $E(\text{EPS}) = \sum P_i \times \text{EPS}_i$	0.60		
Standard Deviation of EPS $\sigma = \sqrt{\sum P_i \times (\text{EPS}_i - E(\text{EPS}))^2}$	0.76		
Coefficient of variation of EPS $\frac{\sigma}{E(\text{EPS})}$	1.27		

- d) When we compare table 2 and Table 3, we find that the financial risk, which is measured by standard deviation, is lower with no debt scenario ( $\sigma = 0.76$ ) than the standard deviation ( $\sigma = 1.138$ ) with debt case. Earnings loss (EPS = - Rs. 0.6) is also lower than the case in which the debt has been acquired (EPS = - Rs. 1.62).

### Question 24

*Data-Check is considering two capital structures. The key information is shown in the following table. Assume a 40% tax rate.*

Source of capital	Structure A	Structure B
Long-term debt Rs.	Rs. 100,000 at 16% coupon rate	Rs.200,000 at 17% coupon rate
Common stock	4,000 shares	2,000 shares

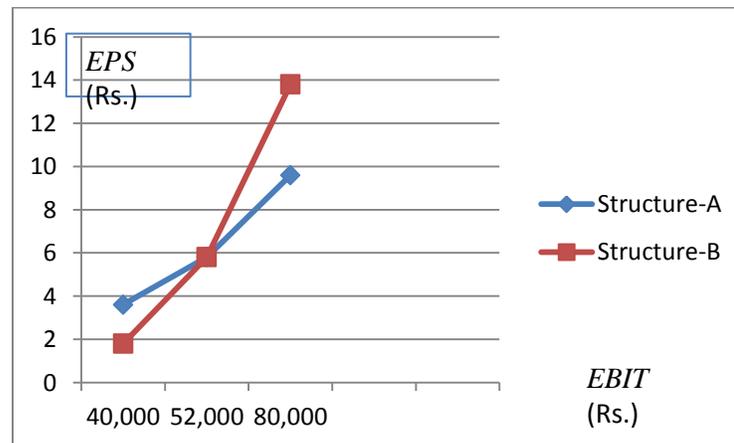
- Indicate over what EBIT range, if any, each structure is preferred.
- Discuss the leverage and risk aspects of each structure.
- If the firm is fairly certain that its EBIT will exceed .Rs. 75,000, which structure would you recommend? Why?

### Answer

- a) For EBIT values of Rs. 40,000, Rs. 52,000, and Rs. 80,000, the associated EPS values are summarized in the table below :

EBIT/EPS	Structure-A	Structure-B
40,000	3.6	1.8
52,000	5.8	5.8
80,000	9.6	13.8

The graph of EBIT-EPS has been shown as under.



The level of EBIT at which both structure-A and structure-B intersect each other is called indifference point. At this point the EPS for both the structures are same. Structure-B will be preferred when the EBIT is more than Rs. 52,000, and structured A will be preferred when EBIT is less than Rs. 52,000.

- b) The degree of financial leverage is reflected in the slope of the capital structure line. The steeper the capital structure line, the higher the financial risk. Now from the figure above, it can be seen that the line of structure B is steeper than structure A therefore, structure B is more risky than structure A.
- c) If the firm is certain that its EBIT will exceed Rs. 75,000, then it should follow structure B. The main reason behind this is that the EPS will be much higher at Rs. 75,000 with structure B as compared to structure A.

### Question 25

*Ambey Technology has a project costing Rs 15 crore for making high-end microchips on hand. It shall provide the earning level of Rs 4 crore annually. With a view to decide the desired capital structure the firm compiled following data with respect to cost of debt and cost of equity for debt levels of 20% to 70% of the cost of the project, that is reproduced below*

<b>Plan</b>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
<i>Debt ratio (%)</i>	<i>20</i>	<i>30</i>	<i>40</i>	<i>50</i>	<i>60</i>	<i>70</i>
<i>Amount of debt (Rs lacs)</i>	<i>300</i>	<i>450</i>	<i>600</i>	<i>750</i>	<i>900</i>	<i>1050</i>
<i>Cost of Debt (%)</i>	<i>8</i>	<i>8</i>	<i>8</i>	<i>9.5</i>	<i>10</i>	<i>10.5</i>
<i>Cost of Equity (%)</i>	<i>15.5</i>	<i>15.5</i>	<i>16</i>	<i>18</i>	<i>21</i>	<i>25</i>

*Examine which of the capital structure is best for Ramsys Technology.*

### Answer

We compute the value of the firm under different capital structures and the costs of debt and equity as given. The desirable capital structure would be one that gives the least weighted average cost of capital and greatest value of the firm consistent with the objective of maximization of value.

<i>Plan</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
<i>Debt ratio (%)</i>	<i>20</i>	<i>30</i>	<i>40</i>	<i>50</i>	<i>60</i>	<i>70</i>
<i>EBIT</i>	<i>400</i>	<i>400</i>	<i>400</i>	<i>400</i>	<i>400</i>	<i>400</i>
<i>Interest</i>	<i>24</i>	<i>36</i>	<i>48</i>	<i>71.25</i>	<i>90</i>	<i>110.25</i>
<i>EBT</i>	<i>376</i>	<i>364</i>	<i>352</i>	<i>328.75</i>	<i>310</i>	<i>289.75</i>

Cost of Equity ( $K_e$ ) (%)	15.5	15.5	16	18	21	25
Value of Equity ( $E=EBT/K_e$ )	2425.8	2348.4	2200	1826.4	1476.2	1159
Value of Debt, D	300	450	600	750	900	1050
Total Value, $V= E+D$	2725.8	2798.4	2800	2576.389	2376.19	2209
WACC ( $EBIT/V$ )	14.67	14.294	14.286	15.53	16.83	18.11

Clearly the Plan III with 40% debt is preferable as it gives the maximum value to the firm at Rs. 2800 lacs and least weighted average cost of capital (WACC) at 14.286%.

### Question 25

*MinRim Ltd., has total assets of Rs. 10,000,000, EBIT of Rs. 2,000,000, and preferred dividends of Rs. 200,000 and is taxed at a rate of 40%. In an effort to determine the optimal capital structure, the firm has assembled data on the cost of debt, the number of shares of common stock for various levels of indebtedness, and the overall required return on investment:*

<i>Capital structure</i>		<i>Number of common</i>	
<i>Debt ratio</i>	<i>Cost of debt, <math>k_d</math></i>	<i>Stock shares</i>	<i>Required return, R</i>
0%	0%	200,000	12%
15%	8%	170,000	13%
30%	9%	140,000	14%
45%	12%	110,000	16%
60%	15%	80,000	20%

*Choose the optimal capital structure. Justify your choice.*

### Answer

First we have to calculate the interest amount.

**Table 1**

**Calculation of interest amount associated with various debt ratios**

<i>Total assets</i>	<i>Capital structure Debt ratio (%)</i>	<i>Total debt, Rs.</i>	<i>Cost of debt (%)</i>	<i>Interest amount (Rs. )</i>
1,00,00,000	0	0	0	0
1,00,00,000	15	1500000	8	120000

1,00,00,000	30	3000000	9	270000
1,00,00,000	45	4500000	12	540000
1,00,00,000	60	6000000	15	900000

Now, putting the values of the interest amount at different level of indebtedness, we can calculate the earnings per share (EPS) for given level of EBIT as under.

**Table 2**  
**Calculation of EPS at various debt ratios**

	<i>Debt ratio (0%)</i>	<i>Debt ratio (15%)</i>	<i>Debt ratio (30%)</i>	<i>Debt ratio (45%)</i>	<i>Debt ratio (60%)</i>
<i>EBIT</i>	20,00,000	20,00,000	20,00,000	20,00,000	20,00,000
<i>Less : Interest</i>	-	1,20,000	2,70,000	5,40,000	9,00,000
Net profit before taxes	20,00,000	18,80,000	17,30,000	14,60,000	11,00,000
Taxes ( $T=0.4$ )	8,00,000	7,52,000	6,92,000	5,84,000	4,40,000
Net profit after Taxes	12,00,000	11,28,000	10,38,000	8,76,000	6,60,000
Preference Dividend ( <i>PD</i> )	2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
Profit for Common shareholders	10,00,000	9,28,000	8,38,000	6,76,000	4,60,000
Number of shares ( <i>N</i> )	2,00,000	1,70,000	1,40,000	1,10,000	80,000
<i>EPS</i>	5.0	5.5	6.0	6.1	5.8

The optimal capital structure is the capital structure at which the value of the firm is maximized.

The value of the firm associated with alternative capital structures can be estimated by using one of the standard valuation models. If, for simplicity, we assume that all earnings are paid out as dividends, we can use a zero-growth valuation model. The model is shown as under.

$$P_0 = \frac{EPS}{R} \quad \dots\dots (1)$$

Where

R = required rate of return of common share holders

By substituting the expected level of EPS and the associated required return, R, into Equation (1), we can estimate the per-share value of the firm, P<sub>0</sub>, as shown in the table below.

<i>Capital structure Debt ratio (%)</i>	<i>EPS, Rs.</i>	<i>Required rate of return, ( R )</i>	<i>Share price (P<sub>0</sub>), Rs.</i>
0	5	0.12	41.67
15	5.5	0.13	42.31
30	6	0.14	42.86
45	6.1	0.16	38.13
60	5.8	0.2	29.00

We can see from the table above that the value of the share is maximum at debt ratio of 30%. Therefore, the optimum capital structure would be 30% debt, with 140,000 common shares and preference capital.

**Question 27**

*XYZ Ltd. is an all equity firm having constant earnings of Rs 24 crore and cost of equity at 12%. It is offered a debt of Rs 100 crore at 8%. With debt the value of the firm does not change as long as the asset base remains constant and debt only substitutes the equity. Find out the total value of the firm, value of equity, cost of equity and WACC if there are no taxes. Can debt help?*

**Answer**

Here the given data are as under:

EBIT – Rs 24 cr

Cost of equity, Ke = 12%

Amount of debt = Rs 100 cr

Cost of debt,  $K_d = 8\%$

The total value of the firm is given by  $V = EBIT/K_e = 24/0.12 = \text{Rs } 200.00 \text{ cr}$

With debt the value of the firm does not change as long as the asset base remains constant and debt only substitutes the equity.

The value of equity would therefore be  $E = \text{Total Value} - \text{Debt Value} = 200 - 100 = \text{Rs } 100 \text{ cr}$

If debt is assumed the cost of equity increases proportionately as given below:

$$K_e = K_o + (K_o - K_d)D/E$$

$$K_e = 0.12 + (0.12 - 0.08)100/100 = 16.00\%$$

Since cost of equity increases proportionately the cost of capital too remains same.

$$WACC = K_e \times E/V + K_d (1 - T) \times D/V = 12.00\%$$

Here the debt is not going to help because it does not provide any tax shield to the firm.

### Question 28

*Refer question 27. Find out the total value of the firm, value of equity, cost of equity and WACC if there are taxes of 40%. Can debt help?*

### Answer

With taxes the value of levered firm increases by the amount of tax shield.

Tax Rate = 40%

Value of tax shield =  $T \times D = 0.4 \times 100 = \text{Rs } 40 \text{ crore}$

Where:

T- Tax rate

D- Amount of debt

Therefore, the value of levered firm would be:

$V_L = V_u + T \times D = 200 + 40 = \text{Rs } 240 \text{ crore}$ ; Here  $V_u$  is the value of unlevered firm

Value of equity,  $E = \text{Total Value, } V_L - \text{Value of Debt, } D$

Value of Debt,  $D$  Rs 100 crore

Therefore, value of equity,  $E$  is  $240 - 100 = \text{Rs } 140 \text{ crore}$

If debt is assumed the cost of equity increases proportionately but not as much as it would under no taxes, as given below:

$$K_e = K_o + (K_o - K_d)(1 - T) D/E$$

$$K_e = 0.12 + (0.12 - 0.08) (0.6)100/140 = 13.71\%$$

The cost of capital would be given by:  $WACC = K_e \times E/V + K_d (1 - T) \times D/V = 10.00\%$

Here the debt is going to benefit the firm.

### Question 29

*JK Enterprises is in the business of manufacture and export of handicraft. Currently in its capital structure it has a debt of Rs 15 crores with cost of 10%. The cost of equity is reckoned at 15%. It has earnings level of Rs 4.75 crores and does not pay any taxes being tax-exempt unit. The Managing Director of the firm believes that the level of debt is too high and would like to repay the debt by issuing additional shares to the extent of Rs 5 crore. According to him reduced level of leverage would reduce the cost of capital because of two reasons - cost of debt falling from existing 10% to 9%, and cost of equity falling from 15% to 14%.*

*Evaluate the option of the Managing Director to replace debt with equity. Also find the WACC and value of the firm in both the situations.*

### Answer

We examine the value of the firm under the existing situation and retiring debt with equity. The capital structure that yields greater value to the firm is the desired one. This is done as follows:

*(Rs. in lakh)*

<i>Plan</i>	<i>Current</i>	<i>Replacing debt</i>
Value of Debt, D	1500	1000
Cost of Debt (%)	10	9
EBIT	475	475
Interest	150	90
EBT	325	385
Cost of Equity (Ke) (%)	15	14
Value of Equity (E=EBT/Ke)	2166.7	2750.0
Value of Debt, D	1500	1000
Total Value, V= E+D	3666.7	3750.0
WACC (EBIT/V) (%)	12.95	12.667

The current value of the firm is Rs 36.67 crore. By replacing debt with equity the value of the firm increases by Rs 83 lacs and WACC reduces from 12.95% to 12.66%. Therefore the firm must replace debt with equity.

### Question 30

Consider the data of JK Enterprises in the previous problem. The Vice President (Finance) of the firm was of the opinion that reducing debt was not an appropriate decision. Instead he was of the view that debt must be increased to retire equity. The revised cost of debt would be marginally higher at 10.50% and the desired return by the shareholders would jump to 16% from existing 15%. Would you be in favor of retiring equity with debt? Again find the value of the firm and WACC under revised conditions as per Vice President (Finance).

### Answer

The value of the firm and WACC under the given situation is worked out below:

(Rs. lakh)

Plan	Current	Replacing debt
Value of Debt, D	1500	2000
Cost of Debt (%)	10	10.5
EBIT	475	475
Interest	150	210
EBT	325	265
Cost of Equity (Ke) (%)	15	16
Value of Equity (E=EBT/Ke)	2166.7	1656.3
Value of Debt, D	1500	2000
Total Value, V= E+D	3666.7	3656.3
WACC (EBIT/V) (%)	12.95	12.991

Since replacing equity with debt decreases the value of the firm and increases WACC, therefore, the proposal to replace equity with debt should not be considered.

### Question 31

Alfa and Beta are two firms, identical in all respects except for their capital structure. Alfa has no debt while Beta carries a debt of Rs 10 crore at pre-tax cost of 10%. Find out the value of firms Alfa and Beta assuming tax of 35% and EBIT level of Rs 300 lakhs and cost of equity as 15% under net income approach.

Also find the value of the levered firm Beta under Net Operating Income Approach. What is the cost of equity and WACC of firms Alfa and Beta under NI and NOI approaches?

## Answer

The values of the unlevered firm, Alfa and levered firm, Beta under Net Income approach and their respective cost of capital (WACC) are worked out as below:

(Rs. lakh)

<i>Plan</i>	<i>Alfa</i>	<i>Beta</i>
Value of Debt, D	0	1000
Cost of Debt (%)	0	10
EBIT	300	300
Interest	0	100
EBT	300	200
Tax (35%)	105	70
PAT	195	130
Cost of Equity (Ke) (%)	15	15
Value of Equity (E=PAT/Ke)	1300.0	866.7
Value of Debt, D	0	1000
Total Value, V= E+D	1300.0	1866.7
WACC (EBIT(1-T)/V) (%)	15.00	10.45

### Under Net Operating Income Approach

Value of levered firm,  $V_L$  = Value of unlevered firm,  $V_U$  + Value of tax shield

In case of perpetual debt, value of tax shield is tax rate, T x Value of debt, D or

$$V_L = V_U + T \times D$$

Value of levered firm, Beta *Rs lakh*

Value of unlevered firm,  $V_U$  = Value of Alfa = 1,300.00

Value of Tax Shield,  $T \times D = 0.35 \times 1000 = 350.00$

Value of levered firm,  $V_L = 1300+350 = 1,650.00$

Value of equity, E = Total Value,  $V_L$  - Value of Debt, D

Value of Debt, D is 1,000.00

Therefore, value of equity,  $E = 1650 - 1000 = 650.00$

Cost of equity,  $K_e$  is given by:  $K_e = K_o + (K_o - K_d)(1 - T) D/E$

$K_e = 0.15 + (0.15 - 0.1) (0.65) 1000/650 = 20\%$

$WACC = K_e \times E/V + K_d (1 - T) \times D/V = 11.72\%$

\*\*\*

# 4

## Cost of Capital

### BASIC CONCEPTS AND FORMULAE

1.	Cost of Capital	<ul style="list-style-type: none"> <li>Cost of capital is the rate of return that a firm must earn on its project investments to maintain its market value and attract funds.</li> </ul>
2.	Opportunity Cost of Capital	<ul style="list-style-type: none"> <li>The returns provided by the next best alternative is called opportunity cost of capital. Capital can be divided broadly as :-               <ol style="list-style-type: none"> <li>Debt capital</li> <li>Preference capital</li> <li>Equity capital and retained earnings</li> </ol> </li> </ul>
3.	Weighted Average Cost of Capital (WACC)	<ul style="list-style-type: none"> <li>WACC is the composite cost of capital with cost of each component of capital multiplied by its proportion in the capital structure.</li> <li><b>Cost of capital, WACC = <math>K_e * W_e + K_d * W_d + K_p * W_p</math></b> Where; <math>K_e</math>- cost of equity, <math>K_d</math>- cost of debt, <math>K_p</math>- cost of preference share, <math>W_e</math>- weight of equity, <math>W_d</math>- weight of debt, <math>W_p</math>- weight of preference share.</li> </ul>
4.	Preference share capital	<ul style="list-style-type: none"> <li>It is the capital where the fixed amount of dividend is paid with prior claim to that of equity shareholders.</li> <li>Cost of preference share capital,  <math display="block">P_o = \sum_{t=1}^n \frac{PD}{(1 + K_p)^t} + \frac{R}{(1 + K_p)^n}</math>           Where;  <math>P_o</math>- value of preference share         </li> </ul>

		<p>R- Redemption value at maturity  <i>PD</i> = preference dividend  n- years  <i>Kp</i>- cost of preference share</p> <ul style="list-style-type: none"> <li>• Cost of Perpetual preference share  <math display="block">Kp = \frac{PD}{Po}</math></li> </ul>
5.	Internal equity	<ul style="list-style-type: none"> <li>• It refers to the retained earnings that are not distributed to the shareholders and are deployed in the business for its needs.</li> <li>• Cost of equity capital as per Dividend Discount Model (DDM):  <math display="block">Ke = \frac{D1}{Po} + g</math> <p>Where;  D1- Dividend of next year  Po- the current market price of share  g- growth rate in dividend</p> </li> <li>• Cost of equity capital as per Capital Asset Pricing Model (CAPM)  <math display="block">Ke = Rf + \beta(Rm - Rf)</math> <p>Where;  <math>\beta</math> - systematic risk of the share  Rf- Risk free rate of return  Rm- market return</p> </li> </ul>
6.	External equity	It refers to the issue of fresh share capital by the firm
7.	Floatation cost	<ul style="list-style-type: none"> <li>• These are the expenses incurred in mobilizing any kind of capital from the markets.</li> <li>• Cost of external equity after floatation cost =  <math display="block">Kex = \frac{Ke}{(1-f)}</math></li> </ul>

		Where; f - floatation cost Ke - cost of internal equity
8.	Cost of debt capital	<p>The cost of debt capital is normally the coupon rate that is payable by the firm to the holders of the debt instrument.</p> <p>Cost of perpetual debt,</p> $K_d = \frac{r(1-t)}{D_0}$ <p>Where; r- coupon rate, t- tax rate D<sub>0</sub>- value of debt</p> <ul style="list-style-type: none"> <li>• Cost of redeemable debt, capital,</li> </ul> $D_0 = \sum_{t=1}^n \frac{r(1-t)}{(1+K_d)^t} + \frac{R}{(1+K_d)^n}$ <p>D<sub>0</sub>- value of debt R- Redemption value at maturity Ct = coupon amount n- years K<sub>d</sub>- cost of debt, t- tax rate</p>
9.	Marginal cost of capital	The cost of raising incremental finances is called marginal cost of capital

### Question 1

*What does the firm's capital structure represent? Which type of capital is least costly and why?*

### Answer

Capital structure can be defined as mix of various types of capital acquired by the firm.

Capital can be divided broadly as:

- (i) Debt capital
- (ii) Preference capital
- (iii) Equity capital and retained earnings

The cost of debt is lower than the cost of other forms of financing. Lenders demand relatively lower returns because they take the least risk of any contributors of long-term capital. Lenders have a higher priority of claim against any earnings or assets available for payment, and they can exert far greater legal pressure against the company to make payment than can owners of preferred or common stock. The tax deductibility of interest payments also lowers the debt cost to the firm substantially.

### Question 2

*What are the net proceeds from the issue of a bond? What are flotation costs, and how do they affect a bond's net proceeds?*

### Answer

The net proceeds from the issue of a bond, or any security, are the funds that the firm receives from the sale. The total proceeds are reduced by the flotation costs, which represent the total costs of issuing and selling securities. These costs apply to all public offerings of securities like debt, preferred stock, and common stock etc. They include two components:

- (i) *Underwriting costs* : It is compensation earned by investment bankers for selling the security and
- (ii) *Administrative costs* : It is issuer expenses such as legal, accounting, and printing.

### Question 3

*What is Capital Asset Pricing Model?*

### Answer

CAPM is a model that describes the relationship between risk and expected return and that is used in the pricing of risky securities.

Cost of equity capital as per Capital Asset Pricing Model (CAPM)

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

Where;

$R_f$  = Risk free rate of return

$\beta$  = systematic risk of the share

$R_m$  = market return

### Question 4

*How do the constant-growth valuation model (DDM) and capital asset pricing model (CAPM) methods for finding the cost of common stock differ?*

### Answer

The CAPM technique differs from the constant-growth valuation model in that it directly considers the firm's risk, as reflected by beta, in determining the required return or cost of common stock equity. The constant-growth model does not look at risk; it uses the market

price,  $P_0$ , as a reflection of the expected risk–return preference of investors in the market place. The constant-growth valuation and CAPM techniques for finding  $K_e$  are theoretically equivalent, though in practice estimates from the two methods do not always agree. The two methods can produce different estimates because they require (as inputs) estimates of other quantities, such as the expected dividend growth rate or the firm’s beta.

Another difference is that when the constant-growth valuation model is used to find the cost of common stock equity, it can easily be adjusted for flotation costs to find the cost of new common stock; the CAPM does not provide a simple adjustment mechanism. The difficulty in adjusting the cost of common stock equity calculated by using the CAPM occurs because in its common form the model does not include the market price,  $P_0$ , a variable needed to make such an adjustment.

Although the CAPM has a stronger theoretical foundation, the computational appeal of the traditional constant-growth valuation model justifies its use throughout this text to measure financing costs of common stock. As a practical matter, analysts might want to estimate the cost of equity using both approaches and then take an average of the results to arrive at a final estimate of the cost of equity.

### Question 5

*Describe the logic underlying the use of target weights to calculate the WACC, and compare and contrast this approach with the use of historical weights. What is the preferred weighting scheme?*

### Answer

First, we have to understand the concept of book value weight and market value weight to calculate WACC.

**Book value weights** use accounting values to measure the proportion of each type of capital in the firm’s financial structure. **Market value weights** measure the proportion of each type of capital at its market value. Market value weights are appealing because the market values of securities closely approximate the actual Rupees to be received from their sale. Moreover, because firms calculate the costs of the various types of capital by using prevailing market prices, it seems reasonable to use market value weights. In addition, the long-term investment cash flows to which the cost of capital is applied are estimated in terms of current as well as future market values. Market value weights are clearly preferred over book value weights.

### Historical versus Target Weight

**Historical weights** can be either book or market value weights based on actual capital structure proportions. For example, past or current book value proportions would constitute a form of historical weighting, as would past or current market value proportions. Such a weighting scheme would therefore be based on real—rather than desired—proportions. However,

**Target weights**, which can also be based on either book or market values, reflect the firm’s desired capital structure proportions. Firms using target weights establish such proportions on the basis of the “optimal” capital structure they wish to achieve.

When one considers the somewhat approximate nature of the calculation of weighted average cost of capital, the choice of weights may not be critical. However, from a long term perspective, the preferred weighting scheme should be target market value proportions.

### Question 6

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

### Answer

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

$$K_d = \frac{r(1-t)}{D_0} \text{-----(1)}$$

Here;

Coupon rate 15%

Coupon Payment Rs 15-

Face value- Rs 100

Tax 35%

Market price Rs 100

Putting the value in Eq-1, we get

$$K_d = \frac{15(1-0.35)}{100}$$

$$= 9.75\%$$

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

$$K_d = \frac{15(1-0.35)}{105}$$

$$= 9.25\%$$

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

Cost of debt

$$K_d = \frac{15(1-0.35)}{95}$$

$$= 10.26\%$$

### Question 7

*ABC Limited has issued 14% perpetual preference shares of Rs 100 each. The current price of the preference shares is Rs 100 What is the cost of preference capital for ABC limited?*

What would be the cost of preference capital if the price of preference shares is changed to a) Rs 90 and b) Rs 120?

**Answer**

Cost of perpetual (non redeemable) preference share is calculated by using following formula:

$$K_p = \frac{PD}{P_o} \text{ -----(1)}$$

Here,

Pref Dividend Rate	14%
Dividend Amount	Rs 14
Face value	Rs 100
Market price	Rs 100

Putting the value in Eq-1, we get

$$K_p = \frac{14}{100}$$

$$= 14\%$$

(a) If the market price is at Rs 90; then

$$K_p = \frac{14}{90}$$

$$= 15.5\%$$

(b) If the market price is Rs 120; then

$$K_p = \frac{14}{120}$$

$$= 11.67\%$$

**Question 8**

*KPL Manufacturing is in the process of analyzing its investment decision-making procedures. The two projects evaluated by the firm during the past month were projects 123 and 124. The basic variables surrounding each project analysis and the resulting decision actions are summarized in the following table.*

<i>Basic variables</i>	<i>Project 123</i>	<i>Project 124</i>
<i>Cost</i>	<i>Rs 60,000</i>	<i>Rs 52,000</i>
<i>Life</i>	<i>10 years</i>	<i>10 years</i>
<i>Expected return</i>	<i>8%</i>	<i>15%</i>

*Cost of financing*

<i>Source</i>	<i>Debt</i>	<i>Equity</i>
<i>Cost (after-tax)</i>	7%	16%
<i>Decision</i>		
<i>Action</i>	<i>Invest</i>	<i>Don't invest</i>
<i>Reason</i>	8% > 7% cost	15% < 16% cost

- Evaluate the firm's decision-making procedures, and explain why the acceptance of project 123 and rejection of project 124 may not be in the owners' best interest.*
- If the firm maintains a capital structure containing 40% debt and 60% equity, find its weighted average cost using the data in the table.*
- If the firm had used the weighted average cost calculated in part b, what actions would have been indicated relative to projects 123 and 124?*
- Compare and contrast the firm's actions with your findings in part c. Which decision method seems more appropriate? Explain why.*

**Answer**

- The firm is basing its decision on the cost to finance a particular project rather than the firm's combined cost of capital. This decision-making method may lead to erroneous accept/reject decisions.
- Weighted average cost of capital,  $K_o = w_d * K_d + w_e * K_e$   
 $= 0.40 (7\%) + 0.60 (16\%)$   
 $= 2.8\% + 9.6\%$   
 $= 12.4\%$
- Reject project 123. Accept project 124.
- Opposite conclusions were drawn using the two decision criteria. The overall cost of capital as a criterion provides better decisions because it takes into consideration the long-run interrelationship of financing decisions

**Question 9**

*Currently, Abteck Industries can sell 15-year, Rs 1,000-par-value bonds paying annual interest at a 12% coupon rate. As a result of current interest rates, the bonds can be sold for Rs 1,010 each; flotation costs of Rs 30 per bond will be incurred in this process. The firm is in the 40% tax bracket.*

- Find the net proceeds from sale of the bond, Nd.*
- Show the cash flows from the firm's point of view over the maturity of the bond.*
- Calculate the before-tax and after-tax costs of debt.*

- d) Use the approximation formula to estimate the before-tax and after-tax costs of debt.

**Answer**

- a) Net proceeds:  $N_d = \text{Rs } 1,010 - \text{Rs } 30 = \text{Rs } 980$   
 b) Cash flows over the maturity of the bond are as under

<i>T</i>	<i>CF</i>
0	980
1 to 15	-120
15	-1000

- c) Cost to maturity:

$$N = 15, P = 980, PMT = -120, FV = -1,000$$

Solving for I (using EXCEL) = 12.30%

$$\text{After-tax cost} = 12.30\% (1 - 0.4) = 7.38\%$$

- d) Approximate formula is calculated as under:

$$K_d (\text{before tax}) = \{I + (RV - SV)/N\} / (RV + SV)/2$$

Where:

I= annual fixed interest

RV= Redeemable value of debenture

SV= Sale value of debenture

N= term of debt till maturity

$$\begin{aligned} \text{Approximate before-tax cost of debt } K_d &= \frac{\{120 + (1000 - 980)\} / 15}{(1000 + 980) / 2} \\ &= 12.26\% \end{aligned}$$

$$\text{Approximate after-tax cost of debt} = 12.26\% (1 - 0.4) = 7.36\%$$

**Question 10**

*Mohan and Gita Sharma, a married couple, are interested in purchasing their first boat. They have decided to borrow the boat's purchase price of Rs 100,000. The family is in the 28% income tax bracket. There are two choices for the Sharma family: They can borrow the money from the boat dealer at an annual interest rate of 8%, or they could take out a Rs 100,000 second mortgage on their home. Currently, home equity loans are at rates of 9.2%. There is no problem securing either of these two alternative financing choices. Mohan and Gita learn that if they borrow from the boat dealership, the interest will not be tax deductible. However, the interest on the second mortgage will qualify as being tax deductible on their income tax return.*

- a) Calculate the after-tax cost of borrowing from the boat dealership.
- b) Calculate the after-tax cost of borrowing through a second mortgage on their home.
- c) Which source of borrowing is less costly for the Sharma family?

**Answer**

- a) Since the interest on the boat loan is not tax deductible, its after-tax cost equals its stated cost of 8%.
- b) Since the interest on the second mortgage is tax deductible, its after-tax cost is found by multiplying the before-tax cost of debt by (1- tax rate). Being in the 28% tax bracket, the after-tax cost of debt:  
= 9.2% (1- 0.28)= 6.6%.
- c) Home equity loan has a lower after-tax cost. However, using the second home mortgage does put the Mohan at risk of losing their home if they are unable to make the mortgage payments.

**Question 11**

*A&S Corporation common stock has a beta,  $\beta$ , of 1.2. The risk-free rate is 6%, and the market return is 11%. Determine the risk premium on A&S common stock. Also determine the A&S's cost of common stock equity using the CAPM.*

**Answer**

Cost of equity capital as per CAPM

$$Ke = Rf + \beta(Rm - Rf)$$

Where;

Rf- Risk free rate of return = 6%

$\beta$  - systematic risk of the shares = 1.2

Rm- market return =11%

The risk premium, (Rm-Rf) = 11-6 =5%

And, cost of equity  $Ke = 6\% + 1.2(11 - 6)$   
= 12%

**Question 12**

*Beriwal Textiles wishes to measure its cost of common stock equity. The firm's stock is currently selling for Rs 57.50. The firm expects to pay Rs 3.40 dividend at the end of the year (2015). The dividends for the past 5 years are shown in the following table.*

Year	Dividend (Rs)
2014	3.10
2013	2.92

2012	2.60
2011	2.30
2010	2.12

After under pricing and flotation costs, the firm expects to net Rs 52 per share on a new issue.

- Determine the growth rate of dividends from 2010 to 2014.
- Determine the net proceeds,  $N$ , that the firm will actually receive.
- Using the constant-growth valuation model, determine the cost of retained earnings,  $K_e$ .
- Using the constant-growth valuation model, determine the cost of new common stock.

### Answer

Cost of common stock equity as per constant-growth valuation model is calculated as under:

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

Where;

$D_1$ - Dividend of next year

$P_0$ - the current market price of share

$g$ - growth rate in dividend

- a) The growth rate of dividends from 2010 to 2014 is calculated by using following formula:

$$\begin{aligned} \text{Growth rate or compound annual growth rate (CAGR)} &= (FV/PV)^{1/n} - 1 \\ &= (3.1/2.12)^{1/4} - 1 \\ &= \mathbf{9.96\%} \end{aligned}$$

- b) Net proceed  $N = \text{Rs } 52$

c) Cost of retained earnings,  $K_e = \frac{D_1}{P_0} + g$

$$\begin{aligned} &= \frac{3.4}{57.5} + 0.0996 \\ &= \mathbf{15.88\%} \end{aligned}$$

d) Cost of new common stock,  $K_{ex} = \frac{3.4}{52} + 0.0996$

$$= \mathbf{16.51\%}$$

### Question 13

ABC Ltd. has expected earnings at Rs 30 per share which is growing at 8% annually. Company follows fixed payout ratio of 50%. The market price of its share is Rs 300. Find the following:

- a) Current cost of equity
- b) Cost of new equity if the firm issues fresh shares at current market price but with floatation cost of 5%

### Answer

- a) Cost of equity can be calculated by using constant growth valuation model. The formula is as under:

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

Here the EPS is given as Rs 30. Since the payout is 50%, therefore, the Dividend per share (DPS) =  $30 \times 0.5 = \text{Rs } 15$ .

$$\text{So, } K_e = \frac{15}{300} + 0.08$$

$$= 0.13 = 13\%$$

- b) Cost of new equity with 5% floatation cost:  $K_{ex} = \frac{K_e}{(1-f)}$

Where;

f- Floatation cost

$K_e$ - Cost of internal equity

So,

$$K_{ex} = \frac{0.13}{(1-0.05)}$$

$$= 0.1368 = 13.68\%$$

### Question 14

Asteck Ltd. is expected to earn Rs 30 per share. Company follows fixed payout ratio of 40%. The market price of its share is Rs 200. Find the following:

- i) Cost of existing equity if dividend tax of 15 % is imposed on the distributed earnings when a) current level of dividend amount is maintained, b) when dividend to the shareholders is reduced by the extent of dividend tax
- ii) How do you interpret the role of dividend distribution tax on cost of equity?

## Answer

- i) a) When dividend net of tax to shareholders maintained at same level

Such policy would reduce the retained earnings which in turn reduces the growth.

Dividend tax, t	15%
Dividend, D1	12
Amount of tax	1.8
Retained earnings	16.2

$$\text{Growth, } g = \text{Retained Earnings/Price} = 16.2/200 = 0.081 = 8.1\%$$

$$\text{Cost of equity } K_e = \frac{D_1}{P_0} + g$$

$$K_e = \frac{12}{200} + 0.081$$

$$= 0.141 = 14.1\%$$

- 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

$$\text{Dividend, } D_1 \text{ net of tax} = 12 - 1.8 = 10.2$$

$$\text{Retained earnings} = 18$$

$$\text{Growth, } g = \text{Retained Earnings/Price} = 18/200 = 0.09 = 9\%$$

$$\text{Cost of equity } K_e = \frac{D_1}{P_0} + g$$

$$K_e = \frac{10.2}{200} + 0.09$$

$$= 0.141 = 14.1\%$$

- ii) The cost of equity remains indifferent to the policy of distribution confirming the principle that cost of equity depends upon the earnings level only and not the way how are they appropriated.

## Question 15

*Janak Limited has its shares quoted in the market for last several years. Its beta is estimated to be 1.30. The yield on T - Bills is 5% and market return is expected to be 15%. Find the cost of equity for Janak Limited.*

**Answer**

Cost of equity capital as per CAPM

$$K_e = R_f + \beta(R_m - R_f) \dots\dots\dots(1)$$

Where;

R<sub>f</sub>- Risk free rate of return = 5%

β - Systematic risk of the shares = 1.3

R<sub>m</sub>- market return =15%

Putting the value of above variable in Eq (1) we get;

$$\begin{aligned} \text{Cost of equity } K_e &= 5\% + 1.3(15 - 5) \\ &= 18\% \end{aligned}$$

**Question 16**

*Tejas Limited has been growing at 20%. It had paid dividend of Rs 4.00 per share last year. The current growth is expected to last for another 5 years and thereafter it would be normal growth of the industry at 8%. Find out the following*

- a) *The current price of the share*
- b) *The price of the share after 1, 2, 3, 4, and 5 years*
- c) *The capital appreciation and the dividend yield for each of the 5 years*
- d) *Confirm that the cost of equity remains at 14% for each of the year*

**Answer**

a) The current price of the share can be calculated by using Dividend Distribution Model (DDM). The following information is available:

	<i>Current Price, P<sub>0</sub></i>
Present Dividend	Rs 4.00
Dividend Growth for first five years	20%
Dividend Growth from fifth years onwards	8%
Expected return	14%

First we have to find out the sum of the present value of next five years dividend which is growing at supernormal growth rate of 20%. It has been calculated in the following table:

<i>Year</i>	<i>Dividend</i>	<i>Present value (Discounted at 14%)</i>
0	4	4
1	4.80	4.21
2	5.76	4.43
3	6.91	4.67
4	8.29	4.91
5	9.95	5.17

Sum of present value of dividend 23.39

Now, the steady state growth after 5 years = 8%

At 5th year the price of the share would be given by DDM as follows.

$$\begin{aligned}
 P_5 &= \frac{D_6}{K_e - g} \\
 &= \frac{9.95(1+0.08)}{0.14-0.08} \\
 &= 179.1
 \end{aligned}$$

Therefore,  $P_0 =$  Discounted value of  $P_5 +$  Discounted value of dividend from Year 1 - 5

$$= 179.1 * PVF_{(0.14,5)} + 23.39$$

$$= 179.1 * 0.5194 + 23.39$$

$$= 116.44$$

b,c,d)

(b,c,d) Price at year 1,  $P_1$  would be governed by following:

$$P_0 = \frac{D_1}{(1+K_e)} + \frac{P_1}{(1+K_e)}$$

$$\text{So, } P_0(1+K_e) = D_1 + P_1$$

$$\text{So, } P_1 = P_0(1+K_e) - D_1$$

Similarly,  $P_2 = P_1(1+K_e) - D_2$  and so on

Following table shows the calculation for prices in year 1-5 as well as the capital appreciation, dividend yield and total return.

<i>Year</i>	<i>Dividend</i>	<i>Price</i>	<i>Capital Appreciation</i>	<i>Dividend Yield</i>	<i>Total return</i>
0	4	116.44			
1	4.80	127.94	9.88	4.12	14.00
2	5.76	140.09	9.50	4.50	14.00
3	6.91	152.79	9.07	4.93	14.00
4	8.29	165.89	8.57	5.43	14.00
5	9.95	179.16	8.00	6.00	14.00

The table above confirms that the cost of equity remains at 14% for each of the year.

### Question 17

*LalBhai Industries has three sources of capital - the equity shares, preference shares and straight debt, costing 18%, 15% and 7% respectively. The proportions of different kinds of capital as reflected in the balance sheet and as per the market values are as under*

<i>Capital</i>	<i>Proportions</i>	
	<i>Book Value (%)</i>	<i>Market value (%)</i>
<i>Equity</i>	50	70
<i>Preference</i>	20	15
<i>Debt</i>	30	15

*Find out the WACC based on*

- a) Book values*
- b) Market values*

### Answer

Cost of capital, WACC =  $K_e \cdot W_e + K_d \cdot W_d + K_p \cdot W_p$

Where;  $K_e$ - cost of equity,  $K_d$ - cost of debt,  $K_p$ - cost of preference share,  $W_e$ - weight of equity,  $W_d$ - weight of debt,  $W_p$ - weight of preference share

Following table shows the calculation.

	<i>Book value</i>		<i>Market Value</i>		
<i>Capital</i>	<i>Cost</i>	<i>Weight</i>	<i>W*Cost</i>	<i>Weight</i>	<i>W*Cost</i>
Equity	0.18	0.5	0.09	0.7	0.126
Preference	0.15	0.2	0.03	0.15	0.0225
Debt	0.07	0.3	0.021	0.15	0.0105
WACC			0.141		0.159

Therefore, the WACC based on book value is 14.1%, while WACC on market value is 15.9%.

### Question 18

Using the data for each firm shown in the following table, calculate the cost of retained earnings and the cost of new common stock using the constant-growth valuation model.

<i>Firm</i>	<i>Current Market price per share (Po)</i>	<i>Dividend growth rate (g)</i>	<i>Projected dividend per share next year (D1)</i>	<i>Under pricing per share</i>	<i>Floataion cost per share</i>
<i>A</i>	<i>50</i>	<i>0.08</i>	<i>2.25</i>	<i>2</i>	<i>1</i>
<i>B</i>	<i>20</i>	<i>0.04</i>	<i>1</i>	<i>0.5</i>	<i>1.5</i>
<i>C</i>	<i>42.5</i>	<i>0.06</i>	<i>2</i>	<i>1</i>	<i>2</i>
<i>D</i>	<i>19</i>	<i>0.02</i>	<i>2.1</i>	<i>1.3</i>	<i>1.7</i>

### Answer

Cost of retained earnings and cost external equity can be calculated as under:

First two columns show the calculation of cost of retained earnings.

The last two columns show the calculation of cost external equity. Here the  $N_n$  is the net proceed from the sale of new shares. So,  $N_n = (P_o - \text{Under pricing per share} - \text{Floataion cost per share})$

<i>Firm</i>	<i>Cost of Retained earning, <math>K_e = (D1/P_o)+g</math></i>	<i>Cost of Retained earning, <math>K_e = (D1/P_o)+g</math></i>	<i>Cost of External equity, <math>K_{ex} = (D1/N_n)+g</math></i>	<i>Cost of External equity, <math>K_{ex} = (D1/N_n)+g</math></i>
A	$(2.25/50)+0.08$	<b>0.125</b>	$\{2.25/(50-2-1)\}+0.08$	<b>0.128</b>
B	$(1/20)+0.04$	<b>0.090</b>	$\{1/(20-0.5-1.5)\}+0.04$	<b>0.096</b>
C	$(2/42.5)+0.06$	<b>0.107</b>	$\{2/(42.5-1-2)\}+0.06$	<b>0.111</b>
D	$(2.1/19)+0.02$	<b>0.131</b>	$\{2.1/(19-1.3-1.7)\}+0.02$	<b>0.151</b>

### Question 19

A firm has a target capital structure of 50 percent common stock, 5 percent preferred stock, and 45 percent debt. Its cost of equity is 16 percent, the cost of preferred stock is 7.5 percent, and the cost of debt is 9 percent. The relevant tax rate is 35 percent. What is its WACC?

### Answer

Using the equation to calculate the WACC, we find:

$$\begin{aligned} \text{WACC} &= 0.50 (0.16) + 0.05(0.075) + 0.45(0.09) (1 - 0.35) \\ &= 0.1101 \text{ or } 11.01\% \end{aligned}$$

### Question 20

Jimi Ltd. has on its books the amounts and specific (after-tax) costs shown in the following table for each source of capital.

<i>Source of capital</i>	<i>Book Value (Rs Crore)</i>	<i>Cost (%)</i>
<i>Equity</i>	<i>650000</i>	<i>16</i>
<i>Preference stock</i>	<i>50000</i>	<i>12</i>
<i>Long term debt</i>	<i>700000</i>	<i>5.3</i>

- Calculate the firm's weighted average cost of capital using book value weights.
- Explain how the firm can use this cost in the investment decision-making process.

## Answer

a) The weighted average cost of capital can be calculated as follows:

<i>Source of capital</i>	<i>Book Value (Rs Crore)</i>	<i>Weight</i>	<i>Cost (%)</i>	$WACC = Ke * We + Kp * Wp + Kd * Wd$
Equity	650000	0.46	16	7.43
Preference stock	50000	0.04	12	0.43
Long term debt	700000	0.5	5.3	2.65
Total	1400000	1		<b>10.51</b>

So, the weighted average cost of capital is 10.51%

b) The WACC is the rate of return that the firm must receive on long-term projects to maintain the value of the firm. The cost of capital can be compared to the return for a project to determine whether the project is acceptable.

## Question 21

*Amar Ltd. has compiled the information shown in the following table.*

<i>Source of capital</i>	<i>Book Value</i>	<i>Market value</i>	<i>After tax cost</i>
<i>Equity</i>	<i>1080000</i>	<i>3000000</i>	<i>17</i>
<i>Preference stock</i>	<i>50000</i>	<i>60000</i>	<i>13</i>
<i>Long term debt</i>	<i>4500000</i>	<i>3840000</i>	<i>6</i>
<i>Total</i>	<i>5630000</i>	<i>6900000</i>	

- Calculate the weighted average cost of capital using book value weights.*
- Calculate the weighted average cost of capital using market value weights.*

c. Compare the answers obtained in parts a and b. Explain the differences.

**Answer**

a) Weighted average cost of capital (WACC) using book value weights can be calculated as follows:

<i>Source of capital</i>	<i>Book Value (Rs Crore)</i>	<i>Weight</i>	<i>Cost (%)</i>	<i>WACC = Ke* We + Kp* Wp+ Kd * Wd</i>
Equity	1080000	0.19	17	3.26
Preference stock	50000	0.01	13	0.12
Long term debt	4500000	0.80	6	4.80
Total	5630000	1		8.17

So, the weighted average cost of capital is 8.17%

b) Weighted average cost of capital (WACC) using market value weights can be calculated as follows:

<i>Source of capital</i>	<i>Market Value (Rs Crore)</i>	<i>Weight</i>	<i>Cost (%)</i>	<i>WACC = Ke* We + Kp* Wp+ Kd * Wd</i>
Equity	3000000	0.43	17	7.39
Preference stock	60000	0.01	13	0.11
Long term debt	3840000	0.56	6	3.34
Total	6900000	1		10.84

So, the weighted average cost of capital is 10.84%

c) The difference lies in the two different value bases. The market value approach yields the better value because the costs of the components of the capital structure are calculated using the prevailing market prices. Since the common stock is selling at a higher value than its book value, the cost of capital is much higher when using the market value weights. Notice that the book value weights give the firm a much greater leverage position than when the market value weights are used.

## Question 22

Accurate Inc has determined that its optimal capital structure is composed of the sources and target market value weights shown in the following table.

Source of capital	Target market value weight (%)
Equity	55
Preference stock	15
Long term debt	30
Total	100

The cost of debt is estimated to be 7.2%; the cost of preferred stock is estimated to be 13.5%; the cost of retained earnings is estimated to be 16.0%; and the cost of new common stock is estimated to be 18.0%. All of these are after-tax rates. The company's debt represents 25%, the preferred stock represents 10%, and the common stock equity represents 65% of total capital on the basis of the market values of the three components. The company expects to have a significant amount of retained earnings available and does not expect to sell any new common stock.

- Calculate the weighted average cost of capital on the basis of historical market value weights.
- Calculate the weighted average cost of capital on the basis of target market value weights.
- Compare the answers obtained in parts a and b. Explain the differences.

## Answer

- a) WACC based upon historical market weights can be calculated as under:

Source of capital	Weight	Cost (%)	$WACC = K_e * W_e + K_p * W_p + K_d * W_d$
Equity	0.65	16	10.40
Preference stock	0.10	13.5	1.35
Long term debt	0.25	7.2	1.80
Total			<b>13.55</b>

So, the weighted average cost of capital is 13.55%

b) WACC based upon target market value weights can be calculated as under:

<i>Source of capital</i>	<i>Weight</i>	<i>Cost (%)</i>	$WACC = Ke * We + Kp * Wp + Kd * Wd$
Equity	0.55	16	8.80
Preference stock	0.15	13.5	2.03
Long term debt	0.30	7.2	2.16
Total			12.99

So, the weighted average cost of capital is 12.99%

c) Using the historical weights the firm has a higher cost of capital due to the weighting of the more expensive common stock component (0.65) versus the target weight of (0.55). This over-weighting in common stock leads to a smaller proportion of financing coming from the significantly less expensive long-term debt and the lower-costing preferred stock.

### Question 23

*Amyra Inc. reported net profit of Rs 4,200,000 in the last year. From those earnings, the company paid a dividend of Rs 1.26 on each of its 1,000,000 common shares outstanding. The capital structure of the company includes 40% debt, 10% preferred stock, and 50% common stock. It is taxed at a rate of 40%. If the market price of the common stock is \$40 and dividends are expected to grow at a rate of 6% per year for the foreseeable future, what is the company's cost of retained earnings financing? Also find out the cost external equity if under pricing and flotation costs on new shares of common stock amount to Rs 7.00 per share.*

### Answer

Cost of retained earnings can be calculated by using following formula:

$$Ke = \frac{D1}{Po} + g$$

Where;

D1- Dividend of next year =  $Do (1+g) = 1.26 (1+0.06) = 1.335$

Po- the current market price of share = 40

g- growth rate in dividend = 0.06

$$Ke = \frac{1.33}{40} + 0.06$$

$$= 0.093 = 9.3\%$$

Cost of external equity can be calculated by using following formula:

$$K_{ex} = \frac{D_1}{N_n} + g$$

Where  $N_n$  is the net proceed from sale of new shares. Here,  $N_n = 40 - 7 = 33$

$$\begin{aligned} K_{ex} &= \frac{1.33}{33} + 0.06 \\ &= 0.1003 = 10.3\% \end{aligned}$$

### Question 24

*Amit has just been awarded his degree in business. He has three education loans outstanding. They all mature in 5 years and can be repaid without penalty any time before maturity. The amounts owed on each loan and the annual interest rate associated with each loan are given in the following table.*

<i>Loan</i>	<i>Balance due (Rs)</i>	<i>Annual interest rate (%)</i>
<i>1</i>	<i>20000</i>	<i>6</i>
<i>2</i>	<i>12000</i>	<i>9</i>
<i>3</i>	<i>32000</i>	<i>5</i>

*Amit can also combine the total of his three debts (that is, Rs 64,000) and create a consolidated loan from his bank. His bank will charge a 7.2% annual interest rate for a period of 5 years.*

*Should Amit do nothing (leave the three individual loans as is) or create a consolidated loan?*

### Answer

Firstly, Amit should calculate his present weighted average cost of capital (WACC). It can be calculated as under:

<i>Loan</i>	<i>Balance due (Rs)</i>	<i>Weight (1/64000)</i>	<i>Annual interest rate (%)</i>	<i>WACC (2X3)</i>
<i>1</i>	<i>20000</i>	<i>0.31</i>	<i>6</i>	<i>1.88</i>
<i>2</i>	<i>12000</i>	<i>0.19</i>	<i>9</i>	<i>1.69</i>
<i>3</i>	<i>32000</i>	<i>0.50</i>	<i>5</i>	<i>2.50</i>
<i>Total</i>	<i>64000</i>	<i>1</i>		<i>6.06</i>

Amit should not consolidate his college loans because their weighted cost is less than the 7.2% offered by his bank.

### Question 25

*Romal Ltd. is trying to decide whether to revise its target capital structure. Currently it targets a 50–50 mix of debt and equity, but it is considering a target capital structure with 70% debt. Bajaj Exploration currently has 6% after-tax cost of debt and a 12% cost of common stock. The company does not have any preferred stock outstanding.*

- a) *What is Romal Ltd.'s current WACC?*
- b) *Assuming that its cost of debt and equity remain unchanged, what will be Bajaj Exploration's WACC under the revised target capital structure?*
- c) *Do you think shareholders are affected by the increase in debt to 70%? If so, how are they affected? Are their common stock claims riskier now?*

### Answer

- a) The WACC can be calculated as under:

$$WACC = K_e \cdot W_e + K_p \cdot W_p + K_d \cdot W_d$$

Where;  $K_e$ - cost of equity,  $K_d$ - cost of debt,  $K_p$ - cost of preference share,  $W_e$ - weight of equity,  $W_d$ - weight of debt,  $W_p$ - weight of preference share

So,  $WACC = 0.50 \cdot (0.12) + 0.50 \cdot (0.06) = 0.09$  or 9.0%

- b)  $WACC = 0.30 \cdot (0.12) + 0.70 \cdot (0.06) = 0.078$  or 7.8%
- c) They are affected, because under the revised capital structure there is more debt financing. Bond holders represent a prior, legal claim to the firm's operating income. A larger interest expense must be paid prior to any dividend payment. There is also a greater chance of bankruptcy, because the firm's operating income may be insufficiently large to accommodate the larger interest expense.

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# 5

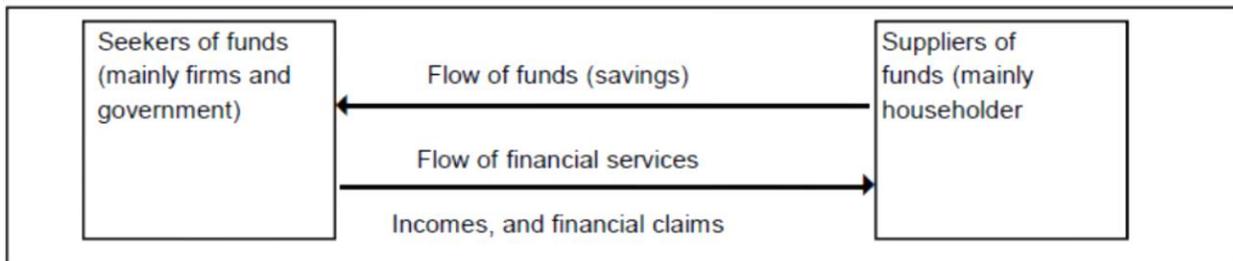
## Financial Services

### Question 1

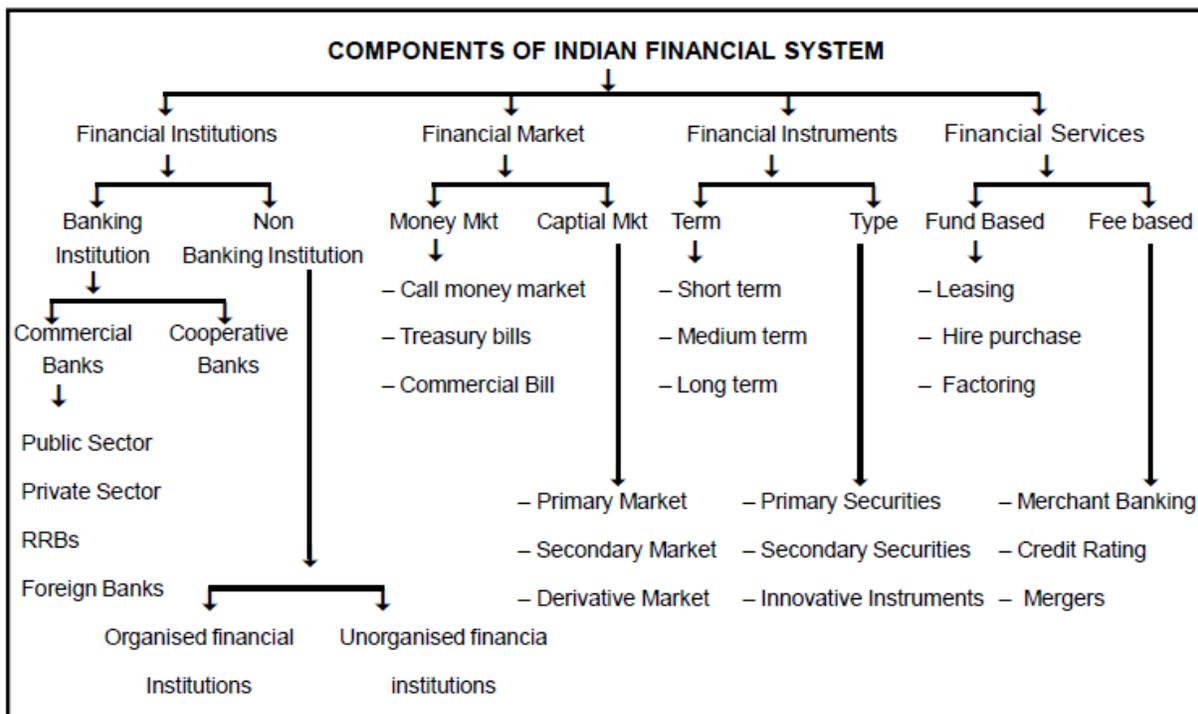
What do you mean by financial system? State its various components.

### Answer

A Financial System is a composition of various institutions, markets, regulations and laws, practices, money managers, analysts, transactions and claims and liabilities. It acts as an intermediary and facilitates the flow of funds from the areas of surplus to the areas of deficit.



### Components of Indian Financial System



## Question 2

*What do you mean by the term 'Financial services'? State various features of Financial services.*

### Answer

Financial services refer to services provided by the financial institutions in a financial system. The term '**Financial Services**' in a broad sense means "**mobilizing and allocating savings.**" Thus, it includes all activities involved in the transformation of savings into investment.

### Features of Financial Services

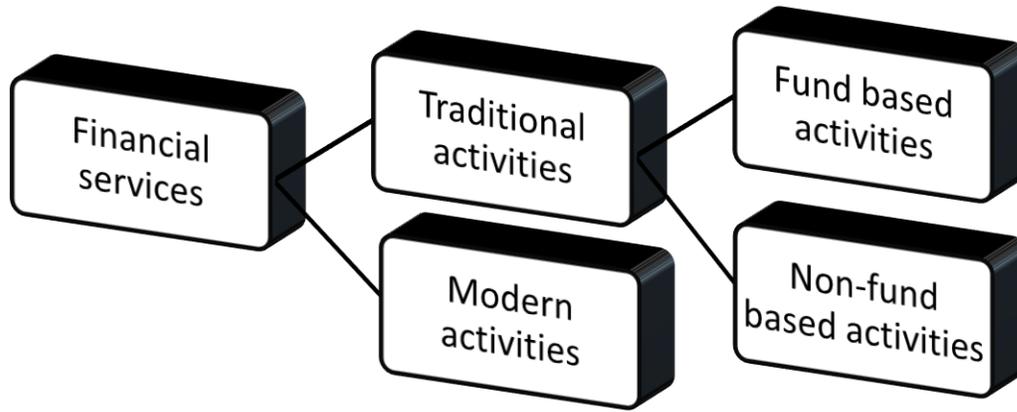
- (i) *Customer-Specific* : Financial services are usually customer focused. The firms providing these services, study the needs of their customers in detail before deciding their financial strategy, giving due regard to costs, liquidity and maturity considerations.
- (ii) *Intangibility* : In a highly competitive global environment brand image is very crucial for financial institutions providing financial products and services in order to enjoy the confidence of their clients. Thus institutions have to focus on the quality and innovativeness of their services to build up their credibility.
- (iii) *Concomitant* : production of new and innovative financial services and supplying of these services are to be performed simultaneously. Both Production of financial services and supply of these services have to be concomitant.
- (iv) *Tendency to Perish* : Unlike any other service, financial services do tend to perish and hence cannot be stored. They have to be supplied as required by the customers. Hence financial institutions have to ensure a proper synchronization of demand and supply.
- (v) *People based services* : The personnel in financial services organisation need to be selected on the basis of their suitability and trained properly, so that they can perform their activities efficiently and effectively.
- (vi) *Market Dynamics* : Market dynamics depends to a great extent, on socioeconomic changes such as disposable income, standard of living and educational changes related to the various classes of customers. Therefore financial services have to be constantly redefined and refined taking into consideration the market dynamics.

## Question 3

*The scope of financial services in India is very wide. Discuss the various activities covered under financial services.*

## Answer

### Scope of Financial Services



#### (i) Traditional Activities

Traditionally, the financial intermediaries have been rendering a wide range of services encompassing both capital and money market activities. They can be grouped under two heads:

**a) Fund based activities :** The traditional services which come under fund based activities are the following:

- Underwriting or investment in shares, debentures, bonds, etc. of new issues (primary market activities).
- Dealing in secondary market activities.
- Participating in money market instruments like commercial Papers, certificate of deposits, treasury bills, discounting of bills etc.

**b) Non-fund based activities :** Financial intermediaries provide services on the basis of non-fund activities also. This can be called 'fee based' activity. They include:

- Managing the capital issue.
- Making arrangements for the placement of capital and debt instruments with investment institutions.
- Arrangement of funds from financial institutions for the clients' project cost or his working capital requirements.
- Assisting in the process of getting all Government and other clearances.

## **(ii) Modern activities**

The financial intermediaries render innumerable services in recent times. Most of them are in the nature of non-fund based activity like undertaking services relating to the capital market, such as clearing services, registration and transfers, safe custody of securities, collection of income on securities etc.

### **Question 4**

*Describe the various types of Merchant banking organizations and role performed by them.*

### **Answer**

Merchant banking services strengthen the economic development of a country as they acts as sources of funds and information for corporations. A merchant banker is any person who is engaged in the business of issue management either by making arrangements regarding selling, buying or subscribing to securities or acting as manager/consultant/advisors or rendering corporate advisory service in relation to such issue management.

### **Types of Merchant Banking Organizations**

According to the Securities and exchanges Board of India, four categories of the merchant banking organizations exist in the country:

- Institutional based merchant banking organizations operate as subsidiaries of private financial institutions or those recognized by the state or central governments.
- Banker based organizations are those that operate as divisions or subsidiaries of the nationalized commercial banks or the foreign banks functioning in the country.
- The third category consists of qualified brokers who provide skilled merchant banking services like portfolio management.
- The private merchant banking organizations work as sole proprietorships, private limited, public limited or partnership companies.

### **Functions of Merchant Banking Organizations**

Merchant bankers undertake the following activities:

- a) Managing of public issue of securities;
- b) Underwriting connected with the aforesaid public issue management business;
- c) Managing/Advising on international offerings of debt/equity i.e. GDR, ADR, bonds and other instruments;
- d) Private placement of securities;
- e) Primary or satellite dealership of government securities;
- f) Corporate advisory services related to securities market including takeovers, acquisition and disinvestment;
- g) Stock broking;

- h) Advisory services for projects;
- i) Syndication of rupee term loans;
- j) International financial advisory services.

The activities of the merchant bankers in the Indian capital market are regulated by SEBI (Merchant Bankers) Regulations, 1992 notified by SEBI in exercise of the powers conferred by Section 30 of SEBI Act, 1992 after approval of the Central Government.

### **Question 5**

*'Loan syndication is one of the project finance services.' Discuss.*

#### **Answer**

Loan syndication involves obtaining commitment for term loans from the financial institutions and banks to finance the project. Basically it refers to the services rendered by merchant bankers in arranging and procuring credit from financial institutions, banks and other lending and investment organisation or financing the client project cost or working capital requirements.

Loan syndication is infact a tie up of term loans from the different financial institutions. The process of loan syndication involves various formalities such as:

- Preparation of project details,
- Preparation of loan application,
- Selection of financial institutions for loan syndication,
- Issue of sanction letter of intent from the financial institutions,
- Compliance of terms and conditions for the availment of the loan,
- Documentation, and
- Disbursement of the loan.

### **Question 6**

*Explain the process of securitisation of debt and the participants involved in the process.*

#### **Answer**

Securitisation of debt is a technique by which identified receivables and other financial assets can be packaged into transferable securities and sold to investors. The instruments issued under a securitisation deal derive their value from the cash flows (current or future) or collateral value of a specified financial asset or pool of financial assets, general debt obligations or other financial receivables.

## Participants of the securitisation process

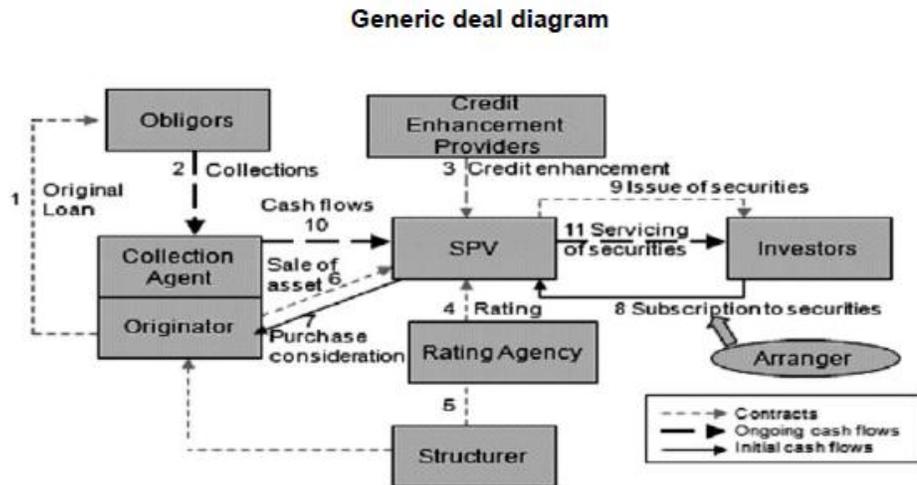
The following parties are involved in a typical securitisation deal:

1. **Originator:** This is the entity that requires the financing and hence is the driver of the deal. Typically the Originator owns the assets or cash flows around which the transaction is structured.
2. **SPV (Special Purpose Vehicle):** An SPV is typically used in structured transaction for ensuring bankruptcy remoteness from the Originator. The SPV is the issuer of securities or the entity through which the financing is channeled. Typically the ownership of the cash flows or assets around which the transaction is structured is transferred from the Originator to the SPV at the time of execution of the transaction. The SPV is typically a marginally capitalized entity with narrowly defined purposes and activities and usually has independent trustees/directors.
3. **Investors :** The investors are the providers of funds and could be individuals or institutional investors like banks, financial institutions, mutual funds, provident funds, pension funds, insurance companies, etc.
4. **Obligor(s) :** The Obligor is the Originator's debtor. The amount outstanding from the Obligor is the asset that is transferred to the SPV. The credit standing of the Obligor(s) is of paramount importance in a structured finance transaction.
5. **Guarantor/Credit Enhancement Provider/Insurer :** These are entities that provide protection to the Investor for the finance provided and the returns thereon against identified risks. Typically, on the happening of pre-identified events, affecting the underlying assets or cash flows or the payment ability of the Obligors, these entities pay moneys, which are passed on, to the Investor.

Besides these primary parties, the other parties involved in a deal are given below:

1. **Rating Agency:** Since structured finance deals are generally complex with intricate payment structures and legal mechanisms, rating of the transaction by an independent qualified rating agency plays an important role in attracting Investors.
2. **Administrator or Servicer:** The Servicer performs the functions of collecting the cash flows, maintaining the assets, keeping records and general monitoring of the Obligors. In many cases, especially in the Indian context, the Originator also performs the role of the Servicer.
3. **Agent and Trustee:** The Trustee is the manager of the SPV and plays a key role in the transaction. The Trustee generally administers the transaction, manages the inflow and outflow of moneys, and does all acts and deeds for protecting the rights of the Investors including initiating legal action against various participants in case of any breach of terms and triggering payment from various credit enhancement structures.

4. **Structurer:** Normally, an investment banker acts as the structurer and designs and executes the transaction. The Structurer also brings together the Originator, Credit Enhancement Provider, the Investors and other parties to a deal. In some cases (like ICICI), the Investor also acts as the Structurer.



A securitisation deal normally has the following stages:-

1. The originator issues loan to the obligors
2. The cashflows (principal + interest) on the loan are collected by the collection agent on behalf of the originator.
3. Support mechanisms (or credit enhancements) are appointed in the structure in order to minimise or mitigate potential credit risks.
4. The loan pool is selected and credit rating is taken.
5. A structure, generally, a merchant banker is appointed.
6. The SPV is formed. It acquires the receivables under an agreement at their discounted value.
7. The SPV pays the purchase consideration to the originator.
8. & 9. The SPV funds the purchase by issuing class A (senior) Pass Through Certificates (PTCs) and class B (Subordinated) PTCs.
9. The collection agent collects the receivables, usually in an escrow mechanism, and pays off the collection to the SPV.
10. The SPV either passes the collection to the investors, or reinvests the same to pay off to investors at stated intervals.

### Question 7

Write short notes on the following:

- a) Asset backed securitization

*b) Benefits of Depository system*

*c) Merchant banking*

**Answer**

**a) Asset backed securitization**

Asset backed Securitisation is securitisation of receivables which are “existing” i.e. the obligation of the Obligor to make payments is not dependent on further action or performance by the Originator. E.g. Mortgage-backed receivables, auto receivables securitisation and hire purchase rental receivables.

The investors prefer to invest in asset-backed securities because:

- Securitization creates instruments with differing maturities, risks, coupons, which is appealing to investors. Securitization is a structured financial instrument i.e. tailored to the risk-return and maturity needs of investors, rather than a simple claim against an entity or asset.
- Asset-Backed Securitization offers a yield higher than instruments with comparable risk. This is due to the credit worthiness of the instruments (usually AAA rated) and the credit enhancement features.

**b) Benefits of Depository system**

In the depository system, the ownership and transfer of securities takes place by means of electronic book entries. At the outset, this system rids the capital market of the dangers related to handling of paper. The system provides numerous direct and indirect benefits, like:

- Elimination of bad deliveries
- Elimination of all risks associated with physical certificates
- Immediate transfer and registration of securities
- Faster disbursement of non cash corporate benefits like rights, bonus, etc.
- Reduction in brokerage by many brokers for trading in dematerialised securities
- Reduction in handling of huge volumes of paper and periodic status reports
- Elimination of problems related to change of address of investor, transmission, etc.
- Elimination of problems related to selling securities on behalf of a minor.

**c) Merchant banking**

Merchant banking services strengthen the economic development of a country as they acts as sources of funds and information for corporations. A merchant banker is any person who is engaged in the business of issue management either by making arrangements regarding selling, buying or subscribing to securities or acting as manager/consultant/advisors or rendering corporate advisory service in relation to such issue management.

Merchant bankers undertake the following activities:

- a) Managing of public issue of securities;
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- h) Advisory services for projects;
- i) Syndication of rupee term loans;
- j) International financial advisory services.

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# 6

## Project Planning

### Question 1

*What is a Project plan? Enumerate various steps in the Project planning process.*

### Answer

A project plan is a formal, approved document that is used to manage and control a project. The project plan forms the basis for all management efforts associated with the project. It is a document that is also expected to change over time. The project plan documents the pertinent information associated with the project; the information associated with the plan evolves as the project moves through its various stages and is to be updated as new information unfolds about the project.

*Steps in the Project Planning Process are:*

The planning process consists of the following basic tasks:

- (a) Define the technical approach used to solve the problem.
- (b) Define and sequence the tasks to be performed and identify all deliverables associated with the project.
- (c) Define the dependency relations between tasks.
- (d) Estimate the resources required to perform each task.
- (e) Schedule all tasks to be performed.
- (f) Define a budget for performing the tasks.
- (g) Define the organization used to execute the project.
- (h) Identify the known risks in executing the project.
- (i) Define the process used for ensuring quality.
- (j) Define the process used for specifying and controlling requirements.

### Question 2

*What is a project report and why is it necessary to prepare project report?*

### Answer

Project report is a working plan for implementation of project proposal after investment decision by a company has been taken.

Importance of preparation of project report has been felt in the wake of sophisticated technology being adopted and the heavy financial state of public funds through financial

institutions, banks and investment organization being contemplated. High technology involvement, higher cost in the project implementation and as such economy cannot afford to tolerate failure of the project. Therefore, to ensure before taking in hand a project whether or not the proposed project is viable, preparation of project report has become essential exercise for all corporate units particularly in the light of the following background:

- (1) Planning in advance, the accomplishment of the following objectives:
  - (a) Performance Objectives
  - (b) Marketing Objectives
  - (c) Operations Objectives
  - (d) Technical Objectives
  - (e) Financial Objectives
  - (f) Personnel Objectives
  - (g) Organisation Objectives
  - (h) The end product Objectives
  - (i) The customer benefit Objectives, and
  - (j) The societal Objectives
- (2) To evaluate above objectives in the right perspective it is essential to consider the input data, analyse the data, predict outcome, choose best alternatives, take action and measure results with predictions. Stress is laid that the objectives become measurable, tangible, verifiable, attainable and the risk of failures is avoided to the maximum desired extents.
- (3) To evaluate constraints on resources viz. manpower, equipment, financial and technological.
- (4) To avail of the financial facilities who require a systematic project report to evaluate desirability of financing the project. Besides, the financial intermediaries today check up and verify the project proposals for accepting the responsibility for a company to procure funds from the capital market. Merchant banks who have entered in the capital market as financial intermediaries are quite careful about the project viability before taking up a contract for making financial services available to corporate units.
- (5) Successful implementation of a project depends upon the course of action suggested in the project report. Besides, comparison of results will depend upon the projected profitability and cash flows, production schedule and targets as planned in the project report.

### **Question 3**

*What guidelines are followed by banks and financial institutions for Project appraisal under inflationary conditions?*

## Answer

The project appraisal by banks and financial institutions under inflationary conditions is generally done keeping in view the following guidelines:

- (1) Make provisions for delay in project implementation, escalation in project cost as per the forecasted rate of inflation in the economy particularly on all heads of cost.
- (2) Sources of finance should be carefully scrutinized with reference to revision in the rate of interest to be made by lender and the revision which could be followed in the interest bearing securities. All these factors will push up the cost of financial resources for the corporate unit.
- (3) Profitability and cash flow projections as made in the project report require revision and adjustment should be made to take care of the inflationary pressures affecting adversely future projections.
- (4) Explain fully the criteria followed in adjusting the inflationary pressures viz. there are two criteria followed given as under:-
  - (a) take inflationary rate at average rate and escalate the total cost at that rate;
  - (b) adjust each cost item against inflationary rate. This would make adjustment for inflationary pressures in the cost elements responsible outflows and the revenue elements in the cash. Both cash inflows and outflows will accordingly adjust to inflationary changes at the appropriate rate applicable to each of them respectively.
- (5) Examine the financial viability of the project at the revised rates and assess the same with reference to economic justification of the project. The appropriate measure for this aspect is the economic rate of return for the project which will equate the present value of capital expenditure to net cash flows over the life of the project. The rate of return should be acceptable which accommodates the rate of inflation per annum.
- (6) In inflationary times, early pay back projects should be prepared. Because projects with long pay back are more subjected to inflationary pressures and the cash flow generated by the project will bear high risk.

## Question 4

*Explain in detail various Viability tests carried out by a bank/financial institution after analyzing the project and promoter's capacity.*

## Answer

After analyzing the Project and Promoters capacity, a bank/financial institution carries out following validity tests:

### **A. Technical Aspects of Project Appraisal**

This involves studying the feasibility of selected technical processes and its suitability under home conditions, location of the project, plant layout, appropriateness of the chosen equipment, machinery and technology, availability of raw material, power and

other inputs, appropriateness of technology chosen from social point of view, availability of infrastructure for the project, the techno economic assumptions and parameters used for analyzing costs and benefits and viability provision for treatment of effluents, training of manpower, legal requirement on documentation, license and registration.

**B. The Financial Aspects of Project Appraisal**

The primary aim of financial analysis is to determine whether the project satisfies the investment criteria of generating acceptable level of profitability. The project should be able to service the debt and ensure expected returns to the investor. The important aspects which are examined while conducting financial appraisal are investment outlay, means of financing, projected financial statements, viability and profitability, break-even point analysis, sensitivity analysis and risk analysis.

**(a) Measures of Financial Viability – NPV, BCR and IRR**

Financial viability is measured by net present value, benefit cost ratio, internal rate of return and debt service coverage ratios.

- (i) Net Present Value (NPV)** representing wealth creation by the Project, is calculated by taking the discounted sum of the stream of cash flows during the project life. In symbolic terms we can express NPV of a project as under:

$$NPV = \frac{C_1}{(1+r)} + \frac{C_2}{(1+r)^2} + \dots + \frac{C_n}{(1+r)^n} - \text{Invst.}$$

Where  $C$  = Cash Flows for different periods,  $r$  = Discount Rate and Invest. = Initial Investment

In other words, NPV represents the difference between the present value of the cost and benefit streams.

A project is considered viable if the NPV is positive at a given discount rate and vice-versa. When two or more mutually exclusive projects are being appraised, the project with the highest NPV should be selected. Among the discounted techniques, NPV is considered the most important parameter for assessing viability.

- (ii) Benefit Cost Ratio (BCR)** : BCR is the ratio of discounted value of benefit and discount value of cost. It can be expressed as under:-

$$BCR = \frac{\text{Summation of discounted value of Benefits}}{\text{Summation of discounted value of Costs}}$$

The project is viable when BCR is one or more than one and is unviable when it is less than one.

- (iii) Internal Rate of Return (IRR)** : IRR represents the returns internally generated by the project. This is also the rate which makes the net present value equal to 0. The calculation of IRR is a process of trial and error. Normally, the process starts with the minimum discount rate and as the

discount rate is increased the NPV will come down and becomes 0 or negative. If NPV is positive at one rate and negative at the immediate next rate, 'Interpolation Method' could be used for finding out the exact IRR by the following formula.

$$\text{Exact IRR by interpolation method} = \frac{L + (H - L) \times (\text{NPV at } L)}{\{(\text{NPV at } L) - (\text{NPV at } H)\}}$$

Where, IRR = Internal Rate of Return; L = Lower discount rate where NPV was positive; H = Higher discount rate at which NPV was negative.

The project is considered viable if the IRR is more than the acceptable rate for the entrepreneur which could be the opportunity cost for his funds.

**(b) Sensitivity Analysis**

Projects are sensitive to fluctuation in values of critical variables like costs of inputs and prices of outputs. It is important to examine how sensitive is the project to fluctuations in the values of these variables because the basic assumptions taken for projections of balance sheet, cash flow statements for future years have an element of uncertainty. Different projects may, however, get affected differently from changes in the assumption of cost and return items. Sensitivity analysis helps us in finding out that how sensitive is the project to these fluctuations.

Sensitivity analysis involves identification of crucial variable relating to costs and returns, specification of alternative values of the crucial variables and re-computation of the NPV and IRR by using the alternative values. A project, which is highly sensitive to even small fluctuations in cost and price, is a risky project for financing.

**(c) Scenario Analysis**

Sensitivity analysis takes care of only one or two variable which is at times inadequate. This limitation is partially overcome by scenario analysis, where scenario of certain prices, cost and other variables are created and the financial parameters are computed.

**(d) Risk Analysis**

Under risk analysis, probabilistic analysis is done by identification of key risk variables, finding out values of each risk variable, assigning probabilities for each value to each of the risk variables, using these values for risk analysis and finding out the probability of negative outcome of the project, i.e. what is the probability that the NPV of the project will be negative. The risk analysis adds valuable information to the project analysis and it is an important tool in this respect but to take up investment or not depends on the risk taking capacity of the entrepreneur which will vary from person to person. Therefore, it is judgmental in nature.

### **C. Economic Appraisal**

The objective of economic appraisal is to examine the project from the entire economy's point of view to determine whether the project will improve the economic welfare of the country. Economic appraisal is traditionally not conducted in banks or financial institutions. It is generally conducted by agencies like the World Bank and the development agencies of the Government for the projects having huge investment and profound implication for the economy. Examples of the projects where economic analysis is conducted are big dams, forestry projects and big industrial projects.

### **D. Social/distributive Appraisal**

For an analysis of a project to be complete, it should include not only the financial and economic but also social appraisal. The social analysis consists of two parts: measurement of the distribution of the income due to the project and identification of the impact on the basic needs objectives of the society.

The steps involved in social appraisal are: conducting financial analysis, economic analysis and appraisal of distributional effect of the net benefits (externalities) of the project. After social and distributive analysis it may emerge that a project is financially unviable but socially and economically is viable. In such situations the decisions to undertake the project would depend upon the goals of the Government. If the Government believes that the positive externalities are worth the negative financial cash flow, it may decide to implement the project.

### **E. Environmental Aspects**

Nowadays huge importance is being attached to the environmental aspects in the projects and most of the banks and financial institutions insist on Environmental Impact Assessment (EIA). The essence of EIA is a prediction of the consequences to the natural environment from development projects. The emphasis in EIA is on those consequences of the projects which are relatively well known and whose magnitudes can be easily estimated. Conditional, uncertain or probabilistic aspects of the impacts are not considered. Another elaborate analysis called Environmental risk Assessment (ERA) is used to differentiate a new and additional analysis in which the probabilistic element is explicitly addressed.

### **F. Organizational and Managerial Aspects**

The organizational and managerial aspects evaluate the managerial capacity of the organization or the entrepreneur, responsible for implementing the project. Even if very good technology is chosen for the project, it may fail due to lack of or inadequate managerial capability. In small agricultural and other projects the entrepreneur is responsible for taking care of all these aspects. It is important for the banker to judge the borrower's managerial capability and also his financial capability (worth). In case of cost escalation he should be in a position to meet the additional financial requirement for the project.

## G. Commercial Aspects Including Marketing

Commercial aspects of a project include arrangement for supply of inputs for the initiation and operation of the project and marketing of outputs. Some experts prefer to have a separate marketing module and would treat it as the most important aspect of appraisal.

### Question 5

*What is Social Cost benefit analysis (SCBA) of project? Explain the approaches for SCBA.*

### Answer

Social cost-benefit analysis is a systematic and cohesive method to survey all the impacts caused by a project. It comprises not just the financial effects (investment costs, direct benefits like tax and fees, etc), but all the social effects, like: pollution, safety, indirect (labour) market, legal aspects, etc. The main aim of a social cost benefit analysis is to attach a price to as many effects as possible in order to uniformly weigh the abovementioned heterogeneous effects. As a result, these prices reflect the value a society attaches to the caused effects, enabling the decision maker to form a statement about the net social welfare effects of a project.

### Two approaches for SCBA

- **UNIDO Approach:** - This approach is mainly based on publication of UNIDO (United Nation Industrial Development Organisations) named Guide to Practical Project Appraisal in 1978.

The UNIDO guidelines provide a comprehensive framework for appraisal of projects and examine their desirability and merit by using different yardsticks in a step-wise manner. The desirability is examined from various angles, such as the impact on

- (a) Financial profitability of utilization of domestic resources,
- (b) Savings and consumption pattern,
- (c) Income distribution, and
- (d) Production of merit and demerit goods.

- **L-M Approach :-** IMD Little and J.A. Mirrlees approach for analysis of Social Cost Benefit in Manual of Industrial Project “ Analysis in Developing countries and project Appraisal and planning for Developing Countries. The seminal work of Little and Mirrlees on benefit-cost analysis systematically develops a theoretical basis for the analysis and its underlying assumptions and lays down step-wise procedure for undertaking benefit-cost studies of public projects. The mathematical formulation is identical to the UNIDO method except for differences in assigning value to discount rates and accounting for imperfections and other market failures and social considerations.

Like UNIDO guidelines, the Little-Mirrlees method also suggests valuation of project investment at opportunity cost (shadow prices) of resources to correct distortions due to market imperfections.

## Question 6

*Explain the various sources of Finance for Project financing.*

### Answer

Different sources of finance for Project financing are:

- 1. Term Loans from Financial Institutions and Banks:** Term loan is a long term secured debt extended by banks or financial institutions to the corporate sector for carrying out their long term projects maturing between 5 to 10 Years which is normally repaid in monthly or quarterly equal installment. They are external source of finance paid in installments governed by loan agreement and covenants. Term loan is a type of funding which is most suitable for projects involving very heavy investment which is not possible by an individual or promoters. Big projects cannot be concluded in a year or two. To yield return from them, long term perspective is required. Such big ventures are normally financed by big banks and financial institutions. If the investment is too large, several banks come together and finance it. Such type of term loan funding is also called as consortium loan Term loan is acquired for new projects, diversification of business, expansion projects, or for modernization or technology upgradation.
- 2. Lease finance:** A lease represents a contractual arrangement whereby the lessor grants the lessee the right to use an asset in return for periodic lease rental payments.  
There are two broad types of lease: finance lease and operating lease.
- 3. Hire-purchase:** Hire Purchase is a loan or contract that involves an initial deposit, linked to a specific purchase, which is a way of obtaining the use of an asset before payment is completed. The payments of the HP are in monthly installments, plus interest within which at the end of the agreement. Finance companies usually offer the facility of leasing as well as hire-purchase to its clients.
- 4. Venture capital:** Venture capital is a source of financing for new businesses. Venture capital funds pool investors' cash and loan it to startup firms and small businesses with perceived, long-term growth potential. This is a very important source of funding startups that do not have access to other capital and it typically entails high risk (and potentially high returns) for the investor.
- 5. Private equity:** Private equity is a way to invest in some assets that isn't publicly traded, or to invest in a publicly traded asset with the intention of taking it private. Unlike stocks, mutual funds, and bonds, private equity funds usually invest in more illiquid assets, i.e. companies. By purchasing companies, the firms gain access to those assets and revenue sources of the company, which can lead to very high returns on investments. Another feature of private equity transactions is their extensive use of debt in the form of high-yield bonds. By using debt to finance acquisitions, private equity firms can substantially increase their financial returns.
- 6. Deferred payment arrangements:** A deferred payments arrangement is one of the sources of finance to industry. Machinery suppliers in India or overseas where

machinery is proposed to be imported may agree to accept payment in a scheduled manner in installments in the period ahead of delivery. This is known as deferred payment arrangement with the machinery suppliers. The machinery suppliers in India or abroad may agree to above arrangement on security which is procured in the form of guarantee from financial institutions and banks of repute relied upon by the machinery suppliers.

**7. International finance and syndication of loans:** International finance plays a very important role in financing the cost of capital of projects of the corporate sector.

In international financial market the borrower from one country may seek lenders in other countries in specific currency which need not be of the participant country. In international financial market, the availability of foreign currency is assured under four main systems: (a) Euro currency market; (b) Export credit facilities; (c) Bond issues; and (d) Financial institutions.

Some new financial instruments like **Swaps** are also available as a source of International finance. Swap is the international finance market instrument for managing funds. The basic concept involved in swaps is matching of difference between spot exchange rate for a currency and the forward rate. The swap rate is the cost of exchanging one currency into another for a specified period of time. The swap will represent an increase in the value of the forward exchange rate (premium of a decrease discount). There are three main types of swaps (a) interest swap; (b) currency swap; (c) combination of both.

**Syndicated Euro Currency Loans:** The Eurocurrency market refers to the availability of a particular currency in the international financial market outside the 'home country' of that currency. For example, the Eurodollar market refers to the financial market for US dollars in England, France, West Germany, Hong Kong and other financial centres outside the US.

### Question 7

*Rising prices may lead to cost escalation of project. As a finance manager how can you finance such a cost escalation?*

### Answer

Financing cost escalation depends upon the corporate arrangements as to how the project cost has originally been financed. There may be two different aspects to treat the financing of cost escalation as discussed below:

1. Firstly, financing cost escalation in the case when the project is new and financed by owner fund only. In such cases, the raising of equity is costly but issue of right shares to existing shareholder could be planned and this cost be met out.

There may be another situation when the company is existing company and project cost is being financed by its internal funds. In this case the company can capitalise its reserves and surplus and use the amount in financing cost escalation.

2. In the second situation where the company has been using borrowed sums in addition to equity capital for financing the project cost, it can always make request of additional funds to the lending institutions to meet the cost escalations or over runs in the project cost. In case the cost escalation is of greater magnitude then the company will have to go to raise funds from equity holders besides raising loans from the institutions so as to maintain the debt equity ratio tin the existing balanced and planned proportions.

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# 7

## Dividend Policy

### Question 1

*What are the factors determining dividend policy of a company?*

### Answer

#### Determinants of dividend policy

Following are major determinants of dividend policy:

- (i) *Dividend Payout Ratio* : A certain share of earnings to be distributed as dividend has to be worked out. This involves the decision to pay out or to retain. The payment of dividends results in the reduction of cash flows of the company and, therefore, depletion of assets from the balance sheet in turn. In order to maintain the desired level of assets as well as to finance the investment opportunities, the company has to decide upon the payout ratio very carefully. D/P ratio should be determined with two broad objectives – maximising the wealth of the firms' owners and providing sufficient funds to finance future growth.
- (ii) *Stability of Dividends* : Generally, investors favour a stable dividend policy. The policy should be consistent and a certain minimum dividend should be paid regularly. The liability can take any form, namely, constant dividend per share; stable D/P ratio and constant dividend per share plus something extra. Because it entails – the investor's desire for current income, information content about the profitability or efficient working of the company; creating interest for institutional investor's etc.
- (iii) *Legal, Contractual and Internal Constraints and Restriction* : Legal as well as contractual requirements have to be followed. All requirements of Companies Act, SEBI guidelines, capital impairment guidelines, net profit and insolvency etc. have to be kept in mind while declaring dividend. For example, an insolvent firm is prohibited from paying dividends and before paying dividend accumulated losses have to be set off, however, the dividends can be paid out of current or previous years' profit. Also, there may be some contractual requirements which need to be honoured. Maintenance of certain debt equity ratio may be one of such requirements. In addition, there may be certain internal firm specific constraints too. . These include growth prospects, financial requirements, availability of funds, earning stability and control etc.

- (iv) *Owner's Considerations* : These may include tax status of shareholders, alternative opportunities for investment, dilution of ownership etc.
- (v) *Capital Market Conditions and Inflation* : Capital market conditions and rate of inflation also play a dominant role in determining the dividend policy of any company. Furthermore, the extent to which a firm has access to the capital market, also affects dividend policy. A firm having easy access to capital market will follow a liberal dividend policy as compared to the firm having limited access. Sometimes, dividends are paid to keep the firms 'eligible' for certain requirements of the capital market. During inflation, rising prices eat into the value of money of investors being received by them as dividends. Good companies will try to compensate for rate of inflation by paying off higher dividends. Replacement decision of the company's assets also affects their dividend policy.

### **Question 2**

*Dividend policy is strictly a financing decision and payment of cash dividend is a passive residual. Comment.*

### **Answer**

According to Ezra Solomon's Residual Theory of Dividend Policy, dividend policy is strictly a financing decision; the payment of cash dividend is a passive residual. The amount of dividend payout will fluctuate from period to period in keeping with fluctuations in the amount of acceptable investment opportunities available to the firm. If the opportunities are in plenty, percentage of payout is likely to be zero; on the other hand, if the firm is unable to find out profitable investment opportunities, payout will be 100 per cent. The theory implies that investors prefer to have the firm retain and reinvest earnings rather than pay them out in dividends if the return on re-invested earnings exceeds the rate of return the investors could themselves obtain on other investments of comparable risks.

### **Question 3**

*Differentiate between 'Stable dividend policy' and 'residual dividend policy'.*

### **Answer**

#### **Stable Dividend Policy**

Profit of the firm fluctuates considerably with changes in the level of business activity. This dividend increases with a lag after earnings rise and this increase in earnings appear quite sustainable and relatively permanent. This stability could take three forms: (1) keep dividends at a stable rupee amount but allow its pay-out ratio to fluctuate, or (2) maintain stable pay-out ratio and let the rupee dividend fluctuate, or (3) set low regular dividend and then supplement it with year-end "extras" in years when earnings are high.

#### **Residual Dividend Policy**

The amount of dividend payout fluctuates from period to period in keeping with fluctuations in the amount of acceptable investment opportunities available to the firm. If the opportunities abound, percentage of payout is likely to be zero; on the other hand, if the firm is unable to find out profitable investment opportunities, payout will be 100 percent.

The theory implies that investors prefer to have the firm retain and reinvest earnings rather than pay them out in dividends.

#### **Question 4**

*Write short note on effect of a Government imposed freeze on dividends on stock prices and the volume of capital investment in the background of Miller-Modigliani (MM) theory on dividend policy.*

#### **Answer**

According to MM theory, under a perfect market situation, the dividend decision of any firm is irrelevant as it does not affect the value of firm. Thus, under MM's theory, the government imposed freeze on dividends should make no difference on stock prices. Firms not paying dividends will have higher retained earnings and will either reduce the volume of new stock issues, repurchase more stock from market or simply invest extra cash in marketable securities. In all of the above cases, the loss by investors of cash dividends will be made up in the form of capital gains.

Whether the Government imposed freeze on dividends has an effect on volume of capital investment in the background of MM theory on dividend policy fetches two arguments. First argument is that if the firms keep their investment decision separate from their dividend and financing decision, then the freeze on dividend by the Government will have no effect on volume of capital investment. If the freeze restricts dividends the firm can repurchase shares or invest excess cash in marketable securities e.g. in shares of other companies.

Other argument is that the firms do not separate their investment decision from dividend and financing decisions. Rather, they prefer to make investment from internal funds. In this case, the freeze of dividend by government could lead to increased real investment.

#### **Question 5**

*Are tax considerations relevant in context of dividend decision of a company?*

#### **Answer**

##### **Dividend Decision and Tax Considerations**

Traditional theories have stressed that distribution of dividend being from after-tax profits, tax considerations do not matter in the hands of the payer-company. However, with the arrival of Corporate Dividend Tax on the scene in India, the position has changed. Since there is a clear levy of such tax with related surcharges, companies have a consequential cash outflow due to their dividend decisions which has to be dealt with as and when the decision is taken.

In the hands of investors too, the position has changed with total exemption from tax being made available to the receiving-investors. In fact, it can be said that such exemption from tax has made the equity investment and the investment in Mutual Fund Schemes very attractive in the market.

Broadly speaking tax consideration has following impacts on the dividend decision of a company:

**Before Introduction of Dividend Tax:** Earlier, the dividend was taxable in the hands of investors. In this case, the shareholders of the company being corporates or individuals falling in higher tax slab; it is preferable to distribute lower dividend or no dividend. On the other hand, for shareholders falling in no tax zone prefer to have dividend in hand.

It can be concluded that before distributing dividend, company should analyse its shareholding pattern.

**After Introduction of Dividend Tax:** Dividend tax is payable @ 12.5% - surcharge + education cess, which effectively works out to be nearly 14%. Now if the company were to distribute dividend, shareholders indirectly bear a tax burden of 14% on their income. On the other hand, if the company were to provide return to shareholder in the form of appreciation in market price – by way of bonus shares – then shareholder will have a reduced tax burden.

For securities on which STT is payable, short term capital gain is taxable @ 10% while long term capital gain is totally exempt from tax.

Therefore, it can be concluded that if the company pays higher dividend (while it still have reinvestment opportunities) then to get same after tax return, shareholders will expect a higher before tax return which will further lead to lower market price per share.

### Question 6

*According to Modigliani and Miller, dividend decision does not influence value. Briefly state reasons, why companies should declare dividend and not ignore it.*

### Answer

The position taken by Modigliani Miller regarding dividend, does not take into account certain practical realities in the market place. Companies are compelled to declare annual cash dividends for reasons given below:-

- (i) Shareholders expects an annual reward for their investment as they require cash for meeting personal consumption needs.
- (ii) Sometimes, tax considerations may be relevant. For example, dividend may be tax free receipt, whereas some part of capital gains may be taxable.
- (iii) Other forms of investment such as bank deposits, bonds etc, fetch cash returns periodically, in such a case investors will not invest in companies not paying appropriate dividend.
- (iv) In certain situations, there could be penalties for non-declaration of dividend, e.g. tax on undistributed profits of certain companies, which force the companies to declare dividend.

## Question 7

*Write a short note on Walter and Gordon Approach to Dividend Policy.*

### Answer

#### Walter Approach

The approach of Prof. James E. Walter guides as to how dividend can be used to maximise the wealth position of equity holders. He argues that in the long run, share prices reflect only the present value of expected dividends. Retentions influence stock prices only through their effect on further dividends. It can envisage different possible market prices in different situations and considers internal rate of return, market capitalisation rate and dividend payout ratio in the determination of market value of shares.

Walter Model focuses on two factors which influence Market Price

- (i) Dividend per Share.
- (ii) Relationship between Internal Rate of Return (IRR) on retained earnings and market expectations (cost of capital).

If  $IRR > \text{Cost of Capital}$ , Share price can be even higher in spite of low dividend. The relationship between dividend and share price on the basis of Walter's formula is shown below:

$$P = \frac{D + r/K_e (E - D)}{K_e}$$

Where,

P = Market price per shares of common stock

r = Return on internal retention, i.e. the rate company earns on its retained profits

$K_e$  = Cost of Capital

E = Earnings per share

D = Dividend per share.

#### Gordon Approach

Graham and Dodd Myron Gordon developed a model relating the market value of the firm to dividend policy. In Gordon Approach there is a continuing Dividend Growth Model which gives the following formula for calculating the value of a firm's stock with dividend declaration:

$$P = \frac{E(1-b)}{K_e - br}$$

Where,

P = price of share

E = earnings per share

$b$  = Retention ratio or percentage of earnings retained

$(1 - b)$  = dividend payout ratio, i.e., percentage of earnings distributed as dividend

$K_e$  = Capitalisation rate/cost of capital

$br$  = growth rate in  $r$ , i.e., rate of return on investment of an all equity firm.

The model is also referred to as the dividend capitalization model. It is also referred to as the dividend growth model. The model considers the growth rate of the firm to be the product of its retention ratio and its rate of return.

The capitalization model projects that the dividend decision has a bearing on the market price of the share. In situations where the rate of return on investment ( $r$ ) is greater than the capitalization rate ( $k_e$ ), the market price of share increases with decrease in dividend payout ratio. If  $r$  is less than  $k_e$ , market price of share declines with decrease in dividend payout ratio. If  $r$  is equal to  $k_e$ , the dividend payout ratio has no effect on the market price of the security.

### Question 8

*"In an uncertain world in which verbal statements can be ignored or misinterpreted, dividend action does provide a clear-cut means of 'making a statement' that speaks louder than thousand words." Explain.*

### Answer

In an uncertain environment, verbal statements about the performance of the company may not be significant but changes in dividends cannot be ignored as they contain information vital to the investors. The payment of dividend conveys to the shareholders information relating to the profitability of the firm. An increase in the amount of dividend signify that the firm expects its profitability to improve in future or vice versa. The dividend policy is likely to cause a changes in the market price of the shares.

Modigliani and Miller have also accepted the information content concept of dividend. But they still maintain that dividend policy is irrelevant as dividends do not determine the market price of shares. However, empirical studies have proved that changes in dividends convey more significant information than what earnings announcements do. Further, the market reacts to dividend changes – prices rise in response to a significant increase in dividends and fall when there is a significant decrease or omission in payment of dividend.

### Question 9

*List the assumptions implicit in Modigliani & Miller approach of Irrelevance of dividend.*

### Answer

Assumptions of Modigliani & Miller approach of Irrelevance of Dividend are:

- Existence of perfect capital market, where all investors are rational.
- No tax differential between dividend income and capital gain.
- Transaction and floatation costs do not exist.

- Risk of uncertainty does not exist.
- The firm has a fixed investment policy.
- Free and uniform access to relevant information of capital market.
- No investor can sway the market forces.
- The cost of equity is equal to shareholders' expectations.
- Securities are infinitely divisible.
- Organisation has a fixed investment policy.

### Question 10

*What are the forms of dividend explain.*

### Answer

Dividends can be divided into following forms:

- (i) *Cash dividend* : The company should have sufficient cash in bank account when cash dividends are declared. If it does not have enough bank balance, it should borrow funds in advance. For stable dividend policy, a cash budget may be prepared for coming period to indicate necessary funds to meet regular dividend payments.

The cash account and reserve account of the company is bound to reduce on payment of cash dividend . Both total assets as well as net worth of the company are reduced when cash dividend is distributed. According to Hastings, market price of share drops by the amount of cash dividend distributed.

- (ii) *Stock Dividend (Bonus shares)* : It is distribution of shares in lieu of cash dividend to existing shareholders. Such shares are distributed proportionately thereby retaining proportionate ownership of the company. If a shareholder owns 100 shares at a time, when 10% dividend is declared he will have 10 additional shares thereby increasing the equity share capital and reducing reserves and surplus (retained earnings). The total net worth is not affected by bonus issue.

*Advantages* : There are many advantages both to the shareholders and to the company. Some of the important advantages are listed as under:

(1) To Share Holders:

- (a) Tax benefit –At present, there is no tax on dividend received.
- (b) Policy of paying fixed dividend per share and its continuation even after declaration of stock dividend will increase total cash dividend of the share holders in future.

(2) To Company:

- (a) Conservation of cash for meeting profitable investment opportunities.
- (b) Cash deficiency and restrictions imposed by lenders to pay cash dividend.

## Question 11

*“Bonus issue is a common method of distribution of dividend, however it has many limitations” comment.*

### Answer

#### Limitations of stock bonus:

(1) *To Shareholders* : Stock dividend does not affect the wealth of shareholders and therefore, has no value for them. This is because, the declaration of stock dividend is a method of capitalising the past earnings of the shareholders and is a formal way of recognising earnings which the shareholders already own. It merely divides the company's ownership into a large number of share certificates. James Porterfield regards stock dividends as a division of corporate pie into a larger number of pieces. Stock dividend does not give any extra or special benefit to the shareholder. His proportionate ownership in the company does not change at all.

Stock dividend creates a favourable psychological impact on the shareholders and is greeted by them on the ground that it gives an indication of the company's growth.

(2) *To Company* : Stock dividends are costlier to administer than cash dividend. It is disadvantageous if periodic small stock dividends are declared by the company as earnings. This results in the measured growth in earnings per share being less than the growth based on per share for small issues of stock dividends are not adjusted at all and only significant stock dividends are adjusted.

## Question 12

*Explain concept of Dividend Discount Model for valuation of shares.*

### Answer

It is a financial model that values shares at the discounted value of the future dividend payments. The model provides a means of developing an explicit expected return for the market. Since shares are valued on the actual cash flows received by the investors, it is theoretically the correct valuation model. Under this model, the price a share will be traded is calculated by the net present value of all expected future dividend payments discounted by an appropriate risk-adjusted rate. This dividend discount model price is the intrinsic value of the stock. If the stock pays no dividend, then the expected future cash flow is the sale price of the stock. The security with a greater risk must potentially pay a greater rate of return to induce investors to buy the security. The required rate of return (capitalization rate) is the rate of return required by investors to compensate them for the risk of owning the security. This capitalization rate can be used to price a stock as the sum of its present values of its future cash flows in the same way that interest rates are used to price bonds in terms of its cash discounted by the market rate. Similarly, the dividend discount model (DDM, dividend valuation model, DVM) prices a stock by the sum of its future cash flows discounted by the required rate of return that an investor demands for the risk of owning the stock. Future cash flows include dividends and the sale price of the stock when it is sold. This DDM price is the intrinsic value of the stock. If the stock pays no dividend, then the expected future cash flow is the sale price of the stock.

Intrinsic Value = Sum of Present Value of Future Cash Flows

Intrinsic Value = Sum of Present Value of Dividends + Present Value of Stock Sale Price

### Practical Questions

#### Question 13

*Ravi & Co. earns Rs. 6 per share having capitalisation rate of 10 per cent and has a return on investment at the rate of 20 per cent. According to Walter's model, what should be the price per share at 30 percent dividend payout ratio? Is this the optimum payout ratio as per Walter model ?*

#### Answer

Walter Model is

$$P = \frac{D + r/k_e (E - D)}{k_e}$$

Where:

P = Market price of the share

r = Return on Retained earnings

$k_e$  = Capitalisation Rate

E = Earnings per share

D = Dividend per share

Hence, if Walter model is applied

Market Value of the Share

$$\begin{aligned} P &= \frac{1.80 + 0.20/0.16(6 - 1.80)}{0.10} \\ &= \frac{1.80 + 0.20/0.10(4.2)}{0.10} \\ &= \frac{1.80 + 8.4}{0.10} \\ P &= 102 \end{aligned}$$

This is not the optimum payout ratio because  $r > k_e$  and therefore value of the shares can further go up if payout ratio is reduced.

#### Question 14

*The earning per share of a company is Rs. 10. It has an internal rate of return of 15% and the capitalization rate of risk class is 12.5%. If Walter's model is used-*

a) *What should be the optimum payout ratio of the firm?*

- b) What should be the price of a share at this payout?  
 c) How shall the price of a share be affected if different payouts were employed?

**Answer**

According to Walter Model –

$$\text{Market Price per share} = \frac{D + (r/K_e)(E - D)}{K_e}$$

Where, D = Dividend per share, E = Earning per share, r = return on Investment and Ke = Capitalization rate.

In the given question :

$$r/K_e = 0.15 / 0.125 \text{ i.e. } 1.2 \text{ which is greater than } 1.$$

- (a) If  $r/K_e > 1$ , the value of the share of a firm will increase as EPS increases. Under this type of situation the firm has ample opportunities for investment and growth. The price of the share would be maximum when the firm retains all its earnings. Thus, the optimum payout ratio in this case is zero.

- (b) When the optimum payout is zero, the price of the share of the firm is as under:

$$\begin{aligned} P &= \frac{0 + (0.15/0.125)(10-0)}{0.125} = \frac{12}{0.125} \\ &= \text{Rs. } 96 \end{aligned}$$

- (c) If the firm, under the condition  $r/K_e > 1$ , chooses a payout other than zero, the price of the share will fall. Suppose the firm has a payout of 20 per cent, the price of the share will be:

$$\begin{aligned} P &= \frac{2 + (0.15/0.125)(10-2)}{0.125} = \frac{2 + (1.2)(8)}{0.125} = \frac{11.60}{0.125} \\ &= \text{Rs. } 92.80 \end{aligned}$$

**Question 15**

The following figures are collected from the annual report of Anand Ltd.:

Net Profit	30 lakhs
Outstanding 12% preference shares	100 lakhs
No. of equity shares	3 lakhs
Return on Investment	20%

What should be the approximate dividend pay-out ratio so as to keep the share price at Rs. 42 by using Walter model?

<b>Answer</b>	<i>in lakhs</i>
Net Profit	30

Less: Preference dividend 12

Earning for equity shareholders 18

Therefore earning per share Rs. 18 lakhs / 3 lakhs = Rs. 6.00

Cost of capital i.e. ( $k_e$ )

(Assumed) 15%\*

Let, the dividend payout ratio be X and so the share price will be:

$$P = \frac{D + r/K_e (E - D)}{K_e}$$

Here D = 6x; E = Rs. 6; r = 0.20 and  $K_e = 0.16$  and P = Rs. 42

$$\text{Hence, } 42 = \frac{6x + 0.2/0.16(6 - 6x)}{0.16}$$

Or

$$x = 0.85$$

So, the required dividend payout ratio will be = 85%

\*Students can assume any percentage other than 15%

### Question 16

- (i) A Ltd has 10 lakh equity shares outstanding at the beginning of the accounting year 2014. The current market price of the shares is Rs. 150 each. The Board of directors of the company has recommended Rs. 8 per share as dividend. The rate of capitalisation, appropriate to the risk-class to which the company belongs is 12%. Based on Modigliani-Miller Approach, calculate the market price of the share 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 net income for the year is Rs. 2 crore and the investment budget is Rs. 4 crore when (a) the above dividends are distributed; and (b) the dividends are not declared.
- (iii) Show that market value of shares at the end of the accounting year will remain the same whether dividends are distributed or not declared.

### Answer

- (i) Modigliani-Miller Dividend Irrelevancy Model

$$P_0 = \frac{(D_1 + P_1)}{1 + k_e}$$

Where,

$P_0$  = existing market price per share

$K_e$  = capitalisation rate for firm in that risk class

$D_1$  = contemplated dividend per share

$P_1$  = market price per share at the year end

(a) Calculation of share price when dividend is declared

$$P_0 = \frac{(D_1 + P_1)}{1 + k_e}$$

$$\text{Rs. } 150 = \frac{(\text{Rs. } 8 + P_1)}{1 + 0.12}$$

$$\text{Rs. } 150 \times 1.12 = \text{Rs. } 8 + P_1$$

$$P_1 = \text{Rs. } 160$$

(b) Calculation of share price when dividend is not declared

$$P_0 = \frac{(D_1 + P_1)}{1 + k_e}$$

$$\text{Rs. } 150 = \frac{(\text{Rs. } 0 + P_1)}{1 + 0.12}$$

$$\text{Rs. } 150 \times 1.12 = \text{Rs. } 0 + P_1$$

$$P_1 = \text{Rs. } 168$$

(ii) Computation of number of shares to be issued

<i>Particulars</i>	<i>If dividend is declared</i>	<i>If dividend is not declared</i>
Net income	Rs. 2,00,00,000	Rs. 2,00,00,000
Less : Dividend paid	Rs. 80,00,000	
Retained earnings	Rs. 1,20,00,000	Rs. 2,00,00,000
New investments	Rs. 4,00,00,000	Rs. 4,00,00,000
Amount to be raised by issue of new shares (a)	Rs. 2,80,00,000	Rs. 2,00,00,000
Market price per share (b)	Rs. 160	Rs. 168
Number of shares to be issued (a)/(b)	1,75,000	1,19,048

Alternatively, the number of shares to be issued is calculated as follows:

$$\Delta n P_1 = I - (Y - n D_1)$$

Where  $\Delta n$  is number of new shares to be issued

$\Delta n P_1$  is total value of new shares to be sold

$I$  is the new investment

$Y$  is net income earned

$nD_1$  is dividend paid on outstanding shares

$$\Delta n = \frac{I - (Y - nD_1)}{P_1}$$

When Dividend is declared:

$$\begin{aligned} \Delta n &= \frac{4,00,00,000 - 1,20,00,000}{160} \\ &= 1,75,000 \text{ shares} \end{aligned}$$

When Dividend is not declared:

$$\begin{aligned} \Delta n &= \frac{4,00,00,000 - 2,00,00,000}{168} \\ &= 1,19,048 \text{ shares} \end{aligned}$$

(iii) *Verification of MM Dividend Irrelevancy Theory*

<i>Particulars</i>	<i>If dividend is declared</i>	<i>If dividend is not declared</i>
<i>Existing shares</i>	<i>10,00,000</i>	<i>10,00,000</i>
<i>Add : new equity shares</i>	<i>1,75,000</i>	<i>1,19,048</i>
Total number of shares at the end (a)	11,75,000	11,19,048
Market price per share (b)	Rs. 160	Rs. 168
Total market value of shares at the year end (a)×(b)	Rs. 18,80,00,000	Rs. 18,80,00,000

*Analysis* : from the above, we can observe that the market value of the shares at the end of the year will remain the same whether dividends are distributed or not declared.

### Question 17

The following information pertains to ABC Ltd.

Earnings of the Company	5,00,000
Dividend Payout ratio	60%
No. of shares outstanding	1,00,000
Equity capitalization rate	12%
Rate of return on investment	15%

- (i) What would be the market value per share as per Walter's model?  
(ii) What is the optimum dividend payout ratio according to Walter's model and the market value of Company's share at that payout ratio?

### Answer

- (i) Walter's model is given by

$$P = \frac{D + r/K_e (E - D)}{K_e}$$

Where,

P = Market price per share.

E = Earnings per share = Rs. 5

D = Dividend per share = Rs. 3

r = Return earned on investment = 15%

$K_e$  = Cost of equity capital = 12%

$$P = \frac{3 + 0.15/0.12(5 - 3)}{0.12}$$

$$P = \frac{3 + 0.15/0.12 \times 2}{0.12}$$

$$= \text{Rs. } 45.83$$

- (ii) According to Walter's model when the return on investment is more than the cost of equity capital, the price per share increases as the dividend pay-out ratio decreases. Hence, the optimum dividend pay-out ratio in this case is nil.

So, at a pay-out ratio of zero, the market value of the company's share will be:

$$P = \frac{3 + 0.15/0.12(5 - 0)}{0.12}$$

$$= \text{Rs. } 52.08$$

### Question 18

From the following information, determine the market value of equity shares of the company:

Earnings of the company	Rs.5,00,000
Dividend paid	Rs.3,00,000
Number of shares outstanding	1,00,000
Price-earnings ratio	8
Rate of return on investment	15%

Are you satisfied with the current dividend policy of the company? If not, what should be the optimal dividend payment ratio? Use Walter's Model.

### Answer

Earnings of the Company	Rs. 5,00,000
Dividend paid	Rs. 3,00,000
No of shares outstanding	1,00,000
P/E Ratio	8
Rate of return on Investment	15%

$$\text{EPS} = 5,00,000/1,00,000 = \text{Rs. } 5$$

$$\text{DPS} = 3,00,000/1,00,000 = \text{Rs. } 3$$

$$\text{Price Earning Ratio} = \frac{\text{MarketPrice}}{\text{EPS}}$$

$$8 = \frac{\text{MarketPrice}}{5}$$

$$\text{So, Market Price} = 8 \times 5 = \text{Rs. } 40$$

$$\text{Dividend payout ratio} \text{ DPS/EPS} * 100 = 3/5 * 100 = 60\%$$

$$\text{P/E Ratio} = 8\%$$

$$K_e = \frac{1}{\text{P/ERatio}} = 1/0.08 = 12.5\%$$

Rate of return (15%) > cost of capital of 12.5%. The company will maximize its market price if it retains 100% of profits. The market price of the share as per Walter's formula would be as follows:

$$P = \frac{D + r/K_e (E - D)}{K_e}$$

$$P = \frac{0 + 0.15/0.125(5 - 0)}{0.125}$$

$$= \text{Rs. } 48$$

So, the firm can increase the market price of the share upto Rs. 48 by increasing the retention ratio to 100%. The optimal dividend payout for the firm is 0.

### Question 19

The following information is given for Z Ltd.:

Total Earnings	2,00,000
No. of equity shares (of Rs. 100 each)	20,000
Dividend paid	1,50,000
Price/Earning ratio	12.5

- (i) Ascertain whether the company Z Ltd. is following an optimal dividend policy.
- (ii) What should be the P/E ratio at which the dividend policy will have no effect on the value of the shares?
- (iii) Will your decision change, if the P/E ratio is 8 instead of 12.5?

### Answer

- (i) The EPS of Z Ltd. is Rs. 10 (i.e., Rs. 2,00,000/20,000). The P/E Ratio is given at 12.5 and the cost of capital,  $k_e$ , may be taken at the inverse of P/E ratio. Therefore,  $k_e$  is 8% (i.e., 1/12.5). The firm is distributing total dividends of Rs. 1,50,000 among 20,000 shares, giving a dividend per share of Rs. 7.50. The value of the share as per Walter's model may be found as follows:

$$P = \frac{D + r/K_e (E - D)}{K_e}$$

$$P = \frac{7.5 + .10/.08(10 - 7.5)}{0.12}$$

$$P = \text{Rs. } 132.81$$

Z Ltd. has a dividend payout of 75% (i.e., Rs. 1,50,000) out of total earnings of 2,00,000. Since, the rate of return of the firm,  $r$ , is 10% and it is more than the  $k_e$  of 8%, therefore, by distributing 75% of earnings, the firm is not following an optimal dividend policy. The optimal dividend policy for the firm would be to pay zero dividend and in such a situation, the market price would be:

$$P = \frac{D + r/K_e (E - D)}{K_e}$$

$$P = \frac{7.5 + .10/.08(10 - 0)}{0.12}$$

$$P = 156.25$$

So, theoretically the market price of the share can be increased by adopting a zero payout.

- (ii) The P/E ratio at which the dividend policy will have no effect on the value of the share is such at which the  $k_e$  would be equal to the rate of return,  $r$ , of Z Ltd. The  $K_e$  would be 10% ( $=r$ ) at the P/E ratio of 10. Therefore, at the P/E ratio of 10, the dividend policy would have no effect on the value of the share.
- (iii) If the P/E is 8 instead of 12.5, then the  $k_e$  which is the inverse of P/E ratio, would be 12.5 and in such a situation  $k_e > r$  and the market price, as per Walter's model would be

$$P = \frac{D + r/K_e (E - D)}{K_e}$$

$$P = \frac{7.5 + .10/.125(10 - 7.5)}{0.125}$$

$$P = 76$$

The optimal dividend policy for Z Ltd. would be to pay 100% dividend and market price of share in such case would be

$$P = \frac{10 + .10/.125(10 - 10)}{0.125}$$

$$P = \text{Rs. } 80$$

### Question 20

*Ananya Ltd. has an internal rate of return @ 20%. It has declared dividend @ 18% on its equity shares, having face value of Rs. 10 each. The payout ratio is 36% and Price Earning Ratio is 7.25. Find the cost of equity according to Walter's Model and hence determine the limiting value of its shares in case the payout ratio is changed as per the said model.*

### Answer

Internal Rate of Return ( $r$ ) = 0.20

Dividend ( $D$ ) = 1.80

Earnings Per share ( $E$ ) =  $1.80/0.36 = 5$

$$P = \frac{D + r/K_e (E - D)}{K_e}$$

$$36.25 = \frac{1.8 + .20/K_e (5 - 1.8)}{K_e}$$

$$36.25 K_e = 1.8 + 0.20/K_e \times 3.2$$

$$36.25 K_e^2 = 1.80 K_e + 0.64$$

$$K_e = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$K_e = \frac{-1.8 \pm \sqrt{1.8^2 - 4 \times -36.25 \times 64}}{2(-36.25)}$$

$$K_e = \frac{-1.8 \pm \sqrt{3.24 + 92.80}}{-72.5}$$

$$K_e = 16\%$$

Since  $r > k_e$ , the firm is a growing firm, therefore 100% payout ratio will give limiting value of share

$$P = \frac{D+r/K_e (E-D)}{K_e}$$

$$= \frac{1.8+.20/.16(5-5)}{0.16}$$

$$= \text{Rs. } 11.25$$

Thus limiting value of the share is Rs. 11.25

### Question 21

*Z Ltd. was started a year back with paid-up equity capital of Rs.40 lakh. Other details are as under : Earnings of the year : Rs.4,00,000*

*Dividend paid : Rs.3,20,000*

*Price-earnings ratio : 12.5*

*Number of shares : 40,000*

*You are required to find out whether company's dividend payout ratio is optimal using Walter's Model, giving reasons.*

### Answer

Paid-up equity Capital = Rs. 40,00,000

Earnings of the year = Rs. 4,00,000

Dividend Paid = Rs. 3,20,000

P/E Ratio = 12.5

No. of Shares = 40,000

EPS or  $r = \text{Rs. } 4,00,000/40,000 = \text{Rs. } 10$

Dividend per share (DPS) =  $\text{Rs. } 3,20,000/40,000 = \text{Rs. } 8$

Walter's Model:

$$P = \frac{D+r/K_e (E-D)}{K_e}$$



$$= \frac{3}{0.18 - (0.165)}$$

$$= \text{Rs. } 200$$

(ii) Walter's Formula

$$P = \frac{D + r/K_e (E - D)}{K_e}$$

P = Market Price

D = Dividend per share

r = Internal rate of return

K<sub>e</sub> = Cost of Capital

E = Earnings per share

$$= \frac{3 + 0.22/0.18(12 - 3)}{0.18}$$

$$= \text{Rs. } 77.77$$

### Question 23

*Panna Ltd., has 8 lakh equity shares outstanding at the beginning of the year. The current market price per share is Rs. 120. The Board of Directors of the company is contemplating Rs. 6.4 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 share of the company, when the dividend is – (a) declared; and (b) not declared.*
- (ii) *How many new shares are to be issued by the company, if the company desires to fund an investment budget of Rs. 3.20 crores by the end of the year assuming net income for the year will be Rs. 1.60 crores?*

### Answer

#### Modigliani and Miller (M-M) – Dividend Irrelevancy Model:

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

Where,

P<sub>0</sub> = Existing market price per share i.e. 120

P<sub>1</sub> = Market price of share at the year-end (to be determined)

D<sub>1</sub> = Contemplated dividend per share i.e. 6.4

K<sub>e</sub> = Capitalisation rate i.e. 9.6%.

**(i) (a) Calculation of share price when dividend is declared:**

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$120 = \frac{P_1 + 6.4}{1 + 0.096}$$

$$\text{Or, } 120 \times 1.096 = P_1 + 6.4,$$

$$P_1 = 120 \times 1.096 - 6.4 = 125.12$$

**(b) Calculation of share price when dividend is not declared:**

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$120 = \frac{P_1 + 0}{1 + 0.096}$$

$$120 \times 1.096 = P_1 + 0,$$

$$P_1 = 120 \times 1.096 = 131.52$$

**(ii) Calculation of No. of shares to be issued**

(Rs. in lakhs)

<i>Particulars</i>	<i>If dividend declared</i>	<i>If dividend not Declared</i>
Net Income	160	160
<i>Less : Dividend paid</i>	51.20	-----
Retained earnings	108.80	160
Investment budget	320	320
Amount to be raised by issue of new shares (i)	211.20	160
Market price per share (ii)	125.12	131.52
No. of new shares to be issued (ii)	1,68,797.95	1,21,654.50
Or say	1,68,798	1,21,655

### Question 24

*Alpha Ltd. has 50,000 shares outstanding. The current market price per share is Rs. 100 each. It estimates to make a net income of Rs. 5,00,000 at the end of current year. The Company's Board is considering to pay a dividend of Rs. 5 per share at the end of current financial year. The company needs to raise Rs. 10,00,000 for an approved investment expenditure. The company belongs to a risk class for which the capitalization rate is 10%. Show, how the MM approach affects the value of firm if the dividends are paid or not paid.*

#### Answer

##### When dividends are paid

$$100 = (5 + P_1)/(1 + 0.10)$$

Therefore,  $P_1 = \text{Rs. } 105$

##### Value of firm

$$\begin{aligned} P_0 &= \frac{D_1 + P_1}{1+k} \\ &= \frac{50000 \times 5 + 50000 \times 105}{1+0.10} \\ &= \frac{250000 + 5250000}{1.10} \\ &= \text{Rs. } 50,00,000 \end{aligned}$$

##### When dividend is not paid

$$100 = 1/1.1 \times P_1$$

Therefore,  $P_1 = \text{Rs. } 110$

##### Value of firm

$$\begin{aligned} &= \frac{50000 \times 0 + 50000 \times 110}{1+0.10} \\ &= \frac{0 + 5500000}{1.10} \\ &= \text{Rs. } 50,00,000 \end{aligned}$$

M.M. Approach indicates that the value of the firm in both the situations will be same.

### Question 25

*Mantis Ltd. belongs to a risk class for which the capitalization rate is 10%. It has 25,000 outstanding shares and the current market price is Rs. 100. It expects a net profit of Rs. 2,50,000 for the year and the Board is considering dividend of Rs. 5 per share.*

*Mantis Ltd. requires to raise Rs. 5,00,000 for an approved investment expenditure. Show, how the MM approach affects the value of Mantis Ltd. if dividends are paid or not paid.*

## Answer

### A. When dividend is paid

- (a) Price per share at the end of year 1

$$100 = \frac{(5 + P_1)}{1.10}$$

$$110 = \text{Rs. } 5 + P_1$$

$$P_1 = 105$$

- (b) Amount required to be raised from issue of new shares

$$5,00,000 - (\text{Rs. } 2,50,000 - \text{Rs. } 1,25,000)$$

$$5,00,000 - \text{Rs. } 1,25,000 = \text{Rs. } 3,75,000$$

- (c) Number of additional shares to be issued

$$\frac{3,75,000}{105} = \frac{75,000}{21} \text{ shares or say } 3572 \text{ shares}$$

- (d) Value of Mantis Ltd.

(Number of shares  $\times$  Expected Price per share)

$$\text{i.e., } (25,000 + 3,572) \times \text{Rs. } 105 = \text{Rs. } 30,00,060$$

### B. When dividend is not paid

- (a) Price per share at the end of year 1

$$100 = \frac{P_1}{1.1} \text{ or } P_1 = 110$$

- (b) Amount required to be raised from issue of new shares

$$\text{Rs. } 5,00,000 - 2,50,000 = 2,50,000$$

- (c) Number of additional shares to be issued

$$\frac{2,50,000}{110} = \frac{25,000}{11} \text{ shares or say } 2273 \text{ shares}$$

- (d) Value of Mantis Ltd.,  $(25,000 + 2273) \times \text{Rs. } 110 = \text{Rs. } 30,00,030$

Whether dividend is paid or not, the value remains the same.

## Question 26

*XYZ Ltd. has a capital of Rs. 10,00,000 in equity shares of Rs. 100 each. The shares are currently quoted at par. The company proposes to declare a dividend of Rs. 10 per share at the end of the current financial year. The capitalization rate for the risk class of which*

the company belongs is 12%. What will be the market price of the share at the end of the year, if:-

(i) dividend is not declared ?

(ii) dividend is declared ?

(iii) assuming that the company pays the dividend and has net profits of Rs. 5,00,000 and makes new investments of Rs. 10,00,000 during the period, how many new shares must be issued? Use the MM model.

### Answer

As per MM model, the current market price of equity share is:

$$P_0 = \frac{D_1 + P_1}{1 + Ke}$$

**(i) If the dividend is not declared:**

$$100 = \frac{P_1}{1 + 0.12}$$

$$P_1 = 100 \times 1.12 = \text{Rs. } 112$$

The Market price of the equity share at the end of the year would be Rs. 112.

**(ii) If the dividend is declared:**

$$100 = \frac{10 + P_1}{1 + 0.12}$$

$$10 + P_1 = 100 \times 1.12 = \text{Rs. } 112$$

$$112 = 10 + P_1$$

$$P_1 = 112 - 10 = \text{Rs. } 102$$

The market price of the equity share at the end of the year would be Rs. 102.

**(iii)** In case, the firm pays dividend of Rs. 10 per share out of total profits of Rs. 5,00,000 and plans to make new investment of Rs. 10,00,000, the number of shares to be issued may be found as follows:

Total Earnings	5,00,000
Dividends paid	1,00,000
Retained earnings	4,00,000
Total funds required	10,00,000
Fresh funds to be raised	6,00,000

Market price of the share	102
Number of shares to be issued (Rs. 6,00,000 / 102)	5,882.35

or, the firm would issue 5,883 shares at the rate of Rs. 102

### Question 27

*In December, 2014 Lipsa Co.'s share was sold for Rs. 146 per share. A long term earnings growth rate of 7.5% is anticipated. Lipsa Co. is expected to pay dividend of Rs. 3.36 per share.*

- (i) *What rate of return an investor can expect to earn assuming that dividends are expected to grow along with earnings at 7.5% per year in perpetuity?*
- (ii) *It is expected that Lipsa Co. will earn about 10% on book Equity and shall retain 60% of earnings. In this case, whether, there would be any change in growth rate and cost of Equity?*

### Answer

- (i) According to Dividend Discount Model approach the Co's expected or required return on equity is computed as follows:

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

Where,

$K_e$  = Cost of equity share capital

$D_1$  = Expected dividend at the end of year 1

$P_0$  = Current market price of the share.

$g$  = Expected growth rate of dividend.

$$\text{Therefore, } K_e = \frac{3.36}{146} + 7.5\%$$

$$= 0.0230 + 0.075 = 0.098$$

$$\text{Or, } K_e = 9.80\%$$

- (ii) With rate of return on retained earnings (r) 10% and retention ratio (b) 60%, new growth rate will be as follows:

$$g = br \text{ i.e.}$$

$$= 0.10 \times 0.60 = 0.06$$

Accordingly dividend will also get changed and to calculate this, first we shall calculate previous retention ratio (b1) and then EPS assuming that rate of return on retained earnings (r) is same.

With previous Growth Rate of 7.5% and  $r = 10\%$  the retention ratio comes out to be:

$$0.075 = b_1 \times 0.10$$

$$b_1 = 0.75 \text{ and payout ratio} = 0.25$$

With 0.25 payout ratio the EPS will be as follows:

$$\frac{3.36}{0.25} = 13.44$$

With new 0.40 (1 - 0.60) payout ratio the new dividend will be  $D_1 = 13.44 \times 0.40 = 5.376$

Accordingly new  $K_e$  will be

$$K_e = \frac{5.376}{146} + 6.0\%$$

$$\text{or, } K_e = 9.68\%$$

### Question 28

*Khusbu Ltd. belongs to a risk class for which the capitalisation rate is 10 per cent. It currently has outstanding 10,000 shares selling at Rs. 100 each. The firm is contemplating the declaration of a dividend of Rs. 5 per share at the end of the current financial year. It expects to have a net income of 1,00,000 and has a proposal for making new investments of Rs. 2,00,000. Show how under MM Hypothesis, the payment of dividend does not affect the value of the firm.*

### Answer

#### (a) Value of the firm when dividends are not paid:

(i) Price per share at the end of the year 1.

$$100 = \frac{P_1}{1.10}$$

$$P_1 = 110$$

(ii) Amount required to be raised from the issue of new shares.

$$\Delta n P_1 = (\text{Rs. } 2,00,000 - \text{Rs. } 1,00,000) = \text{Rs. } 1,00,000$$

(iii) Number of additional shares to be issued.

$$\frac{1,00,000}{110} = \frac{10,000}{11}$$

(iv) Value of the firm

$$\begin{aligned} &= \frac{\left[ \frac{10,000}{1} + \frac{10,000}{11} \right] 110 - 2,00,000 + 1,00,000}{1.10} \\ &= \frac{10,99,999}{1.10} = 9,99,999 \text{ or } = \text{Rs. } 10,00,000 \end{aligned}$$

**(b) Value of the firm, when dividends are paid:**

(i) Price per share at the end of year 1

$$P_0 = \frac{D_1 + P_1}{1 + K_e}$$

$$100 = \frac{5 + P_1}{1.10}$$

$$110 = 5 + P_1$$

$$P_1 = 105$$

(ii) Amount required to be raised from the issue of new shares.

$$\Delta n P_1 = I - (E - n D_1)$$

$$= \text{Rs. } 2,00,000 - (\text{Rs. } 1,00,000 - 10,000 \times 5) = \text{Rs. } 1,50,000$$

(iii) Number of additional shares to be issued.

$$\Delta n = \frac{1,50,000}{105} = \frac{10,000 \text{ shares}}{7}$$

(iv) Value of the firm

$$n P_0 = \frac{(n + \Delta n) P_1 - I + E}{(1 + K_e)}$$

$$\begin{aligned} &= \frac{\left[ \frac{10,000}{1} + \frac{10,000}{11} \right] 105 - 2,00,000 + 1,00,000}{1.10} \\ &= \frac{10,99,999}{1.10} = 9,99,999 \text{ or } = \text{Rs. } 10,00,000 \end{aligned}$$

Thus, it can be seen that the value of the firm remains the same whether dividends are paid or not.

Further, the illustration clearly demonstrates that the shareholders are indifferent between the retention of profits and the payment of dividend.

### Question 29

ABC Ltd. has a capital of Rs. 10 lakhs in equity shares of Rs. 100 each. The shares are currently quoted at par. The company proposes declaration of a dividend of Rs. 10 per share at the end of the current financial year. The capitalisation 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

- (i) dividend is not declared?
- (ii) dividend is declared?
- (iii) assuming that the company pays the dividend and has net profits of Rs. 5,00,000 and makes new investments of Rs. 10 lakhs during the period, how many new shares must be issued? Use the M.M. model.

### Answer

Under M.M. Model, the following formula is used to ascertain the market price of Equity Shares:

$$P_0 = \frac{D_1 + P_1}{1 + K_e}$$

$P_0$  = Prevailing market price of a share i.e., Rs. 100 in this case. (quoted at Par)

$P_1$  = Market Price of a share at the end of period one.

$D_1$  = Dividend to be received at the end of period one.

$K_e$  = Cost of Equity Capital.

- (i) *If the dividend is not declared*

$$100 = \frac{P_1}{1 + 0.12}$$

$$P_1 = 100 \times 1.12 = \text{Rs. } 112$$

The market price of the Equity share at the end of the year would be Rs. 112.

- (ii) *If the dividend is declared*

$$100 = \frac{10 + P_1}{1 + 0.12}$$

$$100 \times 1.12 = (10 + P_1)$$

$$112 = 10 + P_1$$

$$P_1 = 112 - 10 = 102$$

The market price of the equity share at the end of the year would be Rs. 102.

- (iii) *Price of the Equity share would be Rs. 102, if the dividend is paid.*

Hence Number of shares to be issued:

$$np_1 = I - (NP - nD_1)$$

Where n = No. of New shares to be issued

NP = Net Profit

nD1 = Total dividend paid (see note 1)

I = Investment

n 102 = 10,00,000 – (5,00,000 – 1,00,000)

n 102 = 6,00,000

$n = \frac{6,00,000}{102} = 5,883$  shares to be issued

Note: No. of Equity shares existing =  $\frac{10,00,000}{100} = 10,000$  shares

Dividend paid 10,000 × 10 per share = Rs. 1,00,000

### Question 30

The following is the data regarding two Companies 'X', and 'Y' belonging to the same equivalent risk class:

	Company X	Company Y
Number of ordinary shares	90,000	1,50,000
Market price per share	1.20	Re. 1.00
6% Debentures	60,000	
Profit before interest	18,000	18,000

All profits after debenture interest are distributed as dividends.

You are required to explain how under Modigliani & Miller approach, an investor holding 10% of shares in Company 'X' will be better off in switching his holding to Company 'Y'.

### Answer

#### Working Notes

	Company X	Company Y
Profit before interest	18,000	18,000
Less: Interest	3,600	-
Profit before interest	18,000	18,000
Net Profit	14,400	18,000
No. of shares	90,000	1,50,000
Dividend per share	= Rs. 0.16	= Rs. 0.12

All profits after debenture interest are distributed as dividends.

(a) Present income of investor holding 10% of shares in company X:

$$10\% \text{ of shares} = 9,000 \text{ shares} \times 0.16 = \text{Rs. } 1,440 \text{ dividend.}$$

He will dispose of in the market and get Rs. 10,800 (i.e.  $9,000 \times 1.20$ ).

The same amount of Rs. 10,800 will be invested in Company Y. 10,800 shares will be purchased at Re. 1.00 per share. Then he will get dividend of Rs. 1,296 ( $10,800 \times 0.12$ ). Hence, he will not be better off in switching his holding to company Y.

**Alternative to (a) above:**

M & M approach by applying arbitrage process:

	<i>Market value of Firms</i>	
	<i>Company X</i>	<i>Company Y</i>
(i) Market value of Equity shares (90,000 × 1.20) (1,50,000 × 1.00)	1,08,000	1,50,000
(ii) Market value of Debentures	60,000	–
Value of Firm	1,68,000	1,50,000

According to MM's approach, the marginal investor would switch from overvalued to undervalued firm by selling his holdings in the firm X (levered one and overvalued one) and would buy the same percentage of shares of the firm Y. The arbitrage process will work out as follows:

Investor will dispose 10% of shares in Company X and realize 9,000 shares at Rs. 1.20 each  

$$= 10,800$$

Add: He will borrow 10% of 60,000 debt at 6% interest  $\frac{6,000}{100} \times 60,000 = 6,000$

Total amount  $\frac{16,800}{100} \times 100 = 16,800$

With this amount, the investor will buy 16,800 shares in Company Y at Rs. 1.00 each. Then compare the resultant income as follows:

Present income in X (as worked out above) = 1,440

Proposed income in Y:

For 1,50,000 shares PBT 18,000

For 16,800 shares ?

$$= \frac{16,800 \times 18,000}{1,50,000} = \text{Rs. } 2,016$$

<p>Less : Interest on debt 6,000 × 6%</p> <p style="text-align: center;">Net Income</p>	=	$\frac{\text{Rs. 360}}{1656}$
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This shows that the investor will be better off in switching his holdings to Company Y.

Notes:

- (i) When the investor sells equity in Company X and buys equity in company Y with personal leverage, the market value of equity of Company X tends to decline and the market value of equity of company Y tends to rise. This process will continue till the market values of both the companies are in equilibrium.
- (ii) The borrowings of Rs. 6,000 has to be taken on the same terms and conditions as corporate borrowing. Hence, 6% interest rate has been adopted.
- (iii) Companies should belong to the same equivalent risk class.
- (iv) Taxes do not exist and hence tax has not been taken into account.

### Question 31

With the help of following figures calculate the market price of a share of a company by using:

(i) Walter's formula

(ii) Dividend growth model (Gordon's formula)

Earning per share (EPS)	Rs. 10
Dividend per share (DPS)	Rs. 6
Cost of capital (k)	20%
Internal rate of return on investment (r)	25%
Retention Ratio	60%

### Answer

Market price per share by

(i) **Walter's formula**

$$P = \frac{D + r/K_e (E - D)}{K_e}$$

$$P = \frac{6 + .25 / .20 (10 - 6)}{.20}$$

$$P = \text{Rs. 55}$$

**(ii) Gordon's formula (Dividend Growth model)**

When the growth is incorporated in earnings and dividend, the present value of market price per share (Po) is determined as follows

Gordon's theory:

$$P_o = \frac{E(1-b)}{k-br}$$

Where,

Po = Present market price per share.

E = Earning per share

b = Retention ratio (i.e. % of earnings retained)

r = Internal rate of return (IRR)

**Hint:**

Growth rate (g) = br

$$\begin{aligned} P_o &= \frac{10(1-.60)}{.20-(.60 \times .25)} \\ &= \frac{4}{.05} \\ &= \text{Rs. } 80 \end{aligned}$$

**Question 32**

*Following are the details regarding three companies X Ltd., Y Ltd. and Z Ltd.*

	<i>X Ltd.</i>	<i>Y Ltd.</i>	<i>Z Ltd.</i>
<i>Internal Rate of return (%)</i>	<i>5</i>	<i>20</i>	<i>15</i>
<i>Cost of equity capital (%)</i>	<i>15</i>	<i>15</i>	<i>15</i>
<i>Earning per share Rs.</i>	<i>10</i>	<i>10</i>	<i>10</i>

*Calculate the value of an equity share of each of those companies applying Walter's formula when dividend payment ratio (DIP) ratio is (a) 75% (b) 50% (c) 80%.*

**Answer**

Value of an equity share according to Walter's formula is:

$$P = \frac{D+r/K_e(E-D)}{K_e}$$

Where,

P = Market price of the ordinary share of the company.

r = Return on internal retention i.e. the rate company earns in retained profits.

$K_e$  = Capitalisation rate i.e. the rate expected by investors by way of return from particular category of shares.

E = Earnings per share

D = Dividend per share

**(i) Market Price per share when D/P ratio is 75%.**

<i>X Ltd.</i>	<i>Y Ltd.</i>	<i>Z Ltd.</i>
$\frac{7.5+.05/.15 (10-7.5)}{.15}$	$\frac{7.5+.20/.15 (10-7.5)}{.15}$	$\frac{7.5+.15/.15 (10-7.5)}{.15}$
= Rs. 56	= Rs. 72	= Rs. 67

**(ii) When D/P ratio is 50%**

X Ltd.	Y Ltd.	Z Ltd.
$\frac{7.5+.05/.15 (10-5)}{.15}$	$\frac{7.5+.20/.15 (10-5)}{.15}$	$\frac{7.5+.15/.15 (10-5)}{.15}$
= 44Rs.	= Rs. 78	= Rs. 67

**(iii) When D/P ratio is 80%**

X Ltd.	Y Ltd.	Z Ltd.
$\frac{7.5+.05/.15 (10-8)}{.15}$	$\frac{7.5+.05/.15 (10-8)}{.15}$	$\frac{7.5+.15/.15 (10-8)}{.15}$
= Rs. 58	= Rs. 71	= Rs. 67

## Conclusions:

**X Ltd.:** This company may be considered as declining firm because IRR is lower than the cost of capital. It will therefore, be appropriate for this company to distribute the earnings among its shareholders.

**Y Ltd.:** This company may be considered as going firm because IRR is higher than the cost of capital. It will therefore, be appropriate for this company to retain the earnings.

**Z Ltd.:** This company may be considered as normal firm because IRR is equal to the cost of capital. D/P has no impact on value per share.

## Question 33

Following information is available in respect of dividend, market price and market condition after one year.

Market condition	Probability	Market Price	Dividend per share
Good	0.25	115	9
Normal	0.50	107	5
Bad	0.25	97	3

The existing market price of an equity share is Rs. 106 (F.V. Re. 1), which is cum 10% bonus debenture of Rs. 6 each, per share. Axel Finance Company Ltd. had offered the buy-back of debentures at face value.

Find out the expected return and variability of returns of the equity shares. And also advise-whether to accept buy back after?

## Answer

The expected return of an equity share may be found as follows:

Market condition	Probability	Total Return	Cost	Net return
Good	0.25	124	100	24
Normal	0.50	112	100	12
Bad	0.25	100	100	0

$$\begin{aligned}\text{Expected Return} &= (24 \times 0.25) + (12 \times 0.50) + (0 \times 0.25) \\ &= 12\%\end{aligned}$$

The variability of return can be calculated in terms of standard deviation.

$$VSD = 0.25 (24 - 12)^2 + 0.50 (12 - 12)^2 + 0.25 (0 - 12)^2$$

$$\begin{aligned}
&= 0.25 (12)^2 + 0.50 (0)^2 + 0.25 (-12)^2 \\
&= 36 + 0 + 36 \\
SD &= \sqrt{72} \\
SD &= 8.485 \text{ or say } 8.49
\end{aligned}$$

The present market price of the share is Rs. 106 cum bonus 10% debenture of Rs. 6 each; hence, the net cost is Rs. 100 (There is no cash loss or any waiting for refund of debenture amount).

Axel Finance company Ltd. has offered the buyback of debenture at face value. There is reasonable 10% rate of interest compared to expected return 12% from the market.

Considering the dividend rate and market price the creditworthiness of the company seems to be very good. The decision regarding buy-back should be taken considering the maturity period and opportunity in the market. Normally, if the maturity period is low say up to 1 year better to wait otherwise to opt buy back option.

### Question 34

*Abhishek Ltd. has surplus cash of Rs. 90 lakhs and wants to distribute 30% of it to the shareholders. The Company decides to buyback shares. The Finance Manager of the Company estimates that its share price after re-purchase is likely to be 10% above the buyback price; if the buyback route is taken. The number of shares outstanding at present is 10 lakhs and the current EPS is Rs. 3. You are required to determine:*

- (a) *The price at which the shares can be repurchased, if the market capitalization of the company should be Rs. 200 lakhs after buyback.*
- (b) *The number of shares that can be re-purchased.*
- (c) *The impact of share re-purchase on the EPS, assuming the net income is same.*

### Answer

(a) Let P be the buyback price decided by Abhishek Ltd.

Market Capitalisation after Buyback

1.1 P (Original Shares – Shares Bought back)

$$= 1.1P (10 \text{ lakhs}) - \left( 10 \text{ lakhs} - \frac{30\% \text{ of } 90 \text{ lakhs}}{P} \right)$$

$$= 11 \text{ lakhs} \times P - 27 \text{ lakhs} \times 1.1 = 11 \text{ lakhs} \times P - 29.7 \text{ lakhs}$$

Market capitalization rate after buyback is 200 lakhs.

Thus, we have:

$$11 \text{ lakhs} \times P - 29.7 \text{ lakhs} = \text{Rs. } 200 \text{ lakhs}$$

$$\text{or } 11P = 200 + 29.7$$

$$\text{or } P = 20.88$$

(b) Number of shares to be bought back

$$= \frac{27\text{Lakhs}}{20.88} = 1.29 \text{ lakhs (Approximately)}$$

(c) New Equity Shares

$$= (10 - 1.29) \text{ lakhs} = 8.71 \text{ lakhs}$$

$$\text{EPS} = \frac{3 \times 10 \text{lacs}}{8.7 \text{lacs}} = \text{Rs. } 3.44$$

Thus EPS of Abhishek Ltd., increases to Rs. 3.44

\*\*\*

# 8

## Working Capital

### Question 1

*Discuss the factors to be taken into consideration while determining the requirement of working capital.*

### Answer

Working capital is constantly affected by the criss-crossing economic currents flowing about a business. The nature of firm's activities, the industrial health of the country, the availability of material, the ease or tightness of the money markets are all part of these shifting forces. Nature of business, production policies, growth, business cycle, competitive conditions, production collection time period, dividend policy sales policies and risks faced by the business are the various important factors determining the working capital. It is difficult to rank them because the influence in individual items rises and wanes over the years as a company's internal policies and environment in which it operates change. The following factors are however important and are to be taken into consideration while determining the requirement of working capital:

- |                              |                             |
|------------------------------|-----------------------------|
| (i) Production Policies      | (ii) Nature of the business |
| (iii) Credit policy          | (iv) Inventory policy       |
| (v) Abnormal factors         | (vi) Market conditions      |
| (vii) Conditions of supply   | (viii) Business cycle       |
| (ix) Growth and expansion    | (x) Level of taxes          |
| (xi) Dividend policy         | (xii) Price level changes   |
| (xiii) Operating efficiency. |                             |

### Question 2

*What is operating cycle? How can it be reduced?*

### Answer

The operating cycle is the length of time between the company's outlay on raw materials, wages and other expenditures and the inflow of cash from the sale of the goods. In a manufacturing business, operating cycle is the average time that raw material remains in stock less the period of credit taken from suppliers, plus the time

taken for producing the goods, plus the time the goods remain in finished inventory, plus the time taken by customers to pay for the goods. Operating cycle concept is important for management of cash and management of working capital because the longer the operating cycle the more financial resources the company needs. Therefore, the management has to remain cautious that the operating cycle should not become too long.

Operating cycle is long and a number of steps could be taken to shorten this operating cycle.

Debtors could be cut by a quicker collection of accounts.

Finished goods could be turned over more rapidly, the level of raw material inventory could be reduced or the production period shortened.

### **Question 3**

*Most businesses need cash funds to meet contingencies. Comment.*

### **Answer**

This motive of holding cash takes into account the element of uncertainty associated with any form of business. The uncertainty can result in prolongation of the working capital operating cycle or even its disruption. It is possible that cost of raw materials or components might go up or the time taken for conversion of raw materials into finished goods might increase. For such contingencies, some amount of cash is kept by every firm. The motive of holding cash for contingencies is based on the need to maintain sufficient cash to act as a cushion to buffer against unexpected events. One never knows about the happening of natural calamities or sudden increase in cost of raw materials or any other factor such as strike, lock-out etc. Such events may seriously interrupt even the best planned financial plans and thus temporarily make the cash budget ineffective and non-existent. Therefore, the business should maintain larger cash balance than required for day to day transactions in order to avoid unforeseen situation arising because of insufficient cash.

### **Question 4**

*What are the different motives for holding cash?*

### **Answer**

#### *(a) Transactional Motive*

This is the most essential motive for holding cash because cash is the medium through which all the transactions of the firm are carried out. Some examples of transactions of a manufacturing firm are given below:

- Purchase of Capital Goods like plant and machinery
- Purchase of raw material and components
- Payment of rent and wages
- Payment for utilities like water, power and telephone
- Payment for service like freight and courier

These transactions are paid for from the cash pool or cash reservoir which is all the time being supplemented by inflows. These inflows are of the following kinds:

- Capital inflows from promoters' capital and borrowed funds
- Sales proceeds of finished goods
- Capital gains from investments

The size of the cash pool depends upon the overall operations of the firm. Ideally, for transaction purposes, the working capital inflows should be more than the working capital outflows at any point of time. The non-working capital inflows should be utilized for similar outflows such as purchase of fixed assets together with the surplus of working capital inflows.

*(b) Speculative Motive*

Since cash is the most liquid current asset, it has the maximum potential of value addition to a firm's business. The value addition can come in two forms. First, as the originating and terminal point of the operating cycle, cash is invaluable. But cash has an opportunity cost also and if cash is kept idle, it becomes a liability rather than an asset. Therefore, efficient firms seek to deploy surplus cash in short term investments to get better returns. It is here that the second form of value addition from cash can be had. Since this deployment of cash needs to be done skillfully, not all the firms hold cash for speculative motive. Further the amount of cash held for speculative motive should not cause any strain upon the operating cycle.

*(c) Contingency Motive*

This motive of holding cash takes into account the element of uncertainty associated with any form of business. The uncertainty can result in prolongation of the working capital operating cycle or even its disruption. It is possible that cost of raw materials or components might go up or the time taken for conversion of raw materials into finished goods might increase. For such contingencies, some amount of cash is kept by every firm.

**Question 5**

*Differentiate between Forfaiting and Export Factoring.*

**Answer**

Forfaiting is similar to cross border factoring to the extent both have common features of non recourse and advance payment. But they differ in several important respects:

- (a) A forfeiter discounts the entire value of the note/bill but the factor finances between 75-85% and retains a factor reserve which is paid after maturity.
- (b) The availing bank which provides an unconditional and irrevocable guarantee is a critical element in the forfaiting arrangement whereas in a factoring deal,

particularly non-recourse type, the export factor bases his credit decision on the credit standards of the exporter.

- (c) Forfaiting is a pure financing arrangement while factoring also includes ledger administration, collection and so on.
- (d) Factoring is essentially a short term financing deal. Forfaiting finances notes/bills arising out of deferred credit transaction spread over three to five years.
- (e) A factor does not guard against exchange rate fluctuations; a forfeiter charges a premium for such risk.

### Practical Questions

#### Question 6

The following information is available for Excel Ltd.

	Amount (Rs.)
Average stock of raw materials and stores	2,00,000
Average work-in-progress inventory	3,00,000
Average finished goods inventory	1,80,000
Average accounts receivable	3,00,000
Average accounts payable	1,80,000
Average raw materials and stores purchased on credit and consumed per day	10,000
Average work-in-progress value of raw materials committed per day	12,500
Average cost of goods sold per day	18,000
Average sales per day	20,000

Calculate the duration of operating cycle.

#### Answer

Calculation of operating cycle

Period of raw material stage	$\frac{2,00,000}{10,000}$	= 20 days
Period of work-in-progress stage	$\frac{3,00,000}{12,500}$	= 24 days
Period of finished goods stage	$\frac{1,80,000}{18,000}$	= 10 days

Period of Accounts receivable stage	$\frac{3,00,000}{20,000}$	= 15 days
Period of Accounts payable stage	$\frac{1,80,000}{10,000}$	= 18 days

Duration of operating cycle = (20 + 24 + 10 + 15) – 18 = 51 days

### Question 7

*Simplex Limited is launching a new project for the manufacture of a component. At full capacity of 24,000 units, the cost will be as follows:*

	<i>Cost per unit Rs.</i>
<i>Material</i>	<i>80</i>
<i>Labour and Variable Expenses</i>	<i>40</i>
<i>Fixed Manufacturing and Administrative Expenses</i>	<i>20</i>
<i>Depreciation</i>	<u><i>10</i></u>
	<u><i>150</i></u>

*The selling price per unit is expected at Rs. 200 and the selling expenses per unit will be Rs. 10, 80% of which is variable.*

*In the first two years production and sales are expected to be as follows:*

<i>Year</i>	<i>Production</i>	<i>Sales</i>
<i>1</i>	<i>15,000 units</i>	<i>14,000 units</i>
<i>2</i>	<i>20,000 units</i>	<i>18,000 units</i>

*To assess working capital requirement, the following additional information is given:*

- (a) Stock of raw material -3 months' average consumption.*
- (b) Work-in-progress-Nil.*
- (c) Debtors-1 month average sales.*
- (d) Creditors for supply of materials- 2 months average purchases of the year.*
- (e) Creditors for expenses- 1 month average of all expenses during the year.*

(f) Cash balance-Rs. 20,000

Stock of finished goods is taken at average cost.

You are required to prepare for the two years:

- (1) A projected statement of profit/loss
- (2) A projected statement of working capital requirements.

**Answer**

**Simplex Ltd.**

(1) Projected Statement of Profit/Loss

	<i>Year I</i> Rs.	<i>Year II</i> Rs.
Production in units	15,000	20,000
Sales in units	14,000	18,000
Sales Revenue @ Rs. 200 per unit (A)	28,00,000	36,00,000
Cost of Production		
Material @ Rs. 80 per unit	12,00,000	16,00,000
Direct labour & variable expenses @ Rs. 40 per unit	6,00,000	8,00,000
Fixed manufacturing & Administrative expenses @ Rs.20 on 24,000 units	4,80,000	4,80,000
Depreciation @ Rs. 10 for 24,000 units	2,40,000	2,40,000
Total Cost of Production	25,20,000	31,20,000
Add : Opening stock of finished goods at average cost	-	1,68,000*
$\frac{*25,20,000}{15,000} \times 1000$		
Cost of goods available	25,20,000	32,88,000

Less : Closing stock of finished goods at average cost $\frac{32,88,000}{21,000} \times 3000$	1,68,000	4,69,714 <sup>@</sup>
Cost of goods sold	23,52,000	28,18,286
Add : Selling expenses (Variable at Rs. 8)	1,12,000	1,44,000
Selling expenses fixed at Rs. 2	48,000	48,000
Cost of Sales (B)	25,12,000	30,10,286
Profit A-B	2,88,000	5,89,714

### Working Notes

		Year I Rs.	Year II Rs.
(a)	Creditors for supply of material		
	Materials consumed	12,00,000	16,00,000
	Add : Closing stock of Average consumption (3 months)	3,00,000	4,00,000
		15,00,000	20,00,000
	Less : Opening Stock	-	3,00,000
	Purchases	15,00,000	17,00,000
	Average purchases per month (Creditors)	1,25,000	1,41,667
	Creditors (2 months for goods)	2,50,000	2,83,334
(b)	Creditors for expenses	1,03,334*	1,22,667*
	Total of Current Liabilities (B)	3,53,334	4,06,001
	*Labour, Manufacturing expenses & Selling expenses		
	Direct Labour & variable expenses	6,00,000	8,00,000

	Fixed manufacturing & Administrative expenses	4,80,000	4,80,000
	Selling expenses	1,12,000	1,44,000
	Selling expenses fixed	48,000	48,000
	Total	12,40,000	14,72,000
	Creditors for expenses	1240,000/12 = 1,03,334	14,72,000/12 = 1,22,667

(2) Projected Statement of Working Capital Requirements

	Year I Rs.	Year II Rs.
Current Assets:	3,00,000	4,00,000
Stock of materials (3 months average consumption)		
Finished Goods	1,68,000	4,69,714
Debtors (one month)	2,33,334	3,00,000
Cash	20,000	20,000
Total Current Assets (A)	7,21,334	11,89,714
Current Liabilities :		
Creditors for supply of materials	2,50,000	2,83,334
Creditors for expenses	1,03,334	1,22,667
Estimated Working Capital requirement (B)	3,53,334	4,06,001
Estimated Working Capital	3,68,000	7,83,713

**Question 8**

*Sohna Food and Beverages Ltd. is presently operating at 60% level producing 36,000 packets of snack foods and proposes to increase capacity utilisation in the coming year by  $33\frac{1}{3}$  % over the existing level of production.*

The following data has been supplied:

(i) Unit cost structure of the product at current level:

	Rs.
Raw Material	4
Wages (Variable)	2
Overheads (Variable)	2
Fixed Overhead	1
Profit	3
Selling Price	12

(ii) Raw materials will remain in stores for 1 month before being issued for production. Material will remain in process for further 1 month. Suppliers grant 3 months credit to the company.

(iii) Finished goods remain in godown for 1 month.

(iv) Debtors are allowed credit for 2 months.

(v) Lag in wages and overhead payments is 1 month and these expenses accrue evenly throughout the production cycle.

(vi) No increase either in cost of inputs or selling price is envisaged.

Prepare a projected profitability statement and the working capital requirement at the new level, assuming that a minimum cash balance of Rs. 19,500 has to be maintained.

**Answer**

**Sohna Food and Beverages Ltd.**

**Projected Profitability Statement at 80% capacity**

**Units to be produced  $(36,000/60 \times 80) = 48,000$  packets**

A.	Cost of Sales:			(Rs.)
	Raw material	Rs. 4 x 48,000	=	1,92,000
	Wages	Rs. 2 x 48,000	=	96,000
	Overheads (Variable)	Rs. 2 x 48,000	=	96,000
	Overheads (Fixed)	Rs. 1 x 36,000	=	36,000
				4,20,000

B.	Profit	Rs. 3.25 x 48,000	=	1,56,000
C.	Sale value	Rs. 12 x 48,000	=	5,76,000

### Alternatively

If we assume the movement in stock levels, because of increase in capacity, i.e., from 60% to 80%, the profitability statement will be as follows:

Units to be produced                      (36,000/60 x 80)                      48,000 packets

#### A. Cost of goods sold:

		Rs.
Raw Material	(4 x 48,000)	1,92,000
Wages	(2 x 48,000)	96,000
Overheads (Variable)	(2 x 48,000)	96,000
Overheads (Fixed)	(1 x 36,000)	36,000
		4,20,000
Less : Increase in stock of Materials + WIP + Finished goods (Refer to working note)		18,000
Adjusted cost of sales		4,02,000
B. Profit		1,62,000
C. Sales	(12 x 47,000)*	5,64,000

\* Opening Stock + production – closing stock = 3,000 + 48,000-4,000= 47,000

### Working Note:

Capacity		60%		80%
Number of units of production		36,000		48,000
	<i>Cost/Unit</i>	<i>Rs.</i>		<i>Rs.</i>
Raw material stock (I month)	4	12,000		16,000
WIP Stock:				

Material (1 month)	4	12,000		16,000
Wages (1/2 month)	2	3,000		4,000
Variable overheads (1/2 month)	2	3,000		4,000
Fixed overheads (1/2 month)	1	1,500	(0.75)	1,500
Finished goods (1 month)	9	27,000	(8.75)	<u>35,000</u>
		58,500		76,500
Increase in Stock				18,000

**Working Notes:**

**Cost of Sales-average per month**

	<i>Per annum</i>	<i>Per month</i>
Raw material	1,92,000	16,000
Wages	96,000	8,000
Overheads (Variable)	96,000	8,000
Overheads (Fixed)	36,000	3,000
	4,20,000	35,000
Profit	1,56,000	13,000
Sale value	5,76,000	48,000

**Projected Statement of Working Capital at 80% capacity**

Current Assets			
Raw material (48000/12 x 4)		16,000	
Work in process		25,500	
Materials (48,000 x 4 x 1/12)	16,000		
Wages (48,000 x 2 x 1/24)	4,000		
Variable overheads (48,000 x 2 x 1/24)	4,000		
Fixed overheads (48,000 x 0.75 x 1/24)	1,500		

Finished goods (48,000 x 8.75 x 1/12)		35,000	
		76,500	
Sundry debtors		96,000	
		1,72,500	
Cash balance		19,500	(A) 1,92,000
<i>Less : Current Liabilities:</i>			
Creditors for goods (48,000 x 4 x 3/12)		48,000	
Creditors for expenses (48,000 x 4.75 x 1/12)		19,000	(B) 67,000
Net working capital (A)-(B)			1,25,000

**Note:**

- (i) Since wages and overheads payments accrue evenly, it is assumed that they will be in process for half a month in average.
- (ii) Fixed overheads per unit = Rs. 36000/48000=Rs. 0.75

**Question 9**

*The fixed assets and equities of Great Manufacturing Co. Ltd. are supplied to you both at the beginning and at the end of the year 2011-12 :*

	<i>1.04.2011</i>	<i>31.03.2012</i>
	<i>Rs.</i>	<i>Rs.</i>
<i>Plant Less Depreciation</i>	<i>63,500</i>	<i>1,42,500</i>
<i>Investment in Shares of Southern Manufacturing Company</i>	<i>1,32,000</i>	<i>2,90,000</i>
<i>Bonds Payable</i>	<i>2,50,000</i>	<i>70,000</i>
<i>Capital Stock</i>	<i>4,00,000</i>	<i>4,00,000</i>
<i>Retained Earnings</i>	<i>2,38,000</i>	<i>4,10,500</i>

*You are not in a position to have complete Balance Sheet data or an income statement for the year in spite of the fact that you have obtained the following information:*

(a) Dividend of Rs. 37,500 were paid.

(b) The net income included Rs. 13,000 as profit on sale of equipment. There has been an increase of Rs. 93,000 in the value of gross plant assets even though equipments worth Rs. 29,000 with a net book value of Rs. 19,000 was disposed off.

From the particulars given above, prepare a statement of sources and uses of net working capital.

### Answer

#### Working Notes:

(i)	Purchase of plant	Rs.
	Net increase in gross value	93,000
	Add : Gross value of plant sold	29,000
		1,22,000

(ii) Depreciation on plant and machinery

<i>Dr.</i>		<b>Plant and Machinery account</b>		<i>Cr.</i>	
<i>Particulars</i>	<i>Rs.</i>	<i>Particulars</i>	<i>Rs.</i>		
To Balance b/d	63,500	By Sale of Plant & machinery A/c	19,000		
To Purchases	1,22,000	By Depreciation (balancing figure)	24,000		
	_____	By Balance c/d	1,42,500		
	1,85,500				1,85,500

(iii) Funds from Operations	Rs.
Increase in retained earnings [4,10,500 – 2,38,000]	1,72,500
Add: Dividend paid	37,500
Add: Depreciation on plant	<u>24,000</u>
	2,34,000

Less: Gain on sale of equipment	<u>13,000</u>
	<u>2,21,000</u>

### Statement of Sources and Uses of Fund

<i>Sources</i>	<i>Rs.</i>	<i>Uses</i>	<i>Rs.</i>
Funds form operation	2,21,000	Purchase of plant	1,22,000
Sale of equipment	32,000	Purchase of Investments (2,90,000 -1,32,000)	1,58,000
Decrease in net working capital (Balancing figure)	2,44,500 —————	Payment of bonds	1,80,000
		Dividends	37,500
	4,97,500		4,97,500

#### Question 10

*XYZ Company Ltd. has applied to the commercial bank for the first time for financing its working capital requirements. The following information is available about the projections for the current year:*

*Estimated level of activity: 1,04,000 completed units of production plus 4,000 units of work-in-progress. Based on the above activity, estimated cost per unit is:*

<i>Raw material</i>	<i>Rs. 80 per unit</i>
<i>Direct wages</i>	<i>Rs. 30 per unit</i>
<i>Overheads (exclusive of depreciation)</i>	<i>Rs. 60 per unit</i>
<i>Total cost</i>	<i>Rs. 170 per unit</i>
<i>Selling price</i>	<i>Rs. 200 per unit</i>

*Raw materials in stock: Average 4 weeks consumption, work-in-progress (assume 50% completion stage in respect of conversion cost) (materials issued at the start of the processing).*

<i>Finished goods in stock</i>	<i>8,000 units</i>
<i>Credit allowed by suppliers</i>	<i>Average 4 weeks</i>
<i>Credit allowed to debtors/receivables</i>	<i>Average 8 weeks</i>
<i>Lag in payment of wages</i>	<i>Average <math>1\frac{1}{2}</math> weeks</i>

*Cash at banks (for smooth operation) is expected to be Rs. 25,000*

*Assume that production is carried on evenly throughout the year (52 weeks) and wages and overheads accrue similarly. All sales are on credit basis only.*

*Find out*

*(i) the net working capital required;*

*(ii) the maximum permissible bank finance under first and second methods of financing as per Tandon Committee Norms.*

**Answer**

**(i) Estimate of the Requirement of Working Capital**

	<i>Rs.</i>	<i>Rs.</i>
A. Current Assets:		
Raw material stock (Refer to Working note 3)	6,64,615	
Work in progress stock (Refer to Working note 2)	5,00,000	
Finished goods stock (Refer to Working note 4)	13,60,000	
Debtors (Refer to Working note 5)	29,53,846	

Cash and Bank balance	25,000	55,03,461
B. Current Liabilities:		
Creditors for raw materials (Refer to Working note 6)	7,15,740	
Creditors for wages (Refer to Working note 7)	91,731	8,07,471
Net Working Capital (A-B)		46,95,990

**(ii) The maximum permissible bank finance as per Tandon Committee Norms**

First Method:

75% of the net working capital financed by bank i.e. 75% of Rs. 46,95,990

(Refer to (i) above)

= Rs. 35,21,993

Second Method:

(75% of Current Assets)- Current liabilities (i.e. 75% of Rs. 55,03,461)- Rs. 8,07,471

(Refer to (i) above)

= Rs. 41,27,596 – Rs. 8,07,471

= Rs. 33,20,125

*Working Notes:*

1. Annual cost of production

	Rs.
Raw material requirements (1,04,000 units x Rs. 80)	83,20,000
Direct wages (1,04,000 units x Rs. 30)	31,20,000
Overheads (exclusive of depreciation)(1,04,000 x Rs. 60)	62,40,000
	1,76,80,000

2. Work in progress stock

	Rs.
Raw material requirements (4,000 units x Rs. 80)	3,20,000
Direct wages (50% x 4,000 units x Rs. 30)	60,000
Overheads (50% x 4,000 units x Rs. 60)	1,20,000
	5,00,000

3. Raw material stock

It is given that raw material in stock is average 4 weeks consumption. Since, the company is newly formed, the raw material requirement for production and work in progress will be issued and consumed during the year.

Hence, the raw material consumption for the year (52 weeks) is as follows:

	Rs.
For Finished goods	83,20,000
For Work in progress	3,20,000
	86,40,000

$$\text{Raw material stock} = \frac{\text{Rs. } 86,40,000}{52 \text{ weeks}} \times 4 \text{ weeks}$$

i.e. Rs. 6,64,615

4. Finished goods stock

8,000 units @ Rs. 170 per unit = Rs. 13,60,000

5. Debtors for sale

Credit allowed to debtors	Average 8 weeks
Credit sales for year (52 weeks) i.e. (1,04,000 units-8,000 units)	96,000 units
Selling price per unit	Rs. 200
Credit sales for the year (96,000 units x Rs. 200)	Rs. 1,92,00,000
Debtors	$\frac{\text{Rs. } 1,92,00,000}{52 \text{ weeks}} \times 8 \text{ weeks}$ <p>i.e Rs. 29,53,846</p>

6. Creditors for raw material:

Credit allowed by suppliers	Average 4 weeks
Purchases during the year (52 weeks) i.e. (Rs. 83,20,000 + Rs. 3,20,000 + Rs. 6,64,615)	Rs. 93,04,615
(Refer to Working notes 1,2 and 3 above)	
Creditors	$\frac{\text{Rs.93,04,615}}{52\text{weeks}} \times 4\text{ weeks}$ i.e Rs. 7,15,740

7. Creditors for wages

Lag in payment of wages	Average $1 \frac{1}{2}$ weeks
Direct wages for the year (52 weeks) i.e. (Rs. 31,20,000 + Rs. 60,000)	Rs. 31,80,000
(Refer to Working notes 1 and 2 above)	
Creditors	$\frac{\text{Rs.31,80,000}}{52\text{weeks}} \times 1\frac{1}{2}\text{ weeks}$ i.e. Rs. 91,731

**Question 11**

*Suicker Ltd. sells goods at a uniform rate of gross profit of 20% on sales including depreciation as part of cost of production. Its annual figures are as under:*

	Rs.
<i>Sales (At 2 months' credit)</i>	<i>24,00,000</i>
<i>Materials consumed (Suppliers credit 2 months)</i>	<i>6,00,000</i>
<i>Wages paid (Monthly at the beginning of the subsequent month)</i>	<i>4,80,000</i>

<i>Manufacturing expenses (Cash expenses are paid – one month in arrear)</i>	<i>6,00,000</i>
<i>Administration expenses (Cash expenses are paid – one month in arrear)</i>	<i>1,50,000</i>
<i>Sales promotion expenses (Paid quarterly in advance)</i>	<i>75,000</i>

*The company keeps one month stock each of raw materials and finished goods. A minimum cash balance of Rs. 80,000 is always kept. The company wants to adopt a 10% safety margin in the maintenance of working capital.*

*The company has no work in progress*

*Find out the requirements of working capital of the company on cash cost basis.*

**Answer**

**(a) Working Notes:**

1.	Manufacturing expenses		<i>Rs.</i>
	Sales		24,00,000
	Less: Gross profit margin at 20%		4,80,000
	Total Manufacturing cost		19,20,000
	<i>Less: Materials consumed</i>	6,00,000	
	Wages	4,80,000	10,80,000
	Manufacturing expenses		8,40,000
	<i>Less : Cash manufacturing expenses (50,000 x 12)</i>		6,00,000
	Depreciation		2,40,000
2.	Total cash costs		<i>Rs.</i>
	Manufacturing costs		19,20,000
	<i>Less: Depreciation</i>		- 2,40,000
	Cash Manufacturing costs		16,80,000

	Add: Administrative expenses		1,50,000
	Add : Sales promotion expenses		-75,000
	Total cash costs		19,05,000

**Statement showing the Requirements of Working Capital of the Company**

		Rs.
Current Assets:		
Debtors $\frac{1}{6}$ <sup>th</sup> of total cash costs ( $\frac{1}{6} \times$ Rs. 19,05,000)		3,17,500
Sales promotion expenses (prepaid)		18,750
Stock of raw materials (1 month)		50,000
Finished goods ( $\frac{1}{12}$ of cash manufacturing costs) (Rs. 16,80,000 $\times$ $\frac{1}{12}$ ) (Refer to Working note 2)		1,40,000
Cash in hand		80,000
Total Current Assets		6,06,250
Less : Current liabilities		
Creditors for goods ( 2 months)	1,00,000	
Wages (1 month)	40,000	
Manufacturing expenses (1 month)	50,000	
Administrative expenses (1 month)	<u>12,500</u>	2,02,500
Net working capital		4,03,750
Add : Safety margin 10%		40,375
Working Capital Required		4,44,125

**Question 12**

*A company is considering its working capital investment and financial policies for the next year. Estimated fixed assets and current liabilities for the next year are Rs. 2.60*

crores and Rs. 2.34 crores respectively. Estimated Sales and EBIT depend on current assets investment, particularly inventories and book-debts. The financial controller of the company is examining the following alternative Working Capital Policies:

(Rs. Crores)

<i>Working Capital Policy</i>	<i>Investment in Current Assets</i>	<i>Estimated Sales</i>	<i>EBIT</i>
<i>Conservative</i>	<i>4.50</i>	<i>12.30</i>	<i>1.23</i>
<i>Moderate</i>	<i>3.90</i>	<i>11.50</i>	<i>1.15</i>
<i>Aggressive</i>	<i>2.60</i>	<i>10.00</i>	<i>1.00</i>

After evaluating the working capital policy, the Financial Controller has advised the adoption of the moderate working capital policy. The company is now examining the use of long-term and short-term borrowings for financing its assets. The company will use Rs. 2.50 crores of the equity funds. The corporate tax rate is 35%. The company is considering the following debt alternatives.

(Rs. Crores)

<i>Financing Policy</i>	<i>Short-term Debt</i>	<i>Long-term Debt</i>
<i>Conservative</i>	<i>0.54</i>	<i>1.12</i>
<i>Moderate</i>	<i>1.00</i>	<i>0.66</i>
<i>Aggressive</i>	<i>1.50</i>	<i>0.16</i>
<i>Interest rate-Average</i>	<i>12%</i>	<i>16%</i>

You are required to calculate the following:

(1) Working Capital Investment for each policy:

- (a) Net Working Capital position
- (b) Rate of Return
- (c) Current ratio

(2) Financing for each policy :

- (a) Net Working Capital position.
- (b) Rate of Return on Shareholders equity.

(c) Current ratio.

**Answer**

**Statement showing Working Capital for each policy**

(Rs. in crores)

	<i>Working Capital Policy</i>		
	<i>Conservative</i>	<i>Moderate</i>	<i>Aggressive</i>
Current Assets: (i)	4.50	3.90	2.60
Fixed Assets: (ii)	<u>2.60</u>	<u>2.60</u>	<u>2.60</u>
Total Assets: (iii)	<u>7.10</u>	<u>6.50</u>	<u>5.20</u>
Current liabilities: (iv)	2.34	2.34	2.34
Net Worth: (v)=(iii)-(iv)	<u>4.76</u>	<u>4.16</u>	<u>2.86</u>
Total liabilities: (iv)+(v)	<u>7.10</u>	<u>6.50</u>	<u>5.20</u>
Estimated Sales: (vi)	12.30	11.50	10.00
EBIT : (vii)	1.23	1.15	1.00
(a) Net working capital position: (i)-(iv)	2.16	1.56	0.26
(b) Rate of return: (vii)/(iii)	17.3%	17.7%	19.2%
(c) Current ratio: (i)/(iv)	1.92	1.67	1.11

**Statement Showing Effect of Alternative Financing Policy**

(Rs. in crores)

<i>Financing Policy</i>	<i>Conservative</i>	<i>Moderate</i>	<i>Aggressive</i>
Current Assets: (i)	3.90	3.90	3.90
Fixed Assets: (ii)	<u>2.60</u>	<u>2.60</u>	<u>2.60</u>

Total Assets: (iii)	<u>6.50</u>	<u>6.50</u>	<u>6.50</u>
Current Liabilities: (iv)	2.34	2.34	2.34
Short term Debt: (v)	0.54	1.00	1.50
Long term Debt: (vi)	1.12	0.66	0.16
Equity Capital	<u>2.50</u>	<u>2.50</u>	<u>2.50</u>
Total liabilities	<u>6.50</u>	<u>6.50</u>	<u>6.50</u>
Forecasted Sales	11.50	11.50	11.50
EBIT: (vii)	1.15	1.15	1.15
Less : Interest short-term debt : (viii)	0.06 (12% of Rs.0.54)	0.12 (12% of Rs. 1.00)	0.18 (12% of Rs. 1.50)
Long term debt : (ix)	0.18	0.11	0.03
	(16% of Rs. 1.12)	(16% of Rs. 0.66)	(16% of Rs. 1.16)
Earning before tax : (x)- (viii+ix)	0.91	0.92	0.94
Taxes @ 35%	0.32	0.32	0.33
Earning after tax: (xi)	0.59	0.60	0.61
(a) Net Working Capital Position : (i)- [(iv)+(v)]	1.02	0.56	0.06
(b) Rate of return on shareholders Equity capital : (xi)	23.6%	24%	24.4%
(c) Current Ratio : [(i)/(iv)+(v)]	1.35	1.17	1.02

### Question 13

The following information has been extracted from the records of a Company:

<i>Product Cost Sheet</i>	<i>Rs./unit</i>
<i>Raw materials</i>	<i>45</i>
<i>Direct labour</i>	<i>20</i>
<i>Overheads</i>	<i>40</i>
<i>Total</i>	<i>105</i>
<i>Profit</i>	<i>15</i>
<i>Selling price</i>	<i>120</i>

- *Raw materials are in stock on an average of two months.*
- *The materials are in process on an average for 4 weeks. The degree of completion is 50%.*
- *Finished goods stock on an average is for one month.*
- *Time lag in payment of wages and overheads is 1½ weeks.*
- *Time lag in receipt of proceeds from debtors is 2 months.*
- *Credit allowed by suppliers is one month.*
- *20% of the output is sold against cash.*
- *The company expects to keep a Cash balance of Rs.1,00,000.*
- *Take 52 weeks per annum.*

*The Company is poised for a manufacture of 1,44,000 units in the year.*

*You are required to prepare a statement showing the Working Capital requirements of the Company.*

### Answer

#### Statement showing the Working Capital Requirement of the Company

A. Current Assets:	<i>Rs.</i>
Stock of raw materials	<i>10,80,000</i>
[Rs.64,80,000 / 12 months] x 2 months	
Work-in-progress	<i>5,81,538</i>
[(Rs. 1,51,20,000 x 4) / 52 months] x 50%	

Finished goods	12,60,000
(Rs.1,51,20,000 / 12 months)	
Debtors	23,04,000
(Rs.28,80,000 x 80%) (Refer to Working note 2)	
Cash balances	1,00,000
Total Current Assets	53,25,538
Current Liabilities:	
Creditors of raw materials (Rs. 64,80,000 / 12 months)	5,40,000
Creditors for wages & overheads	2,49,231
$\left( \frac{\text{Rs.86,40,000}}{52 \text{ weeks}} \times 1.5 \text{ weeks} \right)$	7,89,231
Net Working Capital (C.A - C.L)	45,36,307
<b>Working Notes:</b>	
1, Annual raw materials requirements (Rs.) 1,44,000 units x Rs.45	64,80,000
Annual direct labour cost (Rs.) 1,44,000 units x Rs.20	28,80,000
Annual overhead costs (Rs.) 1,44,000 units x Rs.40	57,60,000
Total Cost (Rs.)	1,51,20,000
2. Total Sales: (1,44,000 units x Rs.120)	1,72,80,000
Two months sales (Rs.1,72,80,000 / 6 months)	28,80,000

#### Question 14

An engineering company is considering its working capital investment for the year 2003-04. The estimated fixed assets and current liabilities for the next year are Rs.6.63 crore and Rs.5.967 crore respectively. The sales and earnings before interest and taxes (EBIT) depend on investment in its current assets - particularly inventory and receivables. The company is examining the following alternative working capital policies:

<i>Working Capital Policy</i>	<i>Investment in Current Assets (Rs. Crore)</i>	<i>Estimated Sales (Rs. Crore)</i>	<i>EBIT (Rs. Crore)</i>
<i>Conservative</i>	11.475	31.365	3.1365
<i>Moderate</i>	9.945	29.325	2.9325
<i>Aggressive</i>	6.63	25.50	2.55

You are required to calculate the following for each policy:

- (i) Rate of return on total assets.
- (ii) Net working capital position.
- (iii) Current assets to fixed assets ratio.
- (iv) Discuss the risk-return trade off of each working capital policy.

**Answer**

**Basic data:**

(Rs. in Crores)

	<i>Working Capital Investment Policy</i>		
	<i>Conservative</i>	<i>Moderate</i>	<i>Aggressive</i>
1. Current assets	11.475	9.945	6.630
2. Fixed assets	6.630	6.630	6.630
3. Total assets	18.105	16.575	13.26
4. Current liabilities	5.967	5.967	5.967
5. Estimated sales	31.365	29.325	25.50
6. Estimated EBIT	3.1365	2.9325	2.55
7. Current ratio $\{(1) / (4)\}$	1.92	1.67	1.11

Computation of following for each policy:

(i) Rate of return on total assets (in percentages): [[6]/(3)] x 100	17.32	17.69	19.23
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(ii) Net working capital position : (in crores) [(1)x(4)]	5.508	3.978	0.663
(iii) Current assets to fixed assets ratio: [(1) / (2)]	1.73	1.50	1.00

(iv) Risk return trade off:

The net working capital or current ratio is a measure of risk. Rate of return on total assets is a measure of return. The expected risk and return are minimum in the case of conservative investment policy and maximum in the case of aggressive investment policy. The firm can improve profitability by reducing investment in working capital.

### Question 15

*XYZ Co. Ltd. is a pipe manufacturing company. Its production cycle indicates that materials are introduced in the beginning of the production cycle; wages and overhead accrue evenly throughout the period of the cycle. Wages are paid in the next month following the month of accrual. Work in process includes full units of raw materials used in the beginning of the production process and 50% of wages and overheads are supposed to be conversion costs. Details of production process and the components of working capital are as follows:*

<i>Production of pipes</i>	<i>12,00,000 units</i>
<i>Duration of the production cycle</i>	<i>One month</i>
<i>Raw materials inventory held</i>	<i>One month consumption</i>
<i>Finished goods inventory held for</i>	<i>Two months</i>
<i>Credit allowed by creditors</i>	<i>One month</i>
<i>Credit given to debtors</i>	<i>Two months</i>
<i>Cost price of raw materials</i>	<i>Rs. 60 per unit</i>
<i>Direct wages</i>	<i>Rs. 10 per unit</i>
<i>Overheads</i>	<i>Rs. 20 per unit</i>
<i>Selling price of finished pipes</i>	<i>Rs. 100 per unit</i>

Required to calculate:

- (i) The amount of working capital required for the company.  
(ii) Its maximum permissible bank finance under all the three methods of lending norms as suggested by the Tondon Committee, assuming the value of core current assets: Rs. 1,00,00,00.

**Answer**

(i)	Amount in Rs.
<b>A. Current Assets</b>	
(i) Raw material inventory -(1 month)- $12,00,000 \text{ Units} \times 60 \times \frac{1}{12}$	60,00,000
(ii) Work in Progress - Production cycle 1 month	
Raw material (added in the beginning)      Rs 60,00,000	
Wages $(12,00,000 \times 10 \times \frac{1}{2}) \times 50\% = 5,00,000$	
Overheads $20 \times 10,00,000 \times \frac{1}{12} \times 50\% = 10,00,000$	
Total	75,00,000
(iii) Finished goods (inventory held for 2 months)	
Total Cost      Material 60.00	
Labour    10.00	
Overheads 20.00	
= $90 \times 12,00,000 \times \frac{2}{12}$	1,80,00,000
(iv) Debtors for 2 months	
= $12,00,000 \times \text{Rs } 90 \times \frac{2}{12}$	1,80,00,000
Total current assets	4,95,00,000
<b>B. Current liabilities</b>	
(v) Creditors for Raw material - 01 month	
$7,20,00,000 \times \frac{1}{12}$	60,00,000

(vi) Creditors for wages $12,00,000 \times 10 \times \frac{1}{12}$	10,00,000
Total current liabilities	70,00,000
Net working capital (A-B)	4,25,00,000

**(ii) Computation of Maximum Permissible Bank Finance according to Tandon Committee Norms**

**1<sup>st</sup> Method**

	<i>Rs.</i>
CAs	4,95,00,000
CLs	70,00,000
Working capital gap	4,25,00,000
Less 25% from long term sources	(1,06,25,000)
Max Permissible Bank Finance	3,18,75,000

**2<sup>nd</sup> Method**

	<i>Rs.</i>
Working capital gap	4,25,00,000
Less : 25% of CAs	(1,23,75,000)
MPBF	3,01,25,000

**3<sup>rd</sup> Method**

$$\begin{aligned} \text{Total current assets} - \text{Core current assets} &= \text{Rs } 4,95,00,000 - 1,00,00,000 \\ &= \text{Rs } 3,95,00,000 \end{aligned}$$

	<i>Rs.</i>
Real current assets	3,95,00,000
<i>Less : 25% of real current assets</i>	98,75,000
Balance of real current assets	2,96,25,000
<i>Less : Current Liabilities</i>	70,00,000
MPBF	2,26,25,000

### Question 16

*The following annual figures relate to MNP Limited:*

<i>Sales (at three months credit)</i>	<i>Rs. 90,00,000</i>
<i>Materials consumed (suppliers extend one and half month's credit)</i>	<i>Rs. 22,50,000</i>
<i>Wages paid (one month in arrear)</i>	<i>Rs. 18,00,000</i>
<i>Manufacturing expenses outstanding at the end of the year (cash expenses are paid one month in arrear)</i>	<i>Rs. 2,00,000</i>
<i>Total Administrative expenses for the year (cash expenses are paid one month in arrear)</i>	<i>Rs. 6,00,000</i>
<i>Sales Promotion expenses for the year (paid quarterly in advance)</i>	<i>Rs. 12,00,000</i>

*The company sells its products on gross-profit of 25% assuming depreciation as a part of cost of production. It keeps two month's stock of finished goods and one month's stock of raw materials as inventory. It keeps cash balance of Rs.2,50,000.*

*Assume a 5% safety margin, work out the working capital requirements of the company on cash cost basis. Ignore work-in-progress.*

**Answer****Computation of Total Cash Cost:**

	<i>Rs.</i>	<i>Rs.</i>
Sales		90,00,000
<i>Less</i> : Gross profit (25% x sales revenue)		22,50,000
Total Manufacturing cost (A)		67,50,000
<i>Less</i> : Material consumed cost	22,50,000	
<i>Less</i> : Wages paid	18,00,000	40,50,000
Manufacturing expenses		27,00,000
<i>Less</i> : Cash manufacturing expenses (Rs.2,00,000 x 12)		24,00,000
Depreciation: (B)		3,00,000
Total Manufacturing cost : (C) = (A) – (B)		64,50,000
<i>Add</i> : Administrative expenses		6,00,000
<i>Add</i> : Sales promotion expenses		12,00,000
Total cash cost of manufacturing and sales		82,50,000

**Estimation of Current Assets :**

	<i>Rs.</i>
Debtors (Total cash cost x 3/12) or (Rs. 82,50,000 x 3/12)	20,62,500
Cash balance	2,50,000
Pre-paid sales promotion expenses	3,00,000
Raw materials stock (Material consumed / 12) or (Rs. 22,50,000 / 12)	1,87,500
Finished goods stock (Total cash cost x 2/12) or (Rs. 82,50,000 x 2/12)	13,75,000
Total Current Assets	41,75,000

**Estimation of Current Liabilities :**

Sundry creditors	2,81,250
Material cost (Rs.22,50,000 x 1.5 months / 12 months)	
Manufacturing expenses outstanding	2,00,000
Wages outstanding (Rs. 18,00,000 x 1month/12 months)	1,50,000
Administrative expenses outstanding (Rs. 6,00,000 x 1 month / 12 months)	50,000
Total Current Liabilities	6,81,250
Working capital requirements : (CA - CL) (On cash cost basis)	34,93,750

**Question 17**

*A Performa cost sheet of a Company provides the following particulars:*

	<i>Amount per unit (Rs.)</i>
<i>Raw materials cost</i>	<i>100</i>
<i>Direct labour cost</i>	<i>37.50</i>
<i>Overheads cost</i>	<i>75</i>
<i>Total cost</i>	<i>212.50</i>
<i>Profit</i>	<i>37.50</i>
<i>Selling Price</i>	<i>250</i>

*The Company keeps raw material in stock, on an average for one month; work-in-progress, on an average for one week; and finished goods in stock, on an average for two weeks.*

The credit allowed by suppliers is three weeks and company allows four weeks credit to its debtors. The lag in payment of wages is one week and lag in payment of overhead expenses is two weeks.

The Company sells one-fifth of the output against cash and maintains cash-in-hand and at bank put together at Rs.37,500.

Required:

Prepare a statement showing estimate of Working Capital needed to finance an activity level of 1,30,000 units of production. Assume that production is carried on evenly throughout the year, and wages and overheads accrue similarly. Work-in-progress stock is 80% complete in all respects.

**Answer**

**(a) Activity level: 1,30,000 units**

**Statement showing Estimate of Working Capital Needs**

A.	Investment in Inventory: Raw material inventory: 1 month $\left(1,30,000 \times \frac{4}{52} \times Rs. 100\right)^*$	10,00,000
	WIP Inventory : 1 week $\left(1,30,000 \times \frac{1}{52} \times 0.80 \times 21250\right)$	4,25,000
	Finished goods inventory: 2 weeks $\left(1,30,000 \times \frac{2}{52} \times 21250\right)$	10,62,500
B.	Investment in Debtors: 4 weeks at cost $\left(1,30,000 \times \frac{4}{5} \times \frac{4}{52} \times 21250\right)$	17,00,000
C.	Cash balance	37,500
D.	Investment in Current Assets (A + B + C)	42,25,000
E.	Current Liabilities:	

	Creditors : 3 weeks $\left(1,30,000 \times \frac{3}{52} \times 100\right)$	7,50,000	
	Deferred wages : 1 week $\left(1,30,000 \times \frac{1}{52} \times 37.50\right)$	93,750	
	Deferred overheads : 2 weeks $\left(1,30,000 \times \frac{2}{52} \times 75\right)$	3,75,000	12,18,750
	Net Working Capital Needs (D - E)		30,06,250

\* For calculation purposes, 4 weeks has been considered as equivalent to a month.

### Question 18

A *Performa* cost sheet of *Shristi Company* provides the following data:

	Rs.
<i>Raw material cost per unit</i>	117
<i>Direct Labour cost per unit</i>	49
<i>Factory overheads cost per unit</i> <i>(includes depreciation of Rs. 18 per unit at budgeted level of activity)</i>	98
<i>Total cost per unit</i>	264
<i>Profit</i>	36
<i>Selling price per unit</i>	300

Following additional information is available:

*Average raw material in stock* : 4 weeks

*Average work-in-process stock* : 2 weeks

*(% completion with respect to*

*Materials* : 80%

<i>Labour and Overheads</i>	:	60%)
<i>Finished goods in stock</i>	:	3 weeks
<i>Credit period allowed to debtors</i>	:	6 weeks
<i>Credit period availed from suppliers</i>	:	8 weeks
<i>Time lag in payment of wages</i>	:	1 week
<i>Time lag in payment of overheads</i>	:	2 weeks

The company sells one-fifth of the output against cash and maintains cash balance of Rs. 2,50,000.

Required:

Prepare a statement showing estimate of working capital needed to finance a budgeted activity level of 78,000 units of production. You may assume that production is carried on evenly throughout the year and wages and overheads accrue similarly.

**Answer**

#### Estimation of Working Capital Needs

I	Investment in Inventory	Rs.
(i)	Raw material Inventory = $78,000 \times \frac{4}{52} \times \text{Rs.}117$	7,02,000
(ii)	Work-in-Process Inventory	
	Material = $78,000 \times \frac{2}{52} \times 0.80 \times 117 = 2,80,800$	
	Labour and Overheads Cost (other than depreciation) = $78,000 \times \frac{2}{52} \times 0.60 \times 129 = 2,32,200$	5,13,000
(iii)	Finished Goods Inventory (Cash Cost) = $78,000 \times \frac{3}{52} \times 246$	11,07,000
II	Investment in Debtors (Cash Cost) = $78,000 \times \frac{6}{52} \times 0.8 \times 246$	17,71,200

III	Cash Balance	2,50,000
	Investment in Current Assets	43,43,200

**Current Liabilities and Deferred Payment**

Rs.

(i)	Creditors = $78,000 \times \frac{8}{52} \times 117$	14,04,000
(ii)	Wages outstanding = $78,000 \times \frac{1}{52} \times 49$	73,500
(iii)	Overheads outstanding (cash cost) = $78,000 \times \frac{2}{52} \times 80$	2,40,000
	Total Deferred Payments	17,17,500

Net Working Capital = (Current assets – Non-interest bearing current liabilities)  
= 43,43,200 – 17,17,500 = Rs. 26,25,700

**Question 19**

*Shreya Ltd. has furnished the following cost data relating to the year ending of 31st March, 2012.*

	Rs. (in Lakhs)
<i>Sales</i>	450
<i>Material consumed</i>	150
<i>Direct wages</i>	30
<i>Factory overheads (100% variable)</i>	60
<i>Office and Administrative overheads (100% variable)</i>	60
<i>Selling overheads</i>	50

*The company wants to make a forecast of working capital needed for the next year and anticipates that:*

- *Sales will go up by 100%,*
- *Selling expenses will be Rs. 150 lakhs,*
- *Stock holdings for the next year will be-Raw material for two and half months, Work-in-progress for one month, Finished goods for half month and Book debts for one and half months,*
- *Lags in payment will be of 3 months for creditors, 1 month for wages and half month for Factory, Office and Administrative and Selling overheads.*

You are required to:

- (i) Prepare statement showing working capital requirements for next year, and
- (ii) Calculate maximum permissible bank finance as per Tandon Committee guidelines assuming that core current assets of the firm are estimated to be Rs. 30 lakhs.

**Answer**

**Working:**

**Statement showing the projected Cost and Profitability of Shreya Ltd.  
for the year ending on 31-3-2013**

	<i>Year ending 31/3/2012 (Rs.in lakhs)</i>	<i>Increase/ Decrease</i>	<i>Forecast for the next Year ending 31/3/2013 (Rs.in lakhs)</i>	<i>Per month</i>
<b>Sales:</b>	<b>450</b>	+100%	<b>900</b>	<b>75</b>
Direct Materials Consumed	150	+100%	300	25
Direct Wages	30	+100%	60	5
Prime Cost	180		360	30
+ Factory overheads	60	+100%	120	10
Works cost	240		480	40
+ Office & Administrative overheads	60	+100%	120	10
Cost of Production	300		600	50
+ Selling overheads	50	Increase	150	12.50
Total Cost	<b>350</b>		<b>750</b>	<b>62.50</b>
Profit	<b>100</b>		<b>150</b>	<b>12.50</b>

**(i) Statement showing Working Capital Requirements of Shreya Ltd. for the year 31-3-2013**

*Amount (Rs. in lakhs)*

<b>(A) Current Assets</b>		
Raw Material	(25 x 2.5 month)	62.50

Work-in-Progress		
Raw Material	(25 x 1 month)	25.00
Direct Wages	(5 x 1 month)	5.00
Factory Overheads	(10 x 1 month)	10.00
Finished goods	(600 x 0.5/ 12)	25.00
Debtors	(900 x 1.5/12)	112.50
<b>Total (A)</b>		<b>240.00</b>

(B) Current Liabilities - Lags in payment:		
(i) Creditors	(300 x 3/12)	75.00
(ii) Wages	(60 x 1/12)	5.00
(iii) Factory overheads	(120 x 0.5/12)	5.00
(iv) Office & Administrative overheads	(120 x 0.5/12)	5.00
(v) Selling overhead	(150 x 0.5/12)	6.25
<b>Total (B)</b>		<b>96.25</b>
<b>Networking capital (A - B)</b>		<b>143.75</b>

**Note:** In the above answer while computing Work-in-Progress the degree of completion in respect of Labour and Overheads components have been assumed at 100%, which can be assumed otherwise also.

**(ii) Maximum permissible Bank Finance (MPBF):**

<b>First Method</b>	<b>Rs. in lakhs</b>
Total current assets	240
(-) Current Liabilities	96.25
	143.75
(-) 25% from long term sources (approx.)	35.94
<b>MPBF</b>	<b>107.81</b>

<b>Second Method</b>		
Total current assets		240
(-) 25% from long term sources		60
		180
(-) Current Liabilities		96.25
<b>MPBF</b>		83.75
<b>Third Method</b>		
Total current assets		240
(-) Core Current Assets		30
		210
(-) 25% from long term sources		52.5
		157.5
(-) Current Liabilities		96.25
<b>MPBF</b>		61.25

### Question 20

*Hema Ltd. has a present annual sales of 10,000 units at Rs. 300 per unit. The variable cost is Rs. 200 per unit and the fixed costs amount to Rs. 3,00,000 per annum. The present credit period allowed by the company is 1 month. The company is considering a proposal to increase the credit period to 2 months and 3 months and has made the following estimates:*

	<i>Existing</i>	<i>Proposed</i>	
		<i>2 months</i>	<i>3 months</i>
<i>Credit Policy</i>	<i>1 month</i>		
<i>Increase in sales</i>	-	15%	30%
<i>% of Bad Debts</i>	1%	3%	5%

*There will be increase in fixed cost by Rs. 50,000 on account of increase of sales beyond 25% of present level.*

*The company plans on a pre-tax return of 20% on investment in receivables.*

*You are required to calculate the most paying credit policy for the company.*

**Answer**

**Hema Ltd.**  
**Evaluation of Credit Policy**

(Rs.)

		<i>Present Policy</i>	<i>Proposed Policy</i>	
		<i>1 month</i>	<i>2 months</i>	<i>3 months</i>
A.	Sales (Units)	10,000	11,500	13,000
B.	Sales income	30,00,000	34,50,000	39,00,000
	Variable cost at Rs. 200 per unit	20,00,000	23,00,000	26,00,000
	Contribution	10,00,000	11,50,000	13,00,000
	Fixed Costs	3,00,000	3,00,000	3,50,000
C.	Net Margin	7,00,000	8,50,000	9,50,000
D.	Investment in receivables (see Working notes)	1,91,666	4,33,333	7,37,500
E.	Expected Return on receivables at 20%	38,333	86,666	1,47,500
F.	Bad Debts	30,000	1,03,500	1,95,000
G.	Net Profit (C-E-F)	6,31,667	6,59,834	6,07,500
H.	Increase in profits	-	28,167	(-) 52,334

As 2 months credit policy yield higher return, it should be adopted.

**Working Notes:**

Calculation showing investments in receivables:

$$\text{Formula} = \frac{\text{Variable Cost} + \text{Fixed Cost}}{12} \times \text{No. of months credit.}$$

Investment

$$1 \text{ month: } \frac{23,00,000}{12} \times 1 = 1,91,666$$

$$2 \text{ months} : \frac{26,00,000}{12} \times 2 = 4,33,333$$

$$3 \text{ months} = \frac{29,50,000}{12} \times 3 = 7,37,500$$

### Question 21

The present credit terms of Pragma Ltd. Company are 1/10 net 30. Its annual sales are Rs. 80 lakhs, its average collection period is 20 days. Its variable cost and average total costs to sales are 0.85 and 0.95 respectively and its cost of capital is 10 per cent. The proportion of sales on which customers currently take discount is 0.5. Pragma Ltd. company is considering relaxing its discount terms to 2/10 net 30. Such relaxation is expected to increase sales by Rs. 5 lakhs, reduce the average collection period to 14 days and increase the proportion of discount sales to 0.8. What will be the effect of relaxing the discount policy on company's profit? Take year as 360 days.

### Answer

#### Evaluation of effect of relaxing the discount policy on company's profit

A.	Incremental Revenue	Rs.
	Increase in contribution (Rs. 5,00,000 x 15%)	75,000
	Reduction in investment in receivable x cost of capital	
	Present: $\left[ \frac{\text{Rs. } 80 \text{ lakh} \times 0.95 \times 20 \text{ days}}{360 \text{ days}} \right] = \text{Rs. } 4,22,222$	
	Proposed: $\left[ \frac{(\text{Rs. } 80 \text{ lakh} \times 0.95 + \text{Rs. } 5 \text{ lakh} \times 0.85) \times 14 \text{ days}}{360 \text{ days}} \right] = \text{Rs. } 3,12,083$	
	Reduction in investment in receivable	
	Rs. 1,10,139 (Rs. 4,22,222 - Rs. 3,12,083)	
	Cost of savings on investment in receivable (Rs. 1,10,139 x 10%)	11,014
		<b>86,014</b>
B.	Incremental Cost	
	Increase in discount	
	Present: (Rs. 80 lacs x 1% x 0.5)	= Rs. 40,000
	Proposed : (Rs. 85 lacs x 2% x 0.8)	= Rs. 1,36,000
	Net increase in discount	= Rs. 96,000
C.	Net effect on profits (A-B) = Rs. 86,014 - Rs. 96,000	
		= (-) Rs. 9,986

Since, the proposed discount policy will reduce the profits of the company to the extent of Rs. 9,986. Therefore, it is not advisable for the company to relax the present discount policy.

## Question 22

*Somya Garments Ltd. manufactures readymade garments and sells them on credit basis through a network of dealers. Its present sale is Rs. 60 lakh per annum with 20 days credit period. The company is contemplating an increase in the credit period with a view to increasing sales. Present variable costs are 70% of sales and the total fixed costs Rs. 8 lakh per annum. The company expects pre-tax return on investment @ 25%. Some other details are given as under:*

<i>Proposed Credit Policy</i>	<i>Average Collection Period (days)</i>	<i>Expected Annual Sales (Rs. Lakh)</i>
<i>I</i>	<i>30</i>	<i>65</i>
<i>II</i>	<i>40</i>	<i>70</i>
<i>III</i>	<i>50</i>	<i>74</i>
<i>IV</i>	<i>60</i>	<i>75</i>

*Required: Which credit policy should the company adopt? Present your answer in a tabular form. Assume 360-days a year. Calculations should be made upto two digits after decimal.*

## Answer

### Statement showing Evaluation of the Proposed Credit Policies

*(Amount Rs. In Lakhs)*

<i>Credit policies</i>					
	<i>Proposed</i>				
	<i>Present</i>	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>
<i>Average Collection Period (days)</i>	<i>(20 days)</i>	<i>(30 days)</i>	<i>(40 days)</i>	<i>(50 days)</i>	<i>(60 days)</i>
<i>Sales (Annual)</i>	60.00	65.00	70.00	74.00	75.00
<i>Less: Variable cost (70% of sales)</i>	<u>42.00</u>	<u>45.50</u>	<u>49.00</u>	<u>51.80</u>	<u>52.50</u>
<i>Contribution</i>	18.00	19.50	21.00	22.20	22.50
<i>Less: Fixed Costs</i>	<u>8.00</u>	<u>8.00</u>	<u>8.00</u>	<u>8.00</u>	<u>8.00</u>
<i>Profit</i>	10.00	11.50	13.00	14.20	14.50
<i>Increase in profit compared to present profit: (A)</i>	-	1.50	3.00	4.20	4.50

Investments in debtors	50.00	53.50	57.00	59.80	60.50
(Variable cost+ Fixed cost)					
Debtors turnover	18	12	9	7.2	6
(360 days/Average collection period)					
Average investment in debtors	2.78	4.46	6.33	8.3	10.08
(Investment in debtors/ Debtors turnover)					
Additional investment in debtors compared to present level	-	1.68	3.55	5.52	7.30
Required return on additional investment (25%) : (B)	-	0.42	0.89	1.38	1.83
Incremental profit: (A)- (B)	-	1.08	2.11	2.82	2.67

**Decision:** The company should adopt the credit policy III (with collection period of 50 days) as it yields a maximum profit to the company.

### Question 23

*A bank is analysing the receivables of ABC Company in order to identify acceptable collateral for a short-term loan. The company's credit policy is 2/10 net 30. The bank lends 80 percent on accounts where customers are not currently overdue and where the average payment period does not exceed 10 days past the net period. A schedule of ABC's receivables has been prepared. How much will the bank lend on pledge of receivables, if the bank uses a 10 per cent allowance for cash discount and returns?*

<i>Account</i>	<i>Amount Rs.</i>	<i>Days Outstanding in days</i>	<i>Average Payment Period historically</i>
<i>74</i>	<i>25,000</i>	<i>15</i>	<i>20</i>
<i>91</i>	<i>9,000</i>	<i>45</i>	<i>60</i>
<i>107</i>	<i>11,500</i>	<i>22</i>	<i>24</i>
<i>108</i>	<i>2,300</i>	<i>9</i>	<i>10</i>

114	18,000	50	45
116	29,000	16	10
123	14,000	27	48
	1,08,800		

**Answer**

Analysis of the receivables of ABC Company by the bank in order to identify acceptable collateral for a short-term loan:

- (i) The ABC Company's credit policy is 2/10 net 30.

The bank lends 80 per cent on accounts where customers are not currently overdue and where the average payment period does not exceed 10 days past the net period i.e. thirty days. From the schedule of receivables of ABC Company Account No. 91 and Account No. 114 are currently overdue and for Account No. 123 the average payment period exceeds 40 days. Hence Account Nos. 91, 114 and 123 are eliminated. Therefore, the selected Accounts are Account Nos. 74, 107, 108 and 116.

- (ii) Statement showing the calculation of the amount which the bank will lend on a pledge of receivables if the bank uses a 10 per cent allowances for cash discount and returns

Account No.	Amount (Rs.)	90 per cent of amount (Rs.)	80% of amount (Rs.)
	(a)	(b)=90% of (a)	(c)=80% of (b)
74	25,000	22,500	18,000
107	11,500	10,350	8280
108	2,300	2,070	1,656
116	29,000	26,100	20,880
	Total loan amount		48,816

**Question 24**

*The credit manager of XYZ Ltd. is reappraising the company's credit policy. The company sells the products on terms of net 30. Cost of goods sold is 85% of sales and fixed costs are further 5% of sales. XYZ classifies its customers on a scale of 1 to 4. During the past five years, the experience was as under:*

<i>Classification</i>	<i>Default as a percentage of sales</i>	<i>Average collection period- in days for non-defaulting accounts</i>
1	0	45
2	2	42
3	10	40
4	20	80

The average rate of interest is 15%. What conclusions do you draw about the company's Credit Policy? What other factors should be taken into account before changing the present policy? Discuss.

### Answer

Since the amount of revenue generated from each category of customer is not given in the question. Let us consider Rs. 100 as the amount of revenue generated from each type of customer. Therefore, Rs. 100 shall be taken as the basis for reappraisal of Company's credit policy.

<i>Classification</i>	<i>Gross profit @ 15%* (Rs.)</i>	<i>Bad debts (Rs.)</i>	<i>Interest Cost (Refer to Working note)(Rs.)</i>	<i>Total Cost (Rs.)</i>	<i>Net effect (Rs.)</i>	<i>Strategy</i>
	<i>(i)</i>	<i>(ii)</i>	<i>(iii)</i>	<i>(iv)= (ii)+(iii)</i>	<i>(v)= (i)-(iv)</i>	
1	15	Nil	1.57	1.57	13.43	Accept
2	15	2	1.47	3.47	11.53	Accept
3	15	10	1.40	11.40	3.60	Accept
4	15	20	2.80	22.80	(7.80)	Reject

\*It is given the cost of goods sold is 85%. Therefore Gross Profit is 15% of sales.

The reappraisal of company's credit policy indicates that the company either follows a lenient credit policy or it is inefficient in collection of debts. Even though the company sells its products on terms of net 30 days, it allows average collection period for more than 30 to all categories of its customers. The net effect i.e. Gross Profit less Total Cost

is favourable in respect of categories 1, 2 and 3 therefore these customers shall be taken into fold. For the customers covered in category 4 the net effect is unfavourable i.e. total cost is more than the gross profit. The company should try to reduce bad debt % for this category of customers at least by 7.8% (i.e. at 12.20%). If the company is able to do so, the company can allow the credit period of 80 days for at least increasing the market share.

The other factors to be taken into consideration before changing the present policy includes (i) past performance of the customers and (ii) their credit worthiness.

**Working Note:**

Computation of interest cost

$$\frac{\text{Average rate of interest} \times \text{Cost of goods sold} \times \text{Average collection period in days for non-defaulting accounts}}{365 \text{ days}}$$

Interest Cost=

$$\text{For Category 1} = \frac{15\% \times \text{Rs. } 85 \times 45 \text{ days}}{365 \text{ days}} = \text{Rs. } 1.57$$

$$\text{For Category 2} = \frac{15\% \times \text{Rs. } 85 \times 42 \text{ days}}{365 \text{ days}} = \text{Rs. } 1.47$$

$$\text{For Category 3} = \frac{15\% \times \text{Rs. } 85 \times 40 \text{ days}}{365 \text{ days}} = \text{Rs. } 1.40$$

$$\text{For Category 4} = \frac{15\% \times \text{Rs. } 85 \times 80 \text{ days}}{365 \text{ days}} = \text{Rs. } 2.80$$

**Question 25**

*A company has prepared the following projections for a year:*

<i>Sales</i>	<i>21,000 units</i>
<i>Selling Price per unit</i>	<i>Rs.40</i>
<i>Variable Costs per unit</i>	<i>Rs.25</i>
<i>Total Costs per unit</i>	<i>Rs.35</i>
<i>Credit period allowed</i>	<i>One month</i>

*The Company proposes to increase the credit period allowed to its customers from one month to two months. It is envisaged that the change in the policy as above will increase the sales by 8%. The company desires a return of 25% on its investment.*

*You are required to examine and advise whether the proposed Credit Policy should be implemented or not.*

**Answer****Computation of contribution and extra funds blockage if the credit period allowed to customers is increased from one month to two months**

Increase in sales units (8% x 21,000 units )	1,680
Contribution per unit (Rs.)	15
Total contribution on increased sales units (Rs.) : (A) (Rs.1,680 units x Rs.15 )	25,200
Total cost (Rs.) 21,000 units x Rs.35	7,35,000
Additional variable cost of 1,680 units (Rs.) (1,680 units x Rs.25)	42,000
Total cost (Rs.)	7,77,000
Funds blocked for 2 months (Rs.) (Rs.7,77,000 /12 months) x 2 month	1,29,500
<i>Less</i> : Present blockage of funds for 1 month (Rs.) (Rs.7,35,000 / 12 months) x 1 month	61,250
Extra blockage of funds (Rs.) due to change in credit policy	68,250

$$\text{Return (due to change in credit policy)} = \frac{\text{Contribution on increased sales}}{\text{Extra funds blockage}} \times 100$$

$$= \frac{\text{Rs.25,200}}{\text{Rs.68,250}} \times 100 = 36.92\%$$

**Advise:** The return due to a change in the credit policy comes to 36.92%, which is more than the desired return of 25%. Hence, the proposal of increasing the credit period from one month to two months should be accepted.

### Question 26

*A firm has a current sales of Rs.2,56,48,750. The firm has unutilised capacity. In order to boost its sales, it is considering the relaxation in its credit policy. The proposed terms of credit will be 60 days credit against the present policy of 45 days. As a result, the bad debts will increase from 1.5% to 2% of sales. The firm's sales are expected to increase by 10%. The variable operating costs are 72% of the sales. The Firm's Corporate tax rate is 35%, and it requires an after-tax return of 15% on its investment. Should the firm change its credit period?*

### Answer

Computation of after-tax operating profits:

	Rs.
Sales increase (10% of Rs. 2, 56, 48, 750)	25, 64, 875
Contribution margin 28% of Rs.25,64,875	7,18,165
Less : Increase in Bad debt 1.5% x Rs.2,56,48,750 = Rs.3,84,731 2% x Rs.2,82,13,625 = Rs.5,64,273	(1,79,542)
Operating profits	5,38,623
Operating profits after tax (OPAT) 0.65 x Rs.5,38,623	3,50,105

Increase in receivable investment

$$\text{Increase in receivable Investment} = \frac{\text{Sales}_n}{360} \times \text{ACP}_n - \frac{\text{Sales}_0}{360} \times \text{ACP}_0$$

$$= \frac{\text{Rs. } 2,82,13,625}{360 \text{ days}} \times 60 \text{ days} - \frac{\text{Rs. } 2,56,48,750}{360 \text{ days}} \times 45 \text{ days}$$

$$= \text{Rs. } (47,02,271 \times 32,06,094)$$

$$= \text{Rs. } 14,96,177$$

$$\text{Expected rate of return} = \frac{\text{Operating profits after tax}}{\text{Increase in receivable investment}}$$

$$= \text{Rs. } 3,50,105 / \text{Rs. } 14,96,177$$

$$= 23.40\%$$

The expected rate of return is 23.40%. It can be compared with the required rate of return of investment of 15%. Since the expected rate of return is higher than its required rate of returns therefore it is beneficial for the firm to lengthen its credit period to 60 days. The firm shall gain 8.4% on incremental investment.

### Question 27

*A firm is considering offering 30-day credit to its customers. The firm likes to charge them an annualized 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?*

### Answer

Interest @ 24% pa for a period of 30 days (year 365 days) =  $0.24 \times \frac{30}{365} = 0.019726$  i.e. 1.9726 %.

Hence the principal of Re 1 , including the interest after 30 days will become 1.019726.

The present value as on zero date will be  $\frac{1}{1.019726} = 0.980656$

Hence discount which can be offered to receivables as on zero date =  $1 - 0.980656 = 0.019344$  i.e. 1.93%.

### Question 28

*Sangam Ltd. is considering the revision of its credit policy with a view to increasing its sales and profit. Currently all its sales are on credit and the customers are given one month's time to settle the dues. It has a contribution of 40% on sales and it can raise additional funds at a cost of 20% per annum. The marketing manager of the company has given the following options along with estimates for considerations:*

<i>Particulars</i>	<i>Current Position</i>	<i>I Option</i>	<i>II Option</i>	<i>III Option</i>
<i>Sales (Rs. in lakhs)</i>	<i>200</i>	<i>210</i>	<i>220</i>	<i>250</i>
<i>Credit period (in months)</i>	<i>1</i>	<i>1½</i>	<i>2</i>	<i>3</i>
<i>Bad debts (% of sales)</i>	<i>2</i>	<i>2½</i>	<i>3</i>	<i>5</i>
<i>Cost of Credit administration (Rs. in lakhs)</i>	<i>1.20</i>	<i>1.30</i>	<i>1.50</i>	<i>3.00</i>

You are required to advise the company for the best option.

**Answer**

**Evaluation of the Different Options in Credit Policy of Sangam Ltd.**

*(Rs. in lakhs)*

<i>Credit period</i>	<i>1 month Current position</i>	<i>1.5 months Option I</i>	<i>2 months Option II</i>	<i>3 months Option III</i>
Sales	200	210	220	250
Contribution @ 40%	80	84	88	100
Increase in contribution over current level	—	4	8	20 (A)
Debtors = $\frac{\text{Average Collection Period} \times \text{Credit Sales}}{12}$	$\frac{1 \times 200}{12} = 16.67$	$\frac{1.5 \times 210}{12} = 126.25$	$\frac{2 \times 220}{12} = 36.67$	$\frac{3 \times 250}{12} = 62.50$
Increase in debtors over current level	—	9.58	20.00	45.83

Cost of funds for additional amount of debtors @ 20%	—	1.92	4.00	9.17 (B)
Credit administrative cost	1.20	1.30	1.50	3.00
Increase in credit administration cost over present level	—	0.10	0.30	1.80 (C)
Bad debts	4.00	5.25	6.60	12.50
Increase in bad debts over current levels	—	1.25	2.60	8.50 (D)
Net gain/loss A – (B + C + D)	—	0.73	1.10	0.53

*Advise* : It is suggested that the company Sangam Ltd. should implement Option II which has a credit period of 2 months.

### Question 29

*A Company has sales of Rs. 25,00,000. Average collection period is 50 days, bad debt losses are 5% of sales and collection expenses are Rs. 25,000. The cost of funds is 15%. The Company has two alternative Collection Programmes:*

	<i>Programme I</i>	<i>Programme II</i>
<i>Average Collection Period reduced to</i>	<i>40 days</i>	<i>30 days</i>
<i>Bad debt losses reduced to</i>	<i>4% of sales</i>	<i>3% of sales</i>
<i>Collection Expenses</i>	<i>Rs. 50,000</i>	<i>Rs. 80,000</i>

*Evaluate which Programme is viable.*

**Answer****(a) Evaluation of Alternative Collection Programmes**

	<i>Present Programme</i>	<i>1st Programme</i>	<i>2nd Programme</i>
	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>
Sales revenues	25,00,000	25,00,000	25,00,000
Average collection period (days)	50	40	30
Receivables (Rs.)	3,42,466 $\left(25,00,000 \times \frac{50}{365}\right)$	2,73,973	2,05,479
Reduction in receivables from present level (Rs.)	–	68,493	1,36,987
Savings in interest @ 15% p.a. (A)	–	Rs. 10,274	Rs. 20,548
% of bad debt loss	5%	4%	3%
Amount (Rs.)	1,25,000	1,00,000	75,000
Reduction in bad debts from present level (B)	–	25,000	50,000
Incremental benefits from present level (C) = (A) + (B)	–	35,274	Rs. 70,548
Collection expenses (Rs.)	25,000	50,000	80,000
Incremental collection expenses from present level (D)	–	25,000	55,000
Increment net benefit (C – D)	–	<u>Rs. 10,274</u>	<u>Rs. 15,548</u>

**Conclusion:** From the analysis it is apparent that Programme I has a benefit of Rs. 10,274 and Programme II has a benefit of Rs. 15,548 over present level. Whereas Programme II has a benefit of Rs. 5,274 more than Programme I. Thus, benefits accrue at a diminishing rate and hence Programme II is more viable.

**Note:** In the above solution, 1 year = 365 days has been assumed. Alternatively, it may be assumed on the basis 1 year = 360 days. In that case, the figures calculated for the different Programmes would be different from the figures given in the above solution. But the final conclusion regarding viability of the Programme would remain the same. The candidates may be given due credit.

### Question 30

*The annual cash requirement of A Ltd. is Rs. 10 Lakhs. The company has marketable securities in lot sizes of Rs. 50,000, Rs. 1,00,000, Rs. 2,00,000, Rs. 2,50,000 and Rs. 5,00,000. Cost of conversion of marketable securities per lot is Rs. 1,000. The company can earn 5% annual yield on its securities.*

*You are required to prepare a table indicating which lot size will have to be sold by the company.*

*Also show that the economic lot size can be obtained by the Baumal Model.*

### Answer

#### Table indicating lot size of securities

Total annual cash requirements =T= Rs. 10,00,000

Lot Size (Rs.) =C	50,000	1,00,000	2,00,000	2,50,000	5,00,000
Number of Lots (T/C)	20	10	5	4	2
Conversion Cost (Rs.)=(T/C) b Where b = cost of conversion per lot.	20,000	10,000	5,000	4,000	2,000
Interest charges Rs. =(C/2)I	1,250	2,500	5,000	6,250	12,500
Total Cost Rs.=	21,250	12,500	10,000	10,250	14,500

Economic lot size is Rs. 2,00,000 at which total costs are minimum.

**William J. Baumal Model:** Cash management model of William J. Baumal assumes that the concerned company keeps all its cash on interest yielding deposits from which it withdraws as and when required. It also assumes that cash usage is linear over time.

The amount of money is withdrawn from deposits in such a way that the cost of withdrawal are optimally balanced with those of interest foregone by holding cash. The model is almost same as economic stock order quantity model.

$$\text{Formula Economic lot size} = \sqrt{\frac{2 \times T \times b}{I}}$$

Where  
 T= Projected cash requirement = Rs. 10,00,000  
 b= Conversion cost per lot = Rs. 1000  
 I= Interest earned on marketable securities per annum.  
 = 5%

By substituting the figures in the formula

$$\begin{aligned} \text{Economic lot size} &= \sqrt{\frac{2 \times 10,00,000 \times 1000}{0.05}} \\ &= \text{Rs. } 2,00,000 \end{aligned}$$

### Question 31

(a) The following details are available in respect of a firm:

- |       |   |                    |
|-------|---|--------------------|
| (i)   | Annual requirement of inventory                       | 40,000 units       |
| (ii)  | Cost per unit (other than carrying and ordering cost) | Rs. 16             |
| (iii) | Carrying cost are likely to be                        | 15% per year       |
| (iv)  | Cost of placing order                                 | Rs. 480 per order. |

Determine the economic ordering quantity.

(b) The experience of the firm being out of stock is summarised below:

(1)	Stock out (No. of units)	No. of times
	500	1 (1)
	400	2 (2)
	250	3 (3)
	100	4 (4)
	50	10 (10)
	0	80 (80)

Figures in brackets indicate percentage of time the firm has been out of stock.

- (2) Stock out costs are Rs. 40 per unit.  
 (3) Carrying cost of inventory per unit is Rs. 20

Determine the optimal level of stock out inventory.

(c) A firm has 5 different levels in its inventory. The relevant details are given. Suggest a breakdown of the items into A, B and C classifications:

Item No.	Avg. No. of units inventory	Avg. Cost per unit
1	20,000	Rs. 60
2	10,000	Rs. 100
3	32,000	Rs. 11
4	28,000	Rs. 10
5	60,000	Rs. 3.40

**Answer**

- (a) Carrying cost per unit per annum  
 = cost per unit x carrying cost % p.a.  
 = Rs. 16 x 0.15 =Rs. 2.40

Now from the formula for Economic Order Quantity (EOQ)

$$= \sqrt{\frac{2 \times \text{total consumption p.a.} \times \text{ordering cost per order}}{\text{Carrying cost per unit}}}$$

$$= \sqrt{\frac{2 \times 40,000 \times 480}{2.40}} = 4000 \text{ units}$$

**Alternative working:**

Ordering size (units)	1,000	2,000	2,500	4,000	5,000	8,000	10,000
No. of orders required	40	20	16	10	8	5	4
Average inventory (units)	500	1,000	1,250	2,000	2,500	4,000	5,000
Total carrying cost of Average inventory in Rs.	1,200	2,400	3,000	4,800	6,000	9,600	12,000
Total ordering cost= No. of orders x Cost of placing each order	19,200	9,600	7,680	4,800	3,840	2,400	1,920
Total cost in Rs.	20,400	12,000	10,680	9,600	9,840	12,000	13,920

Hence least cost of Rs. 9,600 is at the ordering size of 4,000 units.

**(b)**

<i>Safety stock level (units)</i>	<i>Stock out (units)</i>	<i>Stock out cost @ Rs. 40 per unit Rs.</i>	<i>Probability of stock out</i>	<i>Expected stock out at this level</i>	<i>Total expected stock out cost</i>
500	0	0	0	0	0
400	100	4000	0.01	40	40
250	250	10,000	0.01	100	
	150	6000	0.02	120	260
100	400	16,000	0.01	160	
	300	12,000	0.02	240	
	150	6,000	0.03	180	840
50	450	18,000	0.01	180	
	350	14,000	0.02	280	
	200	8,000	0.03	240	
	50	2,000	0.04	80	1,620
0	500	20,000	0.01	200	
	400	16,000	0.02	320	
	250	10,000	0.03	300	
	100	4,000	0.04	160	
	50	2,000	0.10	200	2,800

<i>Safety stock level (units)</i>	<i>Expected stock out costs</i>	<i>Carrying cost at Rs. 20 per unit Rs.</i>	<i>Total safety stock cost</i>
0	2,800	0	2,800
50	1,620	1,000	2,620
100	840	2,000	2,840

250	260	5,000	5,260
400	40	8,000	8,040
500	0	10,000	10,000

Optimum safety stock where the total cost is the least is at 50 units level.

(c)

Item No.	Units	% of total Units	Unit cost Rs.	Total cost Rs.	% of total cost
1	20,000	13.3	60.00	12,00,000	39.5] A
2	10,000	6.7	100.00	10,00,000	32.9]
3	32,000	21.3	11.00	3,52,000	11.6] B
4	28,000	18.7	10.00	2,80,000	9.2]
5	60,000	40.0	3.40	2,04,000	6.8
	1,50,000	100.0		30,36,000	100.0

Item Nos. I and II being very valuable are to be controlled first though in quantity are hardly 20% of the total, hence can be classified as A. Next priority is for items 3 and 4, though quantity wise 40% to be classified as B and last priority item 5 though in quantity bulk but value is less hence to be classified as C.

### Question 32

*Ashima Ltd. uses inventory turnover as one performance measure to evaluate its production manager. Currently, its inventory turnover (based on cost of goods sold ÷ inventory) is 10 times per annum, as compared with industry average of 4. Average sales are Rs. 4,50,000 p.a. variable costs of inventory have consistently remained at 70% of sales with fixed costs of Rs. 10,000. Carrying costs of inventory (excluding financing costs) are 5% per annum. Sales force complained that low inventory levels are resulting in lost-sales due to stock outs. Sales manager has made an estimate based on stock out reports as under:*

Inventory Policy	Inventory Turnover	Sales in Rs.
Current	10	4,50,000

<i>A</i>	<i>8</i>	<i>5,00,000</i>
<i>B</i>	<i>6</i>	<i>5,40,000</i>
<i>C</i>	<i>4</i>	<i>5,65,000</i>

On the basis of above estimates, assuming a 40% tax rate and an after tax required return of 20% on investment in inventory, which policy would you recommend?

**Answer**

#### Calculation of Cost of Goods Sold

<i>Policy</i>	<i>Variable Cost (Rs.)</i>	<i>Fixed Cost (Rs.)</i>	<i>Total Cost (Rs.)</i>
Current	4,50,000 x .7 = 3,15,000 +	10,000	3,25,000
A	5,00,000 x .7 = 3,50,000 +	10,000	3,60,000
B	5,40,000 x .7 = 3,78,000 +	10,000	3,88,000
C	5,65,000 x .7 = 3,95,500	10,000	4,05,500

#### Investment Level in Various Policies

		<i>(Rs.)</i>
Current	3,25,000 ÷ 10	32,500
A	3,60,000 ÷ 8	45,000
B	3,88,000 ÷ 6	64,667
C	4,05,500 ÷ 4	1,01,375

#### Evaluation of Inventory Policies

<i>Policy</i>	<i>Current</i>	<i>A</i>	<i>B</i>	<i>C</i>
	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>
Sales	4,50,000	5,00,000	5,40,000	5,65,000
Cost of Goods sold	3,25,000	3,60,000	3,88,000	4,05,500

Contribution	1,25,000	1,40,000	1,52,000	1,59,500
Less: Carrying cost @ 5%	1,625	2,250	3,233	5,069
Profit before tax	1,23,375	1,37,750	1,48,767	1,54,431
Incremental Profit (Before tax)		14,375	11,017	5,664
Incremental Profit (After tax)		8,625	6,610	3,398
Incremental Investment		12,500	19,667	36,708
Incremental Rate of Return (%)		69	33.6	9.26

**Conclusion:** Since the incremental rate of return is highest with inventory policy A, therefore, policy A should be followed.

### Question 33

*A publishing house purchases 72,000 reams of a special type paper per annum at cost Rs. 90 per ream. Ordering cost per order is Rs. 500 and the carrying cost is 5 per cent per year of the inventory cost. Normal lead time is 20 days and safety stock is NIL. Assume 300 working days in a year:*

*You are required:*

- (i) Calculate the Economic Order Quantity (EOQ).*
- (ii) Calculate the Reorder Inventory Level.*
- (iii) If a 1 per cent quantity discount is offered by the supplier for purchases in lots of 18,000 reams or more, should the publishing house accept the proposal?*

### Answer

(i) 
$$EOQ = \sqrt{\frac{2SC_0}{ic_1}}$$

Where,

S = Annual consumption

C<sub>0</sub> = Ordering cost per order

ic<sub>1</sub> = Stock carrying cost per unit per annum

$$= \sqrt{\frac{2 \times 72,000 \times 500}{5\% \text{ of Rs. } 90}}$$

$$= \sqrt{1,60,00,000}$$

= 4,000 reams.

(ii) Re-order Level = Normal Lead Time x Normal Usage

= 20 x 240

= 4,800 reams.

Note:

$$\text{Normal Usage} = \frac{\text{Annual usage}}{\text{Normal working days in a year}}$$

$$= \frac{72,000}{300} = 240 \text{ reams.}$$

(iii) Evaluation of Quantity Discount Offer:

	EOQ	Discount Offer
Size of order	4,000 reams	18,000 reams
No. of orders in a year	18	4
Average inventory $\left(\frac{\text{Order size}}{2}\right)$	2,000 reams	9,000 reams
<b>Cost:</b>	Rs.	Rs.
Ordering Cost @ Rs. 500 per order	9,000	2,000
Inventory carrying cost		
At EOQ - $(4,000/2) \times \text{Rs. } 4.5$	9,000	-
At Discount offer - $(18,000/2) \times \text{Rs. } 4.455$	-	40,095
Purchases Cost		
At EOQ - $72,000 \times \text{Rs. } 90$	64,80,000	-
At discount offer - $72,000 \times \text{Rs. } 89.10$	_____	64,15,200
<b>Total Cost</b>	<b>64,98,000</b>	<b>64,57,295</b>

The total cost is less in case of quantity discount offer. Hence, quantity discount offer should be accepted.

#### Question 34

*A Ltd. has a total sales of Rs. 3.2 crores and its average collection period is 90 days. The past experience indicates that bad-debt losses are 1.5% on sales. The expenditure incurred by the firm in administering its receivable collection efforts are Rs. 5,00,000. A factor is prepared to buy the firm's receivables by charging 2% commission. The*

factor will pay advance on receivables to the firm at an interest rate of 18% p.a. after withholding 10% as reserve.

Calculate the effective cost of factoring to the Firm.

**Answer**

Average level of Receivables = $3,20,00,000 \times 90/360$	80,00,000
Factoring commission = $80,00,000 \times 2/100$	1,60,000
Factoring reserve = $80,00,000 \times 10/100$	8,00,000
Amount available for advance = Rs. $80,00,000 - (1,60,000 + 8,00,000)$	70,40,000
Factor will deduct his interest @ 18% :- Interest = $\frac{\text{Rs. } 70,40,000 \times 18 \times 90}{100 \times 360}$	= Rs. 3,16,800

Advance to be paid = Rs. 70,40,000 – Rs. 3,16,800 = Rs. 67,23,200

<b>Annual Cost of Factoring to the Firm:</b>	Rs.
Factoring commission (Rs. $1,60,000 \times 360/90$ )	6,40,000
Interest charges (Rs. $3,16,800 \times 360/90$ )	12,67,200
Total	19,07,200
<b>Firm's Savings on taking Factoring Service:</b>	Rs.
Cost of credit administration saved	5,00,000
Cost of Bad Debts (Rs. $3,20,00,000 \times 1.5/100$ ) avoided	4,80,000
Total	9,80,000
Net Cost to the firm (Rs. $19,07,200 - 9,80,000$ )	9,27,200
Effective rate of interest to the firm = $\frac{\text{Rs. } 9,27,200 \times 100}{67,23,200}$	13.79%*

**Note:** The number of days in a year have been assumed to be 360 days.

### Question 35

*Briefly explain the meaning and importance of 'Credit-rating'.*

#### Answer

Credit-rating essentially reflects the probability of timely repayment of principal and interest by a borrower company. It indicates the risk involved in a debt instrument as well its qualities. Higher the credit rating, greater is the probability that the borrower will make timely payment of principal and interest and vice-versa.

It has assumed an important place in the modern and developed financial markets. It is a boon to the companies as well as investors. It facilitates the company in raising funds in the capital market and helps the investor to select their risk-return trade off. By indicating creditworthiness of a borrower, it helps the investor in arriving at a correct and rational decision about making investments.

Credit rating system plays a vital role in investor protection. Fair and good credit ratings motivate the public to invest their savings.

As a fee based financial advisory service, credit rating is obviously extremely useful to the investors, the corporates (borrowers) and banks and financial institutions. To the investors, it is an indicator expressing the underlying credit quality of a (debt) issue programme. The investor is fully informed about the company as any effect of changes in business/economic conditions on the company is evaluated and published regularly by the rating agencies. The corporate borrowers can raise funds at a cheaper rate with good rating. It minimizes the role of the 'name recognition' and less known companies can also approach the market on the basis of their rating. The fund ratings are useful to the banks and other financial institutions while deciding lending and investment strategies.

### Question 36

*Explain the 'Aging Schedule' in the context of monitoring of receivables.*

#### Answer

**Ageing Schedule** : An important means to get an insight into collection pattern of debtors is the preparation of their 'Ageing Schedule'. Receivables are classified according to their age from the date of invoicing e.g. 0 - 30 days, 31 - 60 days , 61 - 90 days, 91 - 120 days and more. The ageing schedule can be compared with earlier month's figures or the corresponding month of the earlier year.

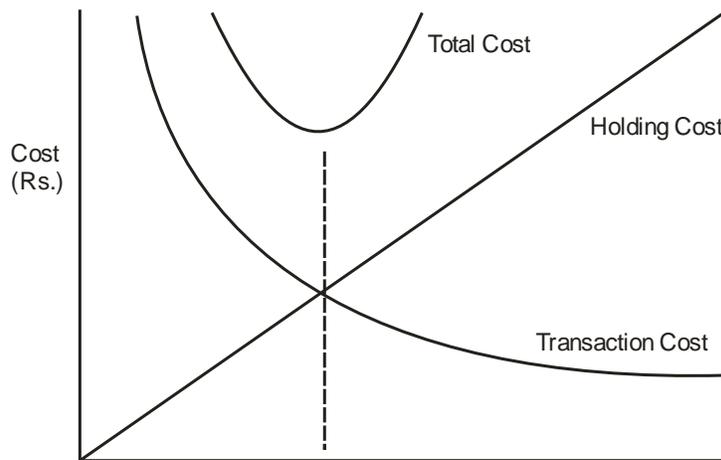
This classification helps the firm in its collection efforts and enables management to have a close control over the quality of individual accounts. The ageing schedule can be compared with other firms also.

### Question 37

*Explain Baumol's Model of Cash Management.*

#### Answer

William J. Baumol developed a model for optimum cash balance which is normally used in inventory management. The optimum cash balance is the trade-off between cost of holding cash (opportunity cost of cash held) and the transaction cost (i.e. cost of converting marketable securities in to cash). Optimum cash balance is reached at a point where the two opposing costs are equal and where the total cost is minimum. This can be explained with the following diagram:



#### Optimum Cash Balance

The optimum cash balance can also be computed algebraically.

$$\text{Optimum Cash Balance} = \sqrt{\frac{2AT}{H}}$$

A = Annual Cash disbursements

T = Transaction cost (Fixed cost) per transaction

H = Opportunity cost one rupee per annum (Holding cost)

The model is based on the following assumptions:

- (i) Cash needs of the firm are known with certainty.
- (ii) The cash is used uniformly over a period of time and it is also known with certainty.

(iii) The holding cost is known and it is constant.

(iv) The transaction cost also remains constant.

### Question 38

*Write short notes Impact of inflation on working capital.*

#### Answer

**Impact of Inflation on Working Capital:** The impact of inflation on working capital is direct. For the same quantity of sales, the value of sundry debtors, closing stock etc. increases as a result of inflation. The valuation of closing stock progressively on higher amounts would result in the company not being able to maintain its operating capability unless it finds extra funds to maintain the same stock level. The higher valuation results in acute shortage of funds as it triggers profit related cash outflows in respect of income tax, dividends and bonus. Unless proper planning is done, the business is likely to face a condition known as “technical insolvency”.

### Question 39

*Write short notes on Different kinds of float with reference to management of cash.*

#### Answer

**Different Kinds of Float with Reference to Management of Cash:** The term float is used to refer to the periods that affect cash as it moves through the different stages of the collection process. Four kinds of float can be identified:

- (i) *Billing Float* : An invoice is the formal document that a seller prepares and sends to the purchaser as the payment request for goods sold or services provided. The time between the sale and the mailing of the invoice is the billing float.
- (ii) *Mail Float* : This is the time when a cheque is being processed by post office, messenger service or other means of delivery.
- (iii) *Cheque processing float* : This is the time required for the seller to sort, record and deposit the cheque after it has been received by the company.
- (iv) *Bank processing float* : This is the time from the deposit of the cheque to the crediting of funds in the seller’s account.

### Question 40

*Write short notes on Factoring.*

#### Answer

**Factoring:** Factoring is a new financial service that is presently being developed in India. Factoring involves provision of specialised services relating to credit investigation, sales ledger management, purchase and collection of debts, credit protection as well as provision of finance against receivables and risk bearing. In factoring, accounts receivables are generally sold to a financial institution (a subsidiary

of commercial bank-called “Factor”), who charges commission and bears the credit risks associated with the accounts receivables purchased by it.

Its operation is very simple. Clients enter into an agreement with the “factor” working out a factoring arrangement according to his requirements. The factor then takes the responsibility of monitoring, follow-up, collection and risk-taking and provision of advance. The factor generally fixes up a limit customer-wise for the client (seller).

Factoring offers the following advantages which makes it quite attractive to many firms.

- (1) The firm can convert accounts receivables into cash without bothering about repayment.
- (2) Factoring ensures a definite pattern of cash in flows.
- (3) Continuous factoring virtually eliminates the need for the credit department. That is why receivables financing through factoring is gaining popularity as useful source of financing short-term funds requirements of business enterprises because of the inherent advantage of flexibility it affords to the borrowing firm. The seller firm may continue to finance its receivables on a more or less automatic basis. If sales expand or contract it can vary the financing proportionally.
- (4) Unlike an unsecured loan, compensating balances are not required in this case. Another advantage consists of relieving the borrowing firm of substantially credit and collection costs and to a degree from a considerable part of cash management.

However, factoring as a means of financing is comparatively costly source of financing since its cost of financing is higher than the normal lending rates.

#### **Question 41**

*Write short notes on Effect on Inflation on Inventory Management.*

#### **Answer**

**Effect on Inflation on Inventory Management:** The main objective of inventory management is to determine and maintain the optimum level of investment in inventories. For inventory management a moderate inflation rate say 3% can be ignored but if inflation rate is higher it becomes important to take into consideration the effect of inflation on inventory management. The effect of inflation on goods which the firm stock is relatively constant can be dealt easily, one simply deducts the expected annual rate of inflation from the carrying cost percentage and uses this modified version in the EOQ model to compute the optimum stock. The reason for making this deduction is that inflation causes the value of the inventory to raise, thus offsetting somewhat the effects of depreciation and other carrying cost factors. Since carrying cost will now be smaller, the calculated EOQ and hence the average inventory will increase. However, if rate of inflation is higher the interest rates will also be higher, and this will cause carrying cost to increase and thus lower the EOQ and average inventories.

Thus, there is no evidence as to whether inflation raises or lowers the optimal level of inventories of firms in the aggregate. It should still be thoroughly considered, however, for it will raise the individual firm's optimal holdings if the rate of inflation for its own inventories is above average and is greater than the effects of inflation on interest rates and vice-versa.

### Question 42

*Explain recent changes in Maximum Permissible Bank Finance (MPBF)*

### Answer

**Maximum Permissible Bank Finance (MPBF):** The maximum permissible limit for bank finance as recommended and suggested by study groups of RBI was 75% of working capital gap shown as below:

Current assets	100
<i>Less</i> : Non-interest bearing current liabilities	40
Working capital gap	60
Financing from long term-sources 25% of either CA or working capital gap	15
MPBF	45

The RBI vide its credit policy (beginning of 1997) scrapped the concept of MPBF. The salient features of new credit system were:

- For borrowers with requirements of upto Rs.25 lakhs credit limit will be computed after detailed discussions with the borrower, without going into detailed evaluation.
- For borrowers with requirements above Rs.25 lakhs, but upto Rs.5 crore, credit limit can be offered upto 20% of the projected gross sales of the borrower.
- For large borrowers not falling in the above categories, the cash budget systems may be used to identify the working capital needs.

### Question 43

*The turnover of Avni Ltd. is Rs. 120 lakhs of which 75 per cent is on credit. The variable cost ratio is 80 per cent. The credit terms are 2/10, net 30. On the current level of sales, the bad debts are 1 per cent. The company spends Rs. 1,20,000 per annum on administering its credit sales. The cost includes salaries of staff who handle credit checking, collection etc.*

These are avoidable costs. The past experience indicates that 60 per cent of the customers avail of the cash discount, the remaining customers pay on an average 60 days after the date of sale.

The Book debts (receivable) of the company are presently being financed in the ratio of 1 : 1 by a mix of bank borrowings and owned funds which cost per annum 15 per cent and 14 per cent respectively.

A factoring firm has offered to buy the firm's receivables. The main elements of such deal structured by the factor are:

- (i) Factor reserve, 12 per cent
- (ii) Guaranteed payment, 25 days
- (iii) Interest charges, 15 per cent, and
- (iv) Commission 4 per cent of the value of receivables.

Assume 360 days in a year.

What advise would you give to Avni Ltd. - whether to continue with the in house management of receivables or accept the factoring firm's offer?

## Answer

### In-house Decision

	Rs.
Cash discount (Rs. 90 lakhs x .60 x .02)	1,08,000
Bad debts losses (90,00,000 x .01)	90,000
Administration cost	1,20,000
Cost of funds in receivables*	1,08,750
	4,26,750

\*Average collection period (10 x .6) + (60 days x .40) = 30 days

Average investments in debtors = 90/12 = 7.5 lakhs

Cost of Bank funds (Rs. 7.5 lakh x .15 x 1/2x)	56,250
Cost of Owned funds (Rs. 7.5 lakh x .14 x 1/2x)	52,500
	1,08,750

### Offer Alternative

Factoring commission (Rs. 90 lakhs x .04)	3,60,000
Interest charges .88 (90 lakhs x 3,60,000) = $\frac{76,03,200 \times .15 \times 25}{360}$	79,200

Cost of owned funds invested in receivables

$$\frac{(90,00,000 \times 76,03,200 \times .14 \times 25)}{360}$$

13,580

**4,52,780**

**Decision:** Avni Ltd. should not go for the factoring alternative as the cost of factoring is more.

Cost of In-house Decision	4,26,750
Cost of Factoring Firm	4,52,780
Net loss	(26,030)

\*\*\*

# 9

## Security Analysis and Portfolio Management

### Question 1

*What is Risk in securities analysis? Discuss different types of risks in securities analysis?*

### Answer

Risk in security analysis is generally associated with the possibility that the realized returns will be less than the returns that were expected.

Risk can be classified as systematic risk and unsystematic risk. Those forces that are uncontrollable, external and broad in their effect are called sources of systematic risk. On the other hand, controllable, internal factors which are peculiar to a particular industry or firm/(s) are known as unsystematic risk.

In this way economic, political and sociological changes are sources of systematic risk. For example, if an economy moves into recession or if there is a political upheaval, it will cause the prices of nearly all the securities, whether bond or equity to decline.

Conversely, unsystematic risk is the portion of the total risk that is unique to a firm or industry. It may be because of change in management, labour strikes, lower sales, profitability etc. which will impact the returns of only specific firms which are facing the problem.

Systematic and unsystematic risk can be subdivided. Systematic risk for bonds is normally identified with interest rate risk; for stocks with market risk. Unsystematic risk includes business and financial risk.

### Question 2

*What is Portfolio Management? State its objectives.*

### Answer

Portfolio management refers to managing efficiently the investment in the securities by diversifying the investments across industry lines or market types.

Following are key objectives of portfolio management:

1. Security/Safety of Principal
2. Stability of Income
3. Capital Growth

4. Marketability
5. Liquidity
6. Reducing risk through diversification
7. Favorable Tax Status
8. Return of amount investment at pre-decided time
9. Preserving purchasing power of investment

### Question 3

*What is Fundamental Analysis? What are the key variables that an investor must monitor in order to carry out his fundamental analysis?*

### Answer

Fundamental analysis is the analysis of past financial statements of any company or firm, its financial health, management, business concept as well as competition with a view to make its future financial forecasts. Actually, it is a logical and systematic approach to estimate future dividends and share price of any company.

Fundamental Analysis is based on the premise that the price of a share is derived from the benefits the holders of the share are expected to receive in the future in the form of dividends. The present value of future dividends, computed at an appropriate discount rate to reflect the riskiness of the share, is called the intrinsic or fundamental value of the share.

**Computation :** Constant Dividend Approach :  $P_0 = \frac{DPS}{K_e}$

Dividend Growth Approach :  $P_0 = \frac{DPS_1}{K_e - g}$  or  $\frac{DPS_0}{K_e - g}$

The fundamental analysts uses the above models or some of their variations for estimating the fundamental or intrinsic price or the fundamental price-earnings multiple of a security.

**Decision to be Taken by Fundamental Analysts:** If the prevailing price or the P/E multiple of a security is higher than its estimated fundamental value, the security is overpriced, the decision in turn in such case will be to sell such security.

If the prevailing price or the P/E multiple of a security is lesser than the estimated fundamental value, the security is underpriced, the decision in such case will be to buy such security.

**Key Variables of Fundamental Analysis:** The key variables that an investor must monitor in order to carry out his fundamental analysis are:

1. Economic Analysis
2. Industry Analysis
3. Firm/Company Analysis

<b>Economic Analysis</b>	<b>Industry Analysis</b>	<b>Firm/Company Analysis</b>
<ul style="list-style-type: none"> <li>• Growth Rates of National Income, Savings, Monetary Policy, Fiscal Policy, Export-import Policies, Population, Price Levels etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Product Life-Cycle</li> </ul>	<ul style="list-style-type: none"> <li>• Net worth &amp; book value</li> </ul>
<ul style="list-style-type: none"> <li>• Growth Rates of Industrial Sector, National Wage Policy</li> </ul>	<ul style="list-style-type: none"> <li>• Demand Supply Gap</li> </ul>	<ul style="list-style-type: none"> <li>• Sources &amp; uses of funds</li> </ul>
<ul style="list-style-type: none"> <li>• Inflation and deflation</li> </ul>	<ul style="list-style-type: none"> <li>• Barriers to Entry</li> </ul>	<ul style="list-style-type: none"> <li>• Cross-sectional &amp; time series analysis</li> </ul>
<ul style="list-style-type: none"> <li>• Monsoon</li> </ul>	<ul style="list-style-type: none"> <li>• Government Attitude</li> </ul>	<ul style="list-style-type: none"> <li>• Size and ranking</li> </ul>
<ul style="list-style-type: none"> <li>• Interest rates and Capital Market Conditions</li> </ul>	<ul style="list-style-type: none"> <li>• State of Competition in the Industry</li> </ul>	<ul style="list-style-type: none"> <li>• Growth record</li> </ul>
<ul style="list-style-type: none"> <li>• Foreign markets</li> </ul>	<ul style="list-style-type: none"> <li>• Cost of Capital and Profitability</li> </ul>	<ul style="list-style-type: none"> <li>• Financial analysis</li> </ul>
<ul style="list-style-type: none"> <li>• Economic Infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Technology and Research</li> </ul>	<ul style="list-style-type: none"> <li>• Quality of management</li> </ul>
	<ul style="list-style-type: none"> <li>• Industry Wage Levels</li> </ul>	<ul style="list-style-type: none"> <li>• Location and labour-management relations</li> </ul>
	<ul style="list-style-type: none"> <li>• Industry practices</li> </ul>	<ul style="list-style-type: none"> <li>• Pattern of existing stock holding</li> </ul>
	<ul style="list-style-type: none"> <li>• Industrial lobby</li> </ul>	<ul style="list-style-type: none"> <li>• Marketability of the shares</li> </ul>

#### **Question 4**

*Briefly Explain 'Technical Analysis' to Portfolio Management?*

#### **Answer**

#### **Meaning**

Technical Analysis is a method of share price movements based on a study of price graphs or charts on the assumption that share price trends are repetitive, that what is seen to have happened before is likely to be repeated. In other words, technical analysis is based on the proposition that the security prices and volume in past suggest their future price behavior.

Technical analysts use three types of charts for analyzing data. They are:

- i. Bar Chart
- ii. Line Chart
- iii. Point and Figure Chart

### Question 5

*Write a short note on DOW JONES THEORY?*

### Answer

Formulated by Charles H. Dow, the Dow theory on stock price movement is a type of technical analysis that consists of some aspects of sector rotation. The Dow Jones Theory is probably the most popular, oldest and most famous theory regarding the behaviour of stock market prices. The Dow Theory's purpose is to determine where the market is and where it is going. It classifies the movements of the prices on the share market into three major categories:

1. Primary Movements,
2. Secondary Movements, and
3. Daily Fluctuations.

- 1) Primary Movements :** They reflect the trend of the stock market & last from one year to three years, or sometimes even more. During a Bull phase, the primary trend is that of rise in prices. During a Bear Phase, the primary trend is that of fall in prices.
- 2) Secondary Movements :** These movements are opposite in direction to the primary movements and are shorter in duration. These movements normally last from three weeks to three months.
- 3) Daily Movements :** There are irregular fluctuations which occur every day in the market. These fluctuations are without any definite trend.

### Benefit of Dow - Jones Theory:

- a) Timings of Investments:** Investor can choose the appropriate time for his investment / divestment. Investment should be made in shares when their prices have reached the lowest level, and sell them at a time when they reached the highest peak.
- b) Identification of Trend:** Using Dow-Jones theory, the correct and appropriate movement in the market Prices can be identified, and depending on the investor's preference, decisions can be taken.

## Question 6

*Write a short note on Efficiency Market Theory?*

### Answer

Market efficiency theory is “the degree to which stock prices reflect all available, relevant information.” Furthermore, the Efficient Market Hypothesis claims “that a market cannot be outperformed because all available information is already built into all stock prices”.  
Misconception about Efficient Market Theory:

- i. Though the Efficient Market Theory implies that market has perfect forecasting abilities, in fact, it merely signifies that prices impound all available information and as such does not mean that market possesses perfect forecasting abilities.
- ii. Although price tends to fluctuate, they cannot reflect fair value.
- iii. Inability of institutional portfolio managers to achieve superior investment performance implies that they lack competence in an efficient market.
- iv. The random movement of stock prices suggests that stock market is irrational.

**Level of Market Efficiency:** There exist three levels of market efficiency:-

- (i) Weak Form Efficiency** – Price reflect all information found in the record of past prices and volumes.
- (ii) Semi – Strong Efficiency** – Price reflect not only all information found in the record of past prices and volumes but also all other publicly available information.
- (iii) Strong Form Efficiency** – Price reflect all available information public as well as private.

**Empirical Evidence on Weak Form Efficient Market Theory:**

- a) Serial Correlation Test
- b) Run Test
- c) Filter Rules Test

**Empirical Evidence on Semi-strong Efficient Market Theory:**

Several studies support the Semi-Strong Form Efficient Market Theory. Fama, Fisher, Jensen and Roll in their adjustment of stock prices to new information examined the effect of stock split on return of 940 stock splits in New York Stock Exchange during the period 1957-1959. They found that prior to the split, stock earns higher returns than predicted by any market model. Boll and Bound in an empirical evaluation of accounting income numbers, studied the effect of annual earnings announcements.

**Empirical Evidence on Strong Form Efficient Market Theory:**

According to the Efficient Market Theory, all available information, public or private, is reflected in the stock prices. This represents an extreme hypothesis. To test this theory, the researcher analysed returns earned by certain groups viz. corporate insiders, specialists on stock exchanges, mutual fund managers who have access to internal information (not

publicly available), or possess greater resource or ability to intensively analyse information in the public domain. They suggested that corporate insiders (having access to internal information) and stock exchange specialists (having monopolistic exposure) earn superior rate of return after adjustment of risk.

### **Challenges to the Efficient Market Theory:**

- (a) Information Inadequacy
- (b) Limited information processing capabilities
- (c) Irrational Behaviour
- (d) Monopolistic Influence

### **Question 7**

*What are the assumptions of Markowitz Model of Risk-Return Optimization or the Modern Approach to Portfolio Management?*

### **Answer**

Markowitz model provides a theoretical framework for analysis of risk-return choices. The concept of efficient portfolios has been enunciated in this model. A portfolio is efficient when it yields highest return for a particular level of risk or minimizes risk for a specified level of expected return.

The Markowitz model makes the following assumptions regarding investor behaviour:

- Investors consider each investment alternative as being represented by a probability distribution of expected returns over some holding period.
- Investors maximize one period expected utility and possess utility curve, which demonstrates diminishing marginal utility of wealth.
- Individuals estimate risk on the basis of variability of expected returns.
- Investors base decisions solely on expected return and variance of returns only.
- At a given risk level, higher returns are preferred to lower returns. Similarly for a given level of expected returns, investors prefer less risk to more risk.

### **Question 8**

*Explain the Random Walk Theory to Portfolio Management?*

### **Answer**

Random walk theory gained popularity in 1973 when Burton Malkiel wrote a book "A Random Walk Down Wall Street", which is now regarded as an investment classic. It's a stock market theory that states that the past movement or direction of the price of a stock or overall market cannot be used to predict its future movement. It propounds that stocks take a random and unpredictable path and no connection can be established between two successive peaks (high price of stocks) and troughs (low price of stocks). The chance of a stock's future price going up is the similar as chance of its going down. A follower of random walk believes it is impossible to outperform the market without

assuming additional risk. This is because, the price trends are not the result of any underlying factors, but represent a statistical expression of past data.

### Question 9

*Write a short note on CAPM? What are its Assumptions?*

### Answer

Capital asset pricing model (CAPM) helps to work out the required rate of return required by investor in the form of equity investment. It establishes a linear relationship between the required rate of return of a security and its beta ( $\beta$ ).

CAPM model is based on certain assumptions:

1. Market efficiency: the capital market efficiency means that share prices reflect all available information.
2. Risk aversion and mean variance optimization: investors are risk averse. They evaluate a security's return and risk in terms of expected return and variance or standard deviation respectively. They prefer the highest expected return for a given level of risk. This implies that the investors are mean variance optimizers and they form efficient portfolios.
3. Homogenous expectations: all investors have the same expectations about expected returns and risks of securities.
4. Single time period: all investors' decisions are based on a single time period.
5. Risk-free rate: all investors can lend and borrow at a risk-free rate of interest.
6. No Taxes : there exist no taxes whether personal or corporate.
7. No Transaction cost : Transaction in securities is without any transaction cost.

Transaction in securities is without any transaction cost.

### Question 10

*Differentiate between 'Capital market line' and 'security market line'*

### Answer

#### Capital Market Line and Security Market Line

Capital Market Line (CML) shows the linear relationship between expected rate of return and total risk ( $r$ ) for efficient portfolios whereas Security Market Line (SML) describes the linear risk-return relationship between systematic risk ( $\beta$ ) and return for both efficient and inefficient portfolios. Some of the major points of distinction between the two are as under:

- In CML, the risk is defined by total risk ( $r$ ), while in SML the risk is defined by undiversifiable market related risk ( $\beta$ ).
- CML is valid only for fully diversified (efficient) portfolios while SML is valid for all portfolios and for individual securities as well.

## Question 11

*Write a short note on Sharpe index model.*

### Answer

Sharpe Index model William Sharpe introduced a model in which return on a security is correlated to an index of securities or an index or an economic indicator like GDP or prices.

According to the Sharpe single index model, the return for each security can be given by the following equation:

$$R = \alpha + \beta I + e$$

Where R = Expected return on a security

$\alpha$  = Alpha Coefficient

$\beta$  = Beta Coefficient

I = Expected Return of an index

e = Error term with a mean of zero and a constant standard deviation.

Alpha Coefficient refers to the value of Y; in the equation,  $Y = \alpha + \beta x$ , when  $x = 0$ . Beta Coefficient is the slope of the regression line and is a measure of the changes in value of the security relative to changes in values of the index.

A beta of +1.0 means that a 10% change in index value would result in a 10% change in the same direction in the security value. A beta of 0.5 means that a 10% change in index value would result in 5% change in the security value. A beta of -1.0 means that the returns on the security are inversely related.

## Question 12

*Write a short note on support and resistance ?*

### Answer

Support and resistance is a concept in technical analysis which states that the movement of the price of a security will tend to stop and reverse at certain predetermined price levels denoted by multiple touches of price without a breakthrough of the level.

As per this concept, when the index/price goes down from a peak, the peak becomes the resistance level. Resistance levels act like a ceiling for the price of a stock. As the price rises up to a resistance level, it tends to stop, turn around and move lower.

When the index/price starts falling, the lowest value reached becomes the support level. Support levels act like a floor for the price of stock. As the price of a stock drops down to a support level it tends to stop at that point, turn around and move higher.

The price is then expected to move between these two levels. Whenever the price approaches the resistance level, there is a selling pressure because all investors who failed to sell at the high would be keen to liquidate, while whenever the price approaches the support level, there is a buying pressure as all those investors who failed to buy at the lowest price would like to purchase the share.

Support levels indicate the price where the most of investors believe that prices will move higher. Resistance levels indicate the price at which the most of investors feel prices will move lower.

### Question 13

*Distinguish between 'Systematic risk' and 'Unsystematic risk'.*

#### Answer

**Systematic Risk :** Systematic risk refers to the variability of return on stocks or portfolio associated with changes in return on the market as a whole. It arises due to risk factors that affect the overall market such as changes in the nations' economy, tax reform by the Government or a change in the world energy situation. These are risks that affect securities overall and, consequently, cannot be diversified away. This is the risk which is common to an entire class of assets or liabilities. The value of investments may decline over a given time period simply because of economic changes or other events that impact large portions of the market. Asset allocation and diversification can protect against systematic risk because different portions of the market tend to underperform at different times. This is also called market risk.

**Unsystematic Risk** Unsystematic risk refers to risk unique to a particular company or industry. It can be avoided through diversification. This is the risk of price change due to the unique circumstances of a specific security as opposed to the overall market. This risk can be virtually eliminated from a portfolio through diversification.

### Practical Questions

#### Question 14

*If the risk free rate of interest (Rf) is 10%, and expected return on market portfolio (Rm) is 15%, ascertain expected return of the portfolio if portfolio betas are — (a) 0.10 and (b) 0.30.*

#### Solution:

##### 1. Rule for determining Expected Return on Portfolio under CAPM

Under Capital Asset Pricing Model (CAPM)  $R_p = R_f + \beta (R_m - R_f)$

<i>Notation</i>	<i>Particulars</i>	<i>Value</i>
Rp	Expected Return on Portfolio	To be computed
Rf	Risk Free Rate of Interest/ Return	10%
$\beta$	Portfolio Beta	0.10/0.30
Rm	Expected Return on Market Portfolio	15%

## 2. Computation of Expected Return on Portfolio

<i>Beta</i>	<i>Expected Return = <math>R_f + \beta (R_m - R_f)</math></i>
0.10	= 10% + 0.10(15%-10%)=10.5%
0.30	= 10% + 0.30(15%-10%)=11.5%

### Question 15

Compute Return under CAPM and the Average Return of the Portfolio from the following information—

<i>Investment in equity shares</i>	<i>Initial price Rs.</i>	<i>Dividends Rs.</i>	<i>Market price at the end of the year Rs.</i>	<i>Beta risk factor</i>
<i>A Ltd.</i>	25	2	50	0.8
<i>B Ltd.</i>	35	2	60	0.7
<i>C Ltd.</i>	40	2	130	0.5
<i>Govt. of India Bonds</i>	1,000	150	1,010	0.99

Risk free return = 15%

### Answer

#### 1. Computation of Expected Return and Average Return

<i>Securities</i>	<i>Cost Rs.</i>	<i>Dividend Rs.</i>	<i>Capital Gain Rs.</i>	<i>Expected Return = <math>R_f + (R_m - R_f) \beta</math></i>
A Ltd.	25	2	25	[15 + 0.80 x (27.82 - 15)] = 25.26%
B Ltd.	35	2	25	[15 + 0.70 x (27.82 - 15)] = 23.97%
C Ltd.	40	2	90	[15 + 0.50 x (27.82 - 15)] = 21.41%
GOI Bonds	1,000	150	10	[15 + 0.99 x (27.82 - 15)] = 27.69%
<b>Total</b>	<b>1,100</b>	<b>156</b>	<b>150</b>	

Notes:

### 1. Return on Market Portfolio

Expected Return on Market Portfolio ( $R_m$ ) = (Dividend + Capital Gains) ÷ Cost of the Total Investment

$$= (156+150) / 1,100 \times 100 = 27.82\%$$

In the absence of Return of a Market Portfolio, it is assumed that portfolio containing one unit of the four securities listed above would result in a completely diversified portfolio, and therefore represent the market portfolio.

### 2. Portfolio's Expected Return based on CAPM

(a) If the Portfolio contains the above securities in equal proportion in terms of value —

$$\text{Expected Return} = (25.26+23.97+21.41+27.69) \div 4 = 24.58$$

(b) If the Portfolio contains one unit of the above securities, then

Securities	Cost (Rs.)	Proportion	Expected Return	Weighted Return
(1)	(2)	(3) = (2) ÷ 1,100	(4)	(5) = (3) x (4)
A Limited	25	0.023	25.26%	0.581%
B Limited	35	0.032	23.97%	0.767%
C Limited	40	0.036	21.41%	0.771%
GOI Bonds	1,000	0.909	27.69%	25.170%
<b>Total</b>	<b>1,100</b>			<b>27.289%</b>

### Question 16

Amrita has invested in four securities M, N, O and P, the particulars of which are as follows—

Security (Rs.)	M	N	O	P
Amount Invested	1,25,000	1,50,000	80,000	1,45,000
Beta ( $\beta$ )	0.60	1.50	0.90	1.30

1. If RBI Bonds carries an interest rate of 8% and NIFTY yields 14%, what is the expected return on portfolio?
2. If investment in Security O is replaced by investment in RBI Bonds, what is the corresponding change in Portfolio Beta and expected return?

**Answer****1. Computation of Expected Return on Portfolio (Under CAPM)***(a) Computation of Weighted Beta (Beta of the Portfolio)*

<i>Security</i>	<i>Amount Invested (Rs.)</i>	<i>Proportion of Investment to Total Investment</i>	<i>Beta of Investment</i>	<i>Weighted Beta</i>
<i>(1)</i>	<i>(2)</i>	<i>(3) = (2) ÷ 5,00,000</i>	<i>(4)</i>	<i>(5) = (3) x (4)</i>
M	1,25,000	0.25	0.60	0.150
N	1,50,000	0.30	1.50	0.450
O	80,000	0.16	0.90	0.144
P	1,45,000	0.29	1.30	0.377
Total	5,00,000	1.00		1.121

*(b) Computation of Expected Return on Portfolio*

$$\begin{aligned} \text{Expected Return [E(Rp)]} &= R_f + \beta_p \times (R_m - R_f) \\ &= 8\% + [1.121 \times (14\% - 8\%)] \\ &= 8\% + [1.121 \times 6\%] = 8\% + 6.726\% = 14.726\% \end{aligned}$$

**2. Computation of Expected Return [Investment in O is replaced by RBI Bonds] (CAPM)***(a) Computation of Weighted Beta (Beta of the Portfolio)*

<i>Security</i>	<i>Amount Invested</i>	<i>Proportion of Investment to Total Investment</i>	<i>Beta of Investment</i>	<i>Weighted Beta</i>
<i>(1)</i>	<i>(2)</i>	<i>(3) = (2) ÷ 5,00,000</i>	<i>(4)</i>	<i>(5) = (3) X (4)</i>
M	1,25,000	0.25	0.60	0.150
N	1,50,000	0.30	1.50	0.450
RBI Bonds	80,000	0.16	0.00	0.000
P	1,45,000	0.29	1.30	0.377
Total	5,00,000	1.00		0.977

(b) *Computation of Expected Return on Portfolio*

$$\begin{aligned}\text{Expected Return [E(RP)]} &= R_f + \beta_p \times (R_m - R_f) \\ &= 8\% + [0.977 \times (14\% - 8\%)] \\ &= 8\% + [0.977 \times 6\%] = 8\% + 5.862\% = 13.862\%\end{aligned}$$

**Question 17**

*Stocks A and B have the following historical returns —*

<i>Year</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>2013</i>	<i>2014</i>
<i>Stock P's Return (K<sub>P</sub>)</i>	<i>-12.24</i>	<i>23.68</i>	<i>34.44</i>	<i>5.82</i>	<i>28.30</i>
<i>Stock Q's Return (K<sub>Q</sub>)</i>	<i>-7.00</i>	<i>25.55</i>	<i>44.09</i>	<i>2.20</i>	<i>20.16</i>

*You are required to calculate the average rate of return for each stock during the period 2010 through 2014. Assume that someone held a Portfolio consisting 50% of Stock A and 50% of Stock B.*

*What would have been the realized rate of return on the Portfolio in each year from 2010 through 2014? What would be the average return on the Portfolio during the period? (You may assume that year ended on 31st March).*

**Answer**

**1. Calculation of average rate of return on Portfolio during 2010-2014**

<i>Year</i>	<i>Stock A's Return %</i>	<i>Stock B's Return %</i>
<i>2010</i>	<i>-12.24</i>	<i>-7.00</i>
<i>2011</i>	<i>23.68</i>	<i>25.55</i>
<i>2012</i>	<i>34.44</i>	<i>44.09</i>
<i>2013</i>	<i>5.82</i>	<i>2.20</i>
<i>2014</i>	<i>28.30</i>	<i>20.16</i>
<i>Total</i>	<i>80.00</i>	<i>85.00</i>
<i>Average rate of return</i>	<i>80/5 years = 16%</i>	<i>85/5 years = 17%</i>

## 2. Calculation of realized rate of return on Portfolio during 2010-2014

	Stock A			Stock B			Total
Year	Proportion	Return	Net Return	Proportion	Return	Net Return	Net Return
1	2	3	$4 = 3 \times 2$	5	6	$7 = 5 \times 6$	$8 = 4 + 7$
2010	0.50	-12.24	-6.12	0.50	-7.00	-3.50	-9.62
2011	0.50	23.68	11.84	0.50	25.55	12.78	24.62
2012	0.50	35.44	17.72	0.50	44.09	22.05	39.77
2013	0.50	5.82	2.91	0.50	2.20	1.10	4.01
2014	0.50	28.30	14.15	0.50	20.16	10.08	24.23
			<b>40.50</b>			<b>42.51</b>	<b>83.01</b>

### Question 18

From the following information, calculate the expected rate of return of a portfolio :

Risk-free rate of return 12%

Expected return on market portfolio 20%

Standard deviation of an asset 3%

Market standard deviation 2.5%

Correlation coefficient of portfolio with market 0.80

### Answer

Calculation of Expected Rate of Return of a Portfolio:

Expected Rate of Return of a portfolio can be worked by using following formula:

$$R_e = R_f + \beta_j(R_m - R_f) \dots\dots(1)$$

Where

$R_e$  stands for expected rate of return of a portfolio

$R_f$  = Risk free rate of interest or return

$R_m$  = Expected return of market portfolio

$\beta_j$  = Beta co-efficient of Security j

Since in the question, information on  $\beta$  is not given, it is essential to find it. The formula to calculate  $\beta_j$  is:

$$= \frac{r_{sm} \times \sigma_s}{\sigma_m}$$

Where  $r_{sm}$  stands for correlation co-efficient of portfolio with market

$\sigma_s$  Standard deviation of an asset

$\sigma_m$  Market standard deviation

By substituting the available information in above formula, (2) we may get:

$$\begin{aligned} \beta &= (0.80 \times 0.03) \div 0.025 \\ &= 0.96 \end{aligned}$$

Now we may get expected rate of return by substituting available information in equation (1)

$$\begin{aligned} R_e &= 12 + 0.96 (20 - 12) \\ &= 19.68\% \end{aligned}$$

### Question 19

*Securities P and Q have standard deviations of 3% and 9%. Ananya is having a surplus of Rs. 20 Lakhs for investment in these two securities. How much should she invest in each of these securities to minimize risk, if the correlation co-efficient for P and Q is — (a) -1; (b) -0.30; (c) 0; (d) 0.60*

### Answer

#### 1. Basic Values of Factors for Determination of Portfolio Risk

Standard Deviation of Security P	$\sigma P$	3%
Standard Deviation of Security Q	$\sigma Q$	9%
Correlation co-efficient of Securities P and Q	$\rho PQ$	-1, -0.30, 0, 0.60
Weight of Security P	$W_P$	x
Weight of Security Q	$W_Q$	1-x

## 2. Computation of Investment in Securities

Proportion of Investment in Security P,  $W_P = [\sigma Q^2 - Cov_{PQ}] \div [\sigma P^2 + \sigma Q^2 - 2Cov_{PQ}]$

Proportion of Investment in Security Q,  $W_Q = 1 - W_P$

<i>If <math>\rho_{PQ}</math> is</i>	<i><math>Cov_{PQ}</math> is</i>	<i>Computation <math>Cov_{PQ} = \rho_{PQ} \times \sigma_P \times \sigma_Q</math></i>	<i>Investment</i>
-1	-27 (-1x3x9)	$\rightarrow W_P = [\sigma Q^2 - Cov_{PQ}] \div [\sigma P^2 + \sigma Q^2 - 2Cov_{PQ}]$ $\rightarrow W_P = [92 - (-27)] \div [32 + 92 - 2 \times (-27)]$ $\rightarrow W_P = [81 + 27] \div [9 + 81 + 54]$ $\rightarrow W_P = 108/144 = 0.75$	0.750 in P 0.250 in Q Rs.15,00,000 in P Rs.5,00,000 in Q
-0.3	-8.1 (-0.3x3x9)	$\rightarrow W_P = [\sigma Q^2 - Cov_{PQ}] \div [\sigma P^2 + \sigma Q^2 - 2Cov_{PQ}]$ $\rightarrow W_P = [92 - (-8.1)] \div [32 + 92 - 2 \times (-8.1)]$ $\rightarrow W_P = [81 + 8.1] \div [9 + 81 + 16.2]$ $\rightarrow W_P = 89.1 / 106.2 = 0.839$	0.839 in P 0.161 in Q Rs.16,78,000 in P Rs.3,22,000 in Q
0	0 (0x3x9)	$\rightarrow W_P = [\sigma Q^2 - Cov_{PQ}] \div [\sigma P^2 + \sigma Q^2 - 2Cov_{PQ}]$ $\rightarrow W_P = [92 - 0] \div [32 + 92 - 2 \times 0]$ $\rightarrow W_P = [81 - 0] \div [9 + 81 - 0]$ $\rightarrow W_P = 81/90 = 0.90$	0.900 in P 0.100 in Q Rs.18,00,000 in P Rs. 2,00,000 in Q
0.60	16.2 (0.6 x 3 x 9)	$\rightarrow W_P = [\sigma Q^2 - Cov_{PQ}] \div [\sigma P^2 + \sigma Q^2 - 2Cov_{PQ}]$ $\rightarrow W_P = [92 - 16.2] \div [32 + 92 - 2 \times 16.2]$ $\rightarrow W_P = [81 - 16.2] \div [9 + 81 - 32.4]$ $\rightarrow W_P = 64.8 / 57.60 = 1.125 > 1$  At this correlation level, risk reduction is not possible.	Reducing Risk below 3% is not possible.

## Question 20

Your client is holding following securities as proxy of market portfolio :

Particulars of securities	Purchase price (Rs.)	Dividends (Rs.)	Expected market price after 1 year (Rs.)	Beta ( $\beta$ )
Equity shares:				
Company A	8000	800	8200	0.80
Company B	10000	800	10500	0.70
Company C	16000	800	22000	0.50
PSU Bonds	34000	3400	32300	1.00

Assume a risk free rate of 15%.

Calculate expected rate of return in each, using capital asset pricing model if shares are held for 1 year.

## Answer

Calculation of expected return on market portfolio ( $R_m$ )

Particulars of securities	Purchase price (Rs.)	Dividends (Rs.)	Expected price after 1 year (Rs.)	Capital gains/loss (Rs.)
Equity shares:				
Company A	8,000	800	8,200	200
Company B	10,000	800	10,500	500
Company C	16,000	800	22,000	6,000
PSU Bonds	34,000	3,400	32,300	(1,700)
Total	68,000	5,800	73,000	5,000

$$R_m = (\text{Total Dividend} + \text{Total capital gains}) / \text{Total purchase price} * 100$$

$$= (5,800 + 5,000) / 68,000 * 100 = 15.88\%$$

Calculation of expected rate of return in each, using CAPM

$$R_e = R_f + \beta (R_m - R_f)$$

Equity shares of Company A

$$R_e = 15 + 0.80(15.88 - 15) = 15.70\%$$

Equity shares of Company B

$$R_e = 15 + 0.70(15.88 - 15) = 15.62\%$$

Equity shares of Company C

$$R_e = 15 + 0.50(15.88 - 15) = 15.44\%$$

PSU Bonds

$$R_e = 15 + 1.00(15.88 - 15) = 15.88\%$$

### Question 21

*A Ltd., and B Ltd., has the following risk and return estimates*

$R_A$	$R_B$	$\sigma_A$	$\sigma_B$	(Correlation coefficient) = $r_{AB}$
20%	22%	18%	15%	-1.50

*Calculate the proportion of investment in A Ltd., and B Ltd., to minimize the risk of Portfolio.*

### Answer

#### 1. Basic Values of Factors for Determination of Portfolio Risk

Standard Deviation of Security A	$\sigma_A$	18%
Standard Deviation of Security B	$\sigma_B$	15%
Correlation co-efficient of Securities A and B		-1.50
Weight of Security A	$W_A$	x
Weight of Security B	$W_B$	1-x

#### 2. Computation of Investment in Security A ( $W_A$ )

$$\text{Proportion or Investment in A Ltd.,} = \frac{\sigma_B^2 - \text{COV}_{AB}}{\sigma_A^2 + \sigma_B^2 + 2\text{COV}_{AB}}$$

$$\text{Proportion of Investment in B Ltd., } W_B = 1 - W_A$$

**(a) Computation of Covariance**

$$\begin{aligned} \text{COV}_{AB} &= r_{AB} \times \sigma_A \sigma_B \\ &= -1.50 \times 18 \times 15 = -405 \end{aligned}$$

**(b) Proportion of investment in A Ltd.**

$$\begin{aligned} \rightarrow W_A &= [\sigma Y^2 - \text{Cov}_{XY}] \div [\sigma X^2 + \sigma Y^2 - 2\text{Cov}_{XY}] \\ \rightarrow W_A &= [152 - (-405)] \div [182 + 152 - 2 \times (-405)] \\ \rightarrow W_A &= [225 + 405] \div [324 + 225 + 810] = 630/1359 = 0.46 \end{aligned}$$

**(c) Proportion of investment in B Ltd.**

$$\rightarrow W_B = 1 - 0.46 = 0.54$$

**Question 22**

An investor is holding 1,000 shares of Horizon Ltd. Presently, the rate of dividend being paid by the company is Rs. 2 per share and the share is sold at Rs. 25 per share. However, several factors are likely to change during the course of the year as given below:

	Existing	Revised
Risk-free rate (%)	12	10
Market risk premium (%)	6	4
Beta ( $\beta$ ) value	1.40	1.25
Expected growth rate (%)	5	9

In view of above factors, should the investor buy, hold or sell the shares and why?

**Answer**

On the basis of given information, the rate of return of shares may be found with the help of the Capital Asset Pricing Model (CAPM) model

Expected Rate of Return on Security as per CAPM Model:  $Re = R_f + \beta (R_m - R_f)$

$R_e$  = Expected rate of return on the security

$R_f$  = Risk free rate of return

$\beta$  = Beta

$R_m$  = Rate of return from the market portfolio

Existing Return =  $0.12 + (0.06) \times 1.4 = 0.12 + .084 = 0.204$  or 20.4%

Revised Return =  $0.10 + 0.04 \times 1.25 = 0.10 + 0.05 = 0.15$  or 15%

Existing Share Price ( $P_0$ ) =  $\frac{D_0(1+g)}{K_e - g} = \frac{2(1.05)}{0.154} = \text{Rs. } 13.64$

Revised selling price a share =  $\frac{D_0(1+g)}{K_e - g} = \frac{2(1.05)}{0.154} = \text{Rs. } 36.33$

The current market price of the share is given at Rs. 25 per share but under equilibrium process it is expected that share price fell to Rs. 13.64. So it is overpriced and it should be sold.

However in the revised situation, the theoretical price of a share is expected to increase to Rs.36.33. Subject to other factors, the investor may hold the share with a view to have capital gain in future.

### Question 23

An investor holds two equity shares A and B in equal proportion with the following risk and return characteristics:

$E(RA)$	28%
$A \sigma$	30%
$E(RB)$	24%
$B \sigma$	26%

The returns of these securities have a positive correlation of 0.7. You are required to calculate the portfolio return and risk. Further, suppose that the investor wants to reduce the portfolio risk ( $\sigma_p$ ) to 17 per cent. How much should the correlation coefficient be to bring the portfolio risk to the desired level?

### Answer

#### 1. Basic Data

Notation	Particulars	Value
$\rho_{MP}$	Correlation co-efficient of Portfolio with market	0.7
$\sigma_A$	Standard Deviation of Share A	30%
$\sigma_B$	Standard Deviation of Share B	26%
$\sigma_P$	Risk of the Portfolio	17%
$E(RA)$	Return of the equity share A	28%
$E(RB)$	Return of the Equity Share B	24%

Computation of Expected Return

$$\begin{aligned} \text{Expected Return } [E(RP)] &= \text{Proportion of A} \times E(RA) + \text{Proportion of B} \times E(RB) \\ &= 28(0.5) + 24(0.5) = 14 + 12 = 26\% \end{aligned}$$

## 2. Computation of Portfolio Risk

$$\begin{aligned}\rho_{AB} &= \frac{\sqrt{\sigma_A^2 W_a^2 + \sigma_B^2 W_b^2} + 2\sigma_A\sigma_B W_a W_b \rho_{AB}}{\sqrt{30^2 0.5^2 + 26^2 0.5^2} + 2 \times 26 \times 0.5 \times 30 \times 0.5 \times \rho_{AB}} \\ &= \frac{\rho_{AB}}{\rho_{AB}} = -0.269\end{aligned}$$

## 3. Correlation Coefficient

If the investor desires the portfolio standard deviation to be 17 per cent, the correlation coefficient will be as computed below:

$$\begin{aligned}\rho_{AB} &= \frac{\sqrt{\sigma_A^2 W_a^2 + \sigma_B^2 W_b^2} + 2\sigma_A\sigma_B W_a W_b \rho_{AB}}{\sqrt{30^2 0.5^2 + 26^2 0.5^2} + 2 \times 26 \times 0.5 \times 30 \times 0.5 \times \rho_{AB}} \\ 17 &= \sqrt{30^2 0.5^2 + 26^2 0.5^2} + 2 \times 26 \times 0.5 \times 30 \times 0.5 \times \rho_{AB} \\ \rho_{AB} &= -0.269\end{aligned}$$

## Question 24

*The prevailing risk-free rate of interest in 10-Year GOI Treasury Bonds is 5.5%. The average risk premium is 8%. The beta of the company is 1.1875. The company now wants to take up a project requiring an investment of Rs.75 crore with a debt-equity ratio of 20%. The beta of this project is 1.4375. The debt can be raised at an interest rate of 9.5% upto first Rs.10 crore and @ 10% for the rest of the amount. Find out the marginal cost of capital, if the tax rate is 35%.*

### Answer

Risk free rate of interest (Rf) = 5.5%

Average Risk Premium = 8%

Investment required = Rs. 75 crore

Debt Equity Ratio = 20%

$\beta$  of Project = 1.4375

Interest rate = 9.5% upto first Rs.10 crore

= 10% for rest of the amount

Tax Rate = 35%

Total investment required = Rs.75 crore

Debt Equity Ratio = 20%

Equity = Rs. 60 crore

Debt = 15 crore

Ke = Rf + (Risk Premium x beta)

= 0.055 + (0.08 x 1.4375)

= 17%

$K_d = I(1-T) = 9.5 \times 0.65 = 6.175$  for Rs.10 crore

$= 10 \times 0.65 = 6.5\%$  for Rs. 5 crore

Proportion of equity in new project = 80%

Weighted Marginal Cost of Capital =  $(K_e \times \text{equity } \%) + (K_d \times \text{debt } \%) + (K_d \times \text{debt } \%)$

$= (17 \times 60/75) + (6.175 \times 10/75) + (6.5 \times 5/75)$

$= 14.86\%$

Note : Cost of Equity Capital has been calculated with reference to  $\beta$  of the project.

### Question 25

The distribution of return of security "P" and the market portfolio "Q" is given below:

Probability	Return %	
	P	Q
0.30	30	-10
0.40	20	20
0.30	0	35

You are required to calculate the expected return of security "P" and the market portfolio "Q", the covariance between the market portfolio and security and beta for the security,

### Answer

#### 1. Expected Return and Risks of Security P

Scenario	Probability (P)	Return (R)%	Expected Return %	Deviation (D)%	$D^2$	Variance ( $P \times D^2$ )
(1)	(2)	(3)	(4) = (2) X (3)	(5) = (3) - (2X4)	(6)	(7) = (2) X (6)
1	0.30	30	9	13	169	50.7
2	0.40	20	8	3	9	3.6
3	0.30	0	0	(17)	289	86.7
			<b>17.00%</b>			<b>141</b>

Expected Return on Security P = 17.00%

$$\text{Risk on Security} = \sqrt{\text{variance}} = \sqrt{141} = 11.87\%$$

## 2. Expected Return and Risks of Market Portfolio Q

Scenario	Probability (P)	Return (R)%	Expected Return %	Deviation (D)%	D <sup>2</sup>	Variance (P X D <sup>2</sup> )
(1)	(2)	(3)	(4) = (2) X (3)	(5) = (3) - Σ(4)	(6)	(7) = (2)X(6)
1	0.30	(10)	(3)	(25.5)	650.25	195.075
2	0.40	20	8	4.5	20.25	8.1
3	0.30	35	10.5	19.5	380.25	114.07
			<b>15.50%</b>			<b>317.245</b>

Expected Return on Market Portfolio Q = 15.50%

$$\text{Risk on Security} = \sqrt{\text{variance}} = \sqrt{317.24} = 17.81\%$$

## 3. Computation of Covariance of Securities P and Market Portfolio Q

Scenario	Probability (P)	Deviation (D <sub>P</sub> ) from Mean for P%	Deviation (D <sub>Q</sub> ) from Mean for Q%	Deviation Product (D <sub>PQ</sub> ) = D <sub>P</sub> X D <sub>Q</sub>	Covariance (P X D <sub>PQ</sub> )
(1)	(2)	(3)	(4)	(5) = (3) x (4)	(6) = (2) x (5)
1	0.30	13	(25.5)	(331.5)	(99.45)
2	0.40	3	4.5	13.5	5.4
3	0.30	(17)	19.5	(331.5)	(99.45)
					<b>(193.5)</b>

Covariance of Securities P and Market Portfolio Q [CovPQ] = (193.5)

$$\text{Beta} = \text{CovPQ} \div \sigma_p^2 = -193.5 \div 317.245 = -0.6099$$

### Question 26

X, an investor, is seeking the price to pay for a security, whose standard deviation is 5%. The correlation coefficient for the security with the market is 0.75 and the market

standard deviation is 4%. The return from risk-free securities is 6% and from the market portfolio is 11%. X knows that only by calculating the required rate of return, he can determine the price to pay for the security. What is the required rate of return on the security?

**Answer**

Calculation of beta coefficient

Standard deviation = 5%

Correlation coefficient = 0.75

Market Standard Deviation = 4%

$$\beta_i = \sigma_i / \sigma_m \times r_m = (0.05 \times 0.75) / 0.04 = 0.9375$$

Calculation of required rate of return on security –

$$R_f = 6\%$$

$$R_m = 11\%$$

$$E(R_1) = R_f + \beta [R_m - R_f]$$

$$= 6.0 + 0.9375 [11.00 - 6.00]$$

$$= 6.0 + 0.9375 \times 5$$

$$= 6.0 + 4.6875$$

$$= 10.6875\%$$

**Question 27**

An investor estimates return on shares in two different companies under four different scenarios as under —

Scenario	Probability of its happening	Return on Security G	Return on Security H
1	0.20	12%	10%
2	0.30	15%	20%
3	0.40	19%	25%
4	0.10	25%	35%

- a. Ascertain expected rate of return if the investor invests all his funds in Security G alone, or in Security H alone?

- b. Determine the preferred security based on return?
- c. Ascertain the risk associated with each of the security?
- d. If the investor invests 40% in Security G & 60% in Security H, what is the expected return and the associated risk?

**Answer**

**1. Expected Return and Risks of Security G**

Scenario	Probability (P)	Return (R)	Expected Return (ER)	Deviation (D)	D <sup>2</sup>	Variance (P x D <sup>2</sup> )
(1)	(2)	(3)	(4) = (2) x (3)	(5) = (3) - ER	(6)	(1) = (2) x (6)
1	0.20	12%	2.40%	(5%)	25	5.00
2	0.30	15%	4.50%	(2%)	4	1.20
3	0.40	19%	7.60%	2%	4	1.60
4	0.10	25%	2.50%	8%	64	6.40
			17.00%			14.20

Expected Return on Security G = 17.00%

Risk on Security =  $\sqrt{\text{variance}} = \sqrt{14.20} = 3.77\%$

**2. Expected Return and Risks of Security H**

Scenario	Probability (P)	Return (R)	Expected Return (ER)	Deviation (D)	D <sup>2</sup>	Variance (P x D <sup>2</sup> )
(1)	(2)	(3)	(4) = (2) x (3)	(5) = (3) - ER	(6)	(7) = (2) x (6)
1	0.20	10%	2.00%	(11.5%)	132.25	26.45
2	0.30	20%	6.00%	(1.5%)	2.25	0.675
3	0.40	25%	10.00%	3.5%	12.25	4.9
4	0.10	35%	3.50%	13.5%	182.25	18.22
			21.50%			50.24

Expected Return on Security H = 21.50%

Risk on Security =  $\sqrt{\text{variance}} = \sqrt{50.24} = 7.08\%$

### 3. Computation of Covariance of Securities G and H

Scenario	Probability (P)	Deviation (DG) from Mean for G	Deviation (DH) from Mean for H	Deviation Product (DP) = DG x DH	Covariance (P x DP)
(1)	(2)	(3)	(4)	(5) = (3) x (4)	(6) = (2) x (5)
1	0.20	(5%)	(11.5%)	57.5	11.5
2	0.30	(2%)	(1.5%)	3	0.9
3	0.40	2%	3.5%	7	2.8
4	0.10	8%	13.5%	108	10.8
					<b>26.00</b>

Covariance of Securities G and H;  $\text{COV}_{GH} = 26.00$

### 4. Expected Risk/ Return on Portfolio of G and H [40% : 60% Ratio]

Basic Values of Factors for Determination of Portfolio Risk

Factors	Symbol	Value
Standard Deviation of Security G [WN 1]	$\delta G$	3.77%
Standard Deviation of Security H [WN 2]	$\delta H$	7.08%
Covariance between Securities G and H [WN 3]	$\text{COV}_{GH}$	26.00
Correlation co- efficient of Securities G and H $\rho_{GH} = \text{Cov}_{GH} \div (\delta G \times \delta H) = 26.00 \div (3.77 \times 7.08)$	$\rho_{GH}$	0.9741
Weight of Security G	$W_G$	0.40
Weight of Security H	$W_H$	0.60

$$\rho_{GH} = \sqrt{\sigma_G^2 W_G^2 + \sigma_H^2 W_H^2 + 2\sigma_G \sigma_H W_G W_H \rho_{GH}}$$

$$= \sqrt{3.77^2 \cdot 0.4^2 + 7.08^2 \cdot 0.6^2} + 2 \times 3.77 \times 0.4 \times 7.08 \times 0.6 \times 0.974$$

$$= \sqrt{32.80} = 5.73\%$$

Return = 40% of Return on G + 60% of Return on H =  $0.40 \times 17\% + 0.60 \times 21\% = 19.40\%$

### Question 28

A Portfolio Manager (PM) has the following four stocks in his portfolio:

Security	No. of shares	Market price per share (Rs.)	$\beta$
Varun Shipping Ltd. (VSL)	10,000	50	0.9
Chowgle Steamship Ltd. (CSL)	5,000	20	1.0
Mercatorlines Ltd. (ML)	8,000	25	1.5
Aurbindo Pharma Ltd. (APL)	2,000	200	1.2

Compute the following :

- Portfolio beta.
- If the PM seeks to reduce the beta to 0.8, how much risk free investment should he bring in?
- If the PM seeks to increase the beta to 1.2, how much risk free investment should he bring in?

### Answer

Security	No. of shares	Market price per share (Rs.)	Value of portfolio	Proportion (W)	$\beta$	Portfolio beta ( $\beta_{ix}$ )
Varun Shipping Ltd. (VSL)	10,000	50	5,00,000	$5/12 = 0.4167$	0.9	0.3750
Chowgle Steamship Ltd. (CSL)	5,000	20	1,00,000	$1/12 = 0.0833$	1.0	0.0833
Mercatorlines Ltd. (ML)	8,000	25	2,00,000	$2/12 = 0.1667$	1.5	0.2501

Aurbindo Pharma Ltd. (APL)	2,000	200	4,00,000	4/12 = 0.3333	1.2	0.400
			12,00,000			1.1084

(i) Portfolio Beta = 1.1084

The Present  $\beta$  of the Portfolio is 1.1084.

(ii) If  $\beta$  is 0.8, Portfolio Beta (assuming only two securities) – Risky and Risk Free Securities

$$= \beta \text{ of Risky Portfolio} \times W_1 + \beta \text{ of risk free securities} \times W_2$$

$$0.8 = 1.1084 \times W_1 + 0 \times (1 - W_1)$$

$$0.8 = 1.1084 W_1$$

$$W_1 = 0.8/1.1084$$

$$W_1 = 72.18\%$$

$$W_2 = (1 - W_1)$$

$$= (1 - 0.7218)$$

$$= 27.82\%$$

The portfolio manager should have (Rs.12,00,000 x 27.82%) = Rs.3,33,840 in the risk free security and (Rs.12,00,000 x 72.18%) = Rs.8,66,160 in the risky securities

(iii) If  $\beta$  is 1.2, Portfolio Beta (assuming only two securities) - Risky and Risk Free Securities

$$= \beta \text{ of Risky Portfolio} \times W_1 + \beta \text{ of risk free securities} \times W_2$$

$$1.2 = 1.1084 \times W_1 + 0 \times (1 - W_1)$$

$$1.2 = 1.1084 \times W_1$$

$$W_1 = 1.2/1.1084$$

$$= 1.0826$$

$$W_2 = (1 - W_1)$$

$$= (1 - 1.0826)$$

$$= -0.0826 = -8.26\%$$

The portfolio manager should borrow (Rs.12,00,000 x 8.26%) = Rs.99,120 at risk free rate and invest total funds. Rs.12,99,120 in the four aforementioned securities in the proportion, 0.4167, 0.0833, 0.1667 and 0.3333 respectively.

### Question 29

The rates of return on the Security of Company A and Market portfolio for 10 periods are given below:

Period	Return of Security A (%)	Return on Market portfolio (%)
1	18	22
2	20	20
3	24	18
4	26	16
5	18	20
6	-5	8
7	17	-6
8	19	5
9	-7	6
10	20	11

- What is the beta of Security A?
- What is the characteristic line for security A?

### Answer

#### 1. Computation of Beta of Security

Period	Return of		Deviation from Mean		Variance of		Covariance of
	Mkt. ( $R_M$ )	A ( $R_A$ )	Mkt. ( $R_M - \bar{R}_m$ )	A ( $R_A - \bar{R}_a$ )	Mkt. ( $R_M - \bar{R}_m$ ) <sup>2</sup>	A ( $R_A - \bar{R}_a$ ) <sup>2</sup>	RM & RA [DM × DA]
(1)	(2)	(3)	(4) [(2)-12]	(5) [(3)-15]	(6) (4) <sup>2</sup>	(7) (5) <sup>2</sup>	(8) (4) × (5)
1	22	18	10	3	100	9	30
2	20	20	8	5	64	25	40
3	18	24	6	9	36	81	54

4	16	26	4	11	16	121	44
5	20	18	8	3	64	9	24
6	8	-5	-4	-20	16	400	80
7	-6	17	-18	2	324	4	-36
8	5	19	-7	4	49	16	-28
9	6	-7	-6	-22	36	484	132
10	11	20	-1	5	1	25	-5
	<b>120</b>	<b>150</b>			<b>706</b>	<b>1174</b>	<b>335</b>

	<i>Market</i>	<i>Security A</i>
Mean	120/10=12	150/10=15
Variance	706/10=70.6	1174/10=117.4
Standard Deviation	= $\sqrt{70.6}$ =8.40	= $\sqrt{117.4}$ =10.84

### Covariance and co-relation

COV <sub>MA</sub>	$\sum D_M \times D_A \div n$ 335/10=-3.35
Beta Q	$COV_{MQ} \div \sigma_M^2$ = 33.5/70.6=.4745

## 2. Computation of Characteristic Line for Security A

<i>Particulars</i>	<i>Value</i>
y= R <sub>A</sub> ( Expected Return on Share)	15
β	0.4745
x = R <sub>M</sub> (Expected Return on Market Index)	12

Characteristic Line for Security A,  $y = x \beta + \alpha$ ,

$$15 = \alpha + 0.4745 \times 12$$

$$\alpha = 15 - (0.4745 \times 12) = 9.306\%$$

Characteristic line for Security A = 9.306 + 0.4745 RM

*Note:*

It is assumed that rates of return for market portfolio and the security given in the question are returns in excess of risk free rate of return.

### Question 30

From the following information pertaining to returns of Security D and the Market for the past 4 Years, ascertain the value of Beta ( $\beta$ ) of Security D —

Year	1	2	3	4
Security D	14%	15%	18%	22%
Market	9%	12%	15%	18%

### Answer

$$\text{Beta } \beta = \frac{\sum R_M R_D}{n R_M R_D} \div \frac{\sum R_M^2}{n R_M^2}$$

Market Return ( $R_M$ )	Return of Security D ( $R_D$ )	Product ( $R_M \times R_D$ )	$R_M^2$
9	14	9 x 14 = 126	81
12	15	12 x 15 = 180	144
15	18	15 x 18 = 270	225
18	22	18 x 22 = 396	324
<b>54</b>	<b>69</b>	<b>972</b>	<b>774</b>

$n = 4$  (No. of pairs considered for Beta, generally the no. of years)

= 972 (Aggregate of Product)

$\sum R_M^2 = 774$  (Aggregate of Return Square)

$M_R = 13.5$  (Mean of Market Return = Aggregate of Market Returns 54 / No. of Years 4)

$D_R = 17.25$  (Mean of Security A Return = Aggregate of Security D Returns 69 / No. of Years 4)

Therefore  $\beta = [972 - (4 \times 13.5 \times 17.25)] / [774 - (4 \times 13.5^2)]$

=  $[972 - 931.5] / [774 - 729] = 40.5 / 45 = 0.90$

### Question 31

An investor is seeking the price to pay for a security, whose standard deviation is 5.00%. The correlation coefficient for the security with the market is 0.80 and the market standard deviation is 4.40%. The return from Government securities is 5.20% and from the market portfolio is 9.80%.

The investor knows that, by calculating the required return, he can then determine the price to pay for the security. What is the required return on security?

### Answer

#### 1. Computation of Beta Co-efficient

$$\text{Beta, } \beta = \rho_{SM} \times S \sigma / M \sigma$$

Where,  $\rho_{SM}$  = Correlation co-efficient between Security (S) and the Market (M).

$S \sigma$  = Standard Deviation of the Security Return

$M \sigma$  = Standard Deviation of the Market Return

$$\beta = 0.80 \times (5.00/4.40) = 0.909$$

#### 2. Computation of Required Rate of Return (Based on CAPM)

$$\text{Expected Return} = RF + \beta \text{ of Security X (RM - RF)}$$

RF = Risk Free Return = 5.20%

$\beta$  = Beta of Security = 0.909

RM = Return on Market Portfolio = 9.80%

$$\text{Expected Return} = 5.20\% + 0.909 \times (9.80\% - 5.20\%) = 9.38\%$$

### Question 32

(a) Calculate the market sensitivity index, and the expected return on the Portfolio from the following data;

Standard deviation of an asset	4.5%
Market standard deviation	4.0%
Risk - free rate of return	15.0%
Expected return on market Portfolio	17.0%
Correlation coefficient of Portfolio with market	0.89

(b) What will be the expected return on the Portfolio? If Portfolio beta is 0.5 and the risk free return is 10%.

**Answer**

**(1) Basic Data for computation of Expected Return**

<i>Notation</i>	<i>Particulars</i>	<i>Case (a)</i>	<i>Case(b)</i>
$\sigma_P$	Standard Deviation of asset	4.5%	4.5%
$\sigma_M$	Market Standard Deviation	4.0%	4.0%
$\rho_{MP}$	Correlation co-efficient of portfolio with market	0.89	0.89
$R_F$	Risk free rate of return	15%	10%
$R_M$	Expected return on market Portfolio	17%	17%
$\beta_P$	Portfolio Beta	To be ascertained	0.5

**(2) Computation of Expected Return**

	<i>Case (a)</i>	<i>Case (b)</i>
Portfolio Beta $\beta_P = \sigma_P \div \sigma_M \times \rho_{MP}$	$4.5 \div 4 \times 0.89 = 1.001$	0.5
Expected Return = $R_F + \beta_P \times (R_M - R_F)$	$0.15 + [1.001 \times (0.17 - 0.15)] = 17.002\%$	$0.10 + [0.5 \times (0.17 - 0.10)] = 13.5\%$

**Question 33**

*The Beta Co-efficient of Rex Ltd is 1.40. The Company has been maintaining 8% rate of growth in dividends and earnings. The last dividend paid was Rs.4 per share. Return on Government Securities is 12%. Return on Market Portfolio is 18%. The Current Market Price of one share of Rex Ltd is Rs.32.00.*

*Required —*

- 1. What will be the equilibrium price per share of Rex Ltd ?*
- 2. Would you advise purchasing the share ?*

## Answer

### 1. Required Rate of Return on Shares of Rex Ltd

(Based on Capital Asset Pricing Model)

$$\text{Expected Return} = R_f + \beta \text{ of Security X } (R_m - R_f)$$

$$R_f = \text{Risk Free Return} = 12\%$$

$$\beta = \text{Beta of Security (Target Ltd)} = 1.40$$

$$R_m = \text{Return on Market Portfolio} = 18\%$$

$$\text{Expected Return} = 12\% + 1.40 \times (18\% - 12\%) = 20.4\%$$

### 2. Expected Market Price of Shares of Rex Ltd

(Based on Dividend Growth Model)

$$\text{Expected Return} = G + P/D_0 (1+GR)$$

$$D_1 = \text{Dividend at end of Year 1} = \text{Last Years Dividend} \times (1 + \text{Growth Rate})$$

$$= \text{Rs.4} \times (1 + 8\%) = \text{Rs.4} \times 1.08 = \text{Rs.4.32}$$

$$P_0 = \text{Price at Year Beginning} = \textbf{To be determined (Expected Price)}$$

$$G = \text{Growth Rate in Dividends}$$

$$20.4 = (\text{Rs.4.32} \div \text{Expected Price}) + \text{Growth rate of } 8\%$$

$$\text{Or, } 20.4\% - 8\% = \text{Rs.4.32} \div \text{Expected Price}$$

$$\text{Or, Expected Price} = \text{Rs.4.32} \div 12.4 = \text{Rs.34.83}$$

### 3. Evaluation of Shares of Rex Ltd

Actual Market Price Rs.32.00

Expected Market Price Rs.34.83

Inference Shares of Rex Ltd. is underpriced.

Decision : Share of Rex Ltd. should be purchased.

### Question 34

An investor holds two stocks X and Y. An analyst prepared ex-ante probability distribution for the possible Economic scenarios and the conditional returns for the two stocks and the market index as shown below:

Economic Scenario	Probability	Conditional Returns %		
		X	Y	Market
Growth	0.40	25	20	18
Stagnation	0.30	10	15	13
Recession	0.30	-5	-8	-3

The risk free rate during the next year is expected to be around 9%. Determine whether the investor should liquidate his holdings in stocks X and Y or on the contrary make fresh investments in them. CAPM assumptions are holding true.

**Answer**

**1. Computation of Expected Returns**

Scenario	Prob. $P$	Return X $R_X$	Mean $P \times R_X$	Return Y $R_Y$	Mean $P \times R_Y$	Market Return $R_M$	Mean $P \times R_M$
<b>Growth</b>	0.4	25	10	20	8.0	18	7.2
<b>Stagnation</b>	0.3	10	3	15	4.5	13	3.9
<b>Recession</b>	0.3	-5	-1.5	-8	-2.4	-3	-0.9
<b>Estimated Returns</b>			<b>11.5</b>		<b>10.1</b>		<b>10.2</b>

**2. Computation of Standard Deviation of RM**

$R_M$	$DM=R_M - 10.2$	$D_m^2$	$P$	$P \times D_m$
18	7.8	60.84	0.4	24.34
13	2.8	7.84	0.3	2.35
-3	-13.2	174.24	0.3	52.27
<b>Market Variance</b>				<b>78.96</b>

Standard Deviation of the Market =  $\sqrt{78.96} = 8.89\%$

**3. Computation of Standard Deviation and Covariance of RX**

$R_X$	$D_X = R_X - 11.5$	$D_X^2$	$P$	$P D_X^2$	$D_X \times D_M$	$P D_X \times D_M$
25	13.5	182.25	0.4	72.900	105.3	42.12
10	-1.5	2.25	0.3	0.675	-4.2	-1.26
-5	-16.5	272.25	0.3	8.675	217.8	65.34
				<b>155.25</b>		<b>106.20</b>

Standard Deviation of Security =  $\sqrt{155.25} = 12.46\%$

Covariance with the market = 106.20

#### 4. Computation of Standard Deviation and Covariance of RY

$R_Y$	$D_Y = R_Y - 10.1$	$D_Y^2$	$P$	$PD_Y^2$	$D_Y X D_M$	$P D_Y X D_M$
20	9.9	98.01	0.4	39.204	77.22	30.89
15	4.9	24.01	0.3	7.203	13.72	4.12
-8	-18.1	327.61	0.3	98.283	238.92	71.68
				<b>144.69</b>		<b>106.69</b>

Standard Deviation of Security Y =  $\sqrt{144.69} = 12.03\%$

Covariance with the market = 106.69

#### 5. Computation of CAPM Return

##### A. Beta = Covariance / Variance of the Market

1. Beta of Security X =  $106.20 / 78.96 = 1.34$

2. Beta of Security Y =  $106.68 / 78.96 = 1.35$

##### B. Under CAPM, Equilibrium Return = $R_f + \beta (R_m - R_f)$

Expected Return of Security X =  $9\% + 1.34 (10.2 - 9) = 10.61\%$

Expected Return of Security Y =  $9\% + 1.35 (10.2 - 9) = 10.62\%$

#### 6. Conclusion and Recommendation

<i>Particulars</i>	<i>Security X</i>	<i>Security Y</i>
Estimated Returns	11.50	10.10
Expected Return under CAPM	10.61	10.62
Estimated Return vs. Expected Returns	Expected Return is Lower. Stock X is underpriced.	Expected Return is Higher. Stock Y is underpriced.
<b>Recommendation</b>	<b>Buy / Hold</b>	<b>Sell</b>

#### Question 35

Portfolio B, a fully diversified portfolio, has a standard deviation of 6%. The NIFTY has yields a return of 16.5%, with a standard deviation of 4%. Ascertain the expected return of Portfolio B under the following three cases —

a. 5.80% Rs.100 Central Government guaranteed RBI Bonds is traded at Rs.116;

- b. Market's Attitude towards risk is 3.5;  
 c. Risk Free Return is 8%.

**Answer**

**Expected Return on Portfolio**

Particulars	Case 1	Case 2	Case 3
Risk Free Return [R <sub>F</sub> ]	5% [Note 1]	2.5% [Note 2]	8% [Given]
Market's Attitude towards Risk ( $\lambda$ ) = $(R_M - R_F) \div \sigma_M$	2.875 [16.50% - 5%]/4%	3.5 [Given]	2.125 [16.50% - 8%]/4%
Expected Return [R <sub>P</sub> ] = R <sub>F</sub> + $\lambda \times \sigma_P$	<b>22.25%</b> [5% + (2.875 x 6%)]	<b>23.50%</b> [2.5% + (3.5 x 6%)]	<b>20.75%</b> [8% + (2.125 x 6%)]

Note:

**1. Risk Free Return [Case 1]:**

- (a) Return on RBI Bonds = 5.80% on Face Value of Rs.100 Rs.5.80  
 (b) Ruling Market Price of the Bond Rs.116  
 (c) Rate of Return on Market Price (Rs.5.80/ Rs.116) 5%

**2. Risk Free Return [Case 2]:**

$$\text{Market's Attitude towards Risk } (\lambda) = (R_M - R_F) \div \sigma_M = 3.5$$

$$(R_M - R_F) = \lambda \times \sigma_M$$

$$R_F = R_M - \lambda \times \sigma_M$$

$$\text{Therefore, } R_F = 16.50\% - (3.5 \times 4\%) = 16.50\% - 14\% = 2.50\%$$

**Question 36**

Stock P has a Beta of 1.50 and a market expectation of 15% return. For Stock Q, it is 0.80 and 12.5% respectively. If the risk free rate is 6% and the market risk premium is 7%, evaluate whether these two stocks are priced correctly? If these two stocks to be regarded as correctly priced, what should the risk free rate and market risk premium be?

**Answer**

**1. Expected Return [E(R)] under CAPM**

$$\text{Expected Return of Stock X [E(R}_x\text{)]} = R_F + \beta_X \times [E(R_M) - R_F]$$

$$\text{Risk Free Return [R}_F\text{]} = 6\%$$

$$\begin{aligned}
 \text{Risk Premium } [E(R_M) - R_F] &= 7\% \\
 \text{Beta of Stock P } [\beta_P] &= 1.50 \\
 \text{Beta of Stock Q } [\beta_Q] &= 0.80 \\
 \text{Stock P } [E(R_P)] &= R_F + \beta_P \times [E(R_M) - R_F] \\
 &= 6\% + 1.50 \times 7\% \\
 &= 6\% + 10.50\% = 16.50\% \\
 \text{Stock Q } [E(R_Q)] &= R_F + \beta_Q \times [E(R_M) - R_F] \\
 &= 6\% + 0.80 \times 7\% \\
 &= 6\% + 5.60\% = 11.30\%
 \end{aligned}$$

### Evaluation of Market Price

<i>Particulars</i>	<i>Stock P</i>	<i>Stock Q</i>
Expected Return (Market) <b>[A]</b>	15.00%	12.50%
Expected Return under CAPM <b>[B]</b>	16.50%	11.30%
Market Expectations [A] vs. CAPM Return [B]	[B] is Higher	[B] is Lower
Inference	Stock P gives lesser return than what it should give	Stock Q gives higher return than what it should give
<b>Conclusion</b>	Stock P is <b>Overvalued</b>	Stock P is <b>Undervalued</b>

\*\*\*

# 10

## Derivatives and Commodity Exchanges - An Overview

### Question 1

*Write a short note on Derivatives. What are different types of Derivative markets and Derivative Risks ?*

### Answer

A derivative is a financial instrument which derives their value from their underlying assets or securities..

The Underlying Securities for Derivatives are:

- Commodities (Castor seed, Grain, Coffee beans, Gur, Pepper, Potatoes)
- Precious Metals (Gold, Silver)
- Short-Term Debt Securities (Treasury Bills)
- Interest Rates
- Common Shares/Stock
- Stock Index Value (NSE Nifty)

**Uses & Purpose :** Derivative serve as a method to hedge and reduce risks.

	<i>Users</i>	<i>Purposes</i>
i)	Corporation	To hedge currency risk and inventory risk.
ii)	Individual Investors	For speculation, hedging and yield enhancement.
iii)	Institutional Investor	For hedging asset allocation, yield enhancement and to avail arbitrage opportunities.
iv)	Dealers	For hedging position taking, exploiting inefficiencies and earning dealer spreads.

**Example:** The most important derivatives are Futures, Options, Forward, Swaps.

### Types of Derivative Market

(a) Exchange Traded Derivatives (b) OTC (Over the Counter) Derivatives

- (a) **Exchange-traded derivatives** : Derivatives which trade on an exchange are called 'Exchange-traded derivatives'. Trades on an exchange generally take place with anonymity. Trades at an exchange generally go through the clearing corporation.

**Example** : Interest rate futures, Interest rate options, Currency futures, Currency options.

- (b) **Over The Counter (OTC) derivatives** : A derivative contract which is privately negotiated is called an OTC derivative. OTC trades have no anonymity, and they generally do not go through a clearing corporation.

**Example** : Interest rate swaps, Currency swaps, Caps, collars, floors, forward.

**Types of Derivative Risks:** The different types of derivatives risks are:

- (a) Credit risk : Credit risk in derivative products comes in two forms
  - (i) Pre-Settlement Risk
  - (ii) Settlement risk
- (b) Market risk
- (c) Liquidity risk
  - (i) Market liquidity risk
  - (ii) Funding liquidity risk
- (d) Operational risk
- (e) Legal risk
- (f) Regulatory risk
- (g) Reputation risk

## Question 2

*Discuss the various participants in the Derivatives market.*

## Answer

Participants in the Derivatives market are:

1. **Hedgers** use futures or options markets to reduce or eliminate the risk associated with price of an asset.
2. **Speculators** use futures and options contracts to get extra leverage in betting on future movements in the price of an asset. They can increase both the potential gains and potential losses by usage of derivatives in a speculative venture.
3. **Arbitrageurs** are in business to take advantage of a discrepancy between prices in two different markets. If, for example, they see the futures price of an asset getting out of line with the cash price, they will take offsetting positions in the two markets to lock in a profit.

### Question 3

*What are the major advantages & disadvantages of Futures Trading as compared to Stock Trading?*

#### Answer

**The Major Advantages of Futures Trading Vs. Stock Trading:** Compared to directly trading stocks, stock futures provide several major advantages:

- (i) **Leverage:** Compared to buying stock on margin, investing in futures is less costly. An investor can use leverage to control more stock with a smaller cash outlay.
- (ii) **Ease of Shorting:** Taking a short position in futures is simpler, less costly and may be executed at any time - there is no requirement for an uptick.
- (iii) **Flexibility:** Future investors can use the instruments to speculate, hedge, spread or for use in a large array of sophisticated strategies.

Stock Futures also have disadvantages. These include:

- (i) **Risk:** In a stock future contract, there is the risk of losing significantly more than the initial investment (margin deposit).
- (ii) **No Stockholder Privileges:** The future owner has no voting rights and no rights to dividends.
- (iii) **Required Vigilance:** Stock Futures are investments that require investors to monitor their positions more closely than many would like to do. Because future accounts are marked to the market every business day, there is the possibility that the brokerage firm might issue a margin call, requiring the investor to decide whether to quickly deposit additional funds or liquidate the position.

### Question 4

*What are the reasons for stock index futures becoming more popular financial derivatives over stock futures segment in India?*

#### Answer

Trading in stock index futures contracts was introduced by the Kansas City Board of Trade on February 24, 1982. In April 1982, the Chicago Mercantile Exchange (CME) began trading in futures contract based on the Standard and Poor's Index of 500 common stocks. The introduction of both contracts was successful, especially the S&P 500 futures contract, adopted by most institutional investors. In India, both the NSE and the BSE have introduced index futures in the S&P CNX Nifty and the BSE Sensex.

#### Uses of Stock Index Futures

Investors can use stock index futures to perform myriad tasks. Some common uses are:

- (i) To speculate on changes in specific markets;
- (ii) To change the weightings of portfolios;

- (iii) To separate market timing from market selection decisions; and
- (iv) To take part in index arbitrage, whereby the investors seek to gain profits whenever a futures contract is trading out of line with the fair price of the securities underlying it.
- (v) Using Indexes to Hedge Portfolio Risk: Aside from the above uses of indexes, investors often use stock index futures to hedge the value of their portfolios.

**Main reasons to trade stock index futures are:**

Stock index futures are most popular financial derivatives over stock futures due to following reasons:

1. It adds flexibility to one's investment portfolio. The stock systems do not provide this flexibility and hedging.
2. It creates the possibility of speculative gains using leverage. Speculative gains in stock futures are limited but liabilities are greater.
3. Stock index futures are the most cost efficient hedging device whereas hedging through individual stock futures is costlier.
4. Stock index futures cannot be easily manipulated whereas individual stock price can be exploited more easily.
5. Since, stock index futures consists of many securities, so being an average stock, is much less volatile than individual stock price.

Further, it implies much lower capital adequacy and margin requirements in comparison of individual stock futures.

Risk diversification is possible under stock index future than in stock futures.

6. One can sell contracts as readily as one buys them and the amount of margin required is the same.
7. In case of individual stocks the outstanding positions are settled normally against physical delivery of shares. In case of stock index futures they are settled in cash all over the world on the premise that index value is safely accepted as the settlement price.
8. It is also seen that regulatory complexity is much less in the case of stock index futures in comparison to stock futures.
9. It provides hedging or insurance protection for a stock portfolio in a falling market.

**Question 5**

*Differentiate between spot contract and forward contract.*

**Answer**

**Differences between spot contract and forward contract**

- In a spot contract, at least one component, i.e. either the price or the goods/ services is tendered at the time of the contract. In a forward contract, both the components are exchanged at a specified future date.

- In a spot contract, both the parties transact on the basis of their present capability. The buyer purchases according to his ability to pay for the goods or services and the seller sells according to his present ability to deliver the goods or services. In a forward contract, a leveraging of capabilities is involved. Since no down payment is involved, the buyer might contract to buy a larger number of goods or services, expecting to derive some benefits from the perceived price differential between the spot price and the likely price at the time of maturity of the forward contract. Also the seller, feeling that a larger number of goods shall be available at the contracted price at the time of maturity, agrees to sell a far larger number of goods.
- In a spot contract, execution of the contract is more or less certain because both the components, i.e. money and goods are available. Even through the transaction does not pass through a regulated delivery and payment mechanism yet the chances of default are very less. The problems of payment and delivery get magnified in the case of a forward contract.

### **Question 6**

*Write a short note on Commodity Derivatives?*

*Or*

*Write a short note on total set of customer needs concerning commodity derivatives?*

### **Answer**

Trading in derivatives first started to protect farmers from the risk of the value of their crop going below the cost price of their produce. Derivative contracts were offered on various agricultural products like cotton, rice, coffee, wheat, pepper and so on.

### **Necessary Conditions to Introduce Commodity Derivatives**

The following attributes are considered crucial for qualifying for the derivatives trade:

1. A commodity should be durable and it should be possible to store it;
2. Units must be homogeneous;
3. The commodity must be subject to frequent price fluctuations with wide amplitude; supply and demand must be large;
4. Supply must flow naturally to market.

### **Total set of customer needs concerning commodity derivatives**

The total set of customer needs concerning commodity derivatives is differentiated into instrumental needs and convenience needs.

Instrumental needs are the hedgers' needs for price risk reduction.

Not only do hedgers wish to reduce price risk, they also desire flexibility in doing business, easy access to the market, and an efficient clearing system. These needs are called convenience needs.

**Some of the advantages of commodity markets are:**

- (i) Most money managers prefer derivatives to tangible commodities;
- (ii) Less hassle (delivery, etc);
- (iii) Allows indirect investment in real assets that could provide an additional hedge against inflation risk.

**Special characteristics of Commodity derivatives trading are:**

- (i) To complement investment in companies that use commodities;
- (ii) To invest in a country's consumption and production;
- (iii) No dividends, only returns from price increases

Four popular national commodity exchanges of India are: National Multi-Commodity Exchange of India (NMCE), National Board of Trade (NBOT), National Commodity and Derivatives Exchange (NCDEX) and Multi Commodity Exchange (MCX).

National Commodity and Derivatives Exchange (NCDEX) is the largest commodity derivatives exchange with a turnover of around Rs 3,000 crore (Rs 30 billion) every fortnight.

**Question 7**

*Write a short note on Commodity Futures.*

**Answer**

Commodities futures, or futures contracts, are an agreement to buy or sell a commodity at a specific date in the future at a specific price.

The prices of commodities can change on a weekly or even daily basis. If the price goes up, the buyer of the futures contract makes money, because he gets the product at the lower, agreed-upon price and can now sell it at the higher, market price. If the price goes down, the seller makes money, because he can buy the commodity at the lower market price, and sell it to the buyer at the higher, agreed-upon price.

**Advantages of Commodity Futures**

1. Easiest and cheapest way to invest in commodities
2. Can either buy (go long) or sell (go short)
3. Can trade with a small amount of capital
4. Volatility offers potential for quick profits

**Disadvantage of Commodity Futures**

1. Principal/Initial Investment is not guaranteed
2. High risk due to use of leverage
3. High price volatility could lead to margin calls

## Major Categories of Commodity Futures are

1. Agricultural products (soft commodities) –fibers, grains, food, livestock
2. Energy – crude oil, heating oil, natural gas
3. Metals – copper, aluminum, gold, silver, platinum

### Question 8

*Write a short note on Commodities market.*

#### Answer

#### Commodities market

A commodity may be defined as an article, a product or material that is bought and sold. It can be classified as every kind of movable property, except Actionable Claims, Money & Securities.

A commodity market is a market that trades in primary rather than manufactured products. Trading is done in agricultural products such as wheat, coffee, cocoa, sugar etc. and in mined commodity, such as gold, rubber, oil etc. Commodity markets can include physical trading and derivatives trading using spot prices, forwards, futures, and options on futures. Farmers have used a simple form of derivative trading in the commodity market for centuries for price risk management

Commodities offer immense potential to become a separate asset class for market-savvy investors, arbitrageurs and speculators. Retail investors, who understand the equity markets, find commodities an unfathomable market. Commodities are easy to understand as far as fundamentals of demand and supply are concerned.

Historically, pricing in commodities futures has been less volatile compared with equity and bonds, thus providing an efficient portfolio diversification option.

Commodity market is an important constituent of the financial markets of any country. It is important to develop a vibrant, active and liquid commodity market. This would help investors hedge their commodity risk, take speculative positions in commodities and exploit arbitrage opportunities in the market

### Question 9

*What is the difference between Cash market and the Derivative Market?*

#### Answer

The basic differences between Cash and the Derivative market are as follows :

- (a) In cash market tangible assets are traded whereas in derivative markets contracts based on tangible or intangibles assets likes index or rates are traded.
- (b) In cash market, we can purchase even one share whereas in Futures and Options minimum lots are fixed.
- (c) Cash market is more risky than Futures and Options segment because in “Futures and Options” risk is often limited.

- (d) Cash assets may be meant for consumption or investment. Derivative contracts are for hedging, arbitrage or speculation.
- (e) The value of derivative contract is always based on and linked to the underlying security. Though this linkage may not be on point-to-point basis.
- (f) In the cash market, a customer must open securities trading account with a securities depository whereas to trade futures a customer must open a future trading account with a derivative broker.
- (g) Buying securities in cash market involves putting up all the money upfront whereas buying futures simply involves putting up the margin money.
- (h) With the purchase of shares of the company in cash market, the holder becomes part owner of the company. While in future it does not happen.

### **Question 10**

*Write a short note on different kinds of Swaps.*

### **Answer**

A swap can be defined as the exchange of one stream of future cash flows with another stream of cash flows with different characteristics. A swap is an agreement between two or more people/parties to exchange sets of cash flows over a period in future. Swaps can be divided into two types:

- (1) Interest Rate Swaps,
- (2) Currency Swaps

### **Interest Rate Swaps**

*Meaning* : An Interest Rate Swap is a transaction involving an exchange of one stream of interest obligations for another. In an interest rate swap, no exchange of principal takes place but interest payments are made on the notional principal amount.

Interest payments can be exchanged between two parties to achieve changes in the calculation of interest on the principal, for example : (a) Floating to fixed; (b) Fixed to floating; (c) LIBOR to prime - based; (d) Prime to LIBOR.

*Major Players* : The major players in the swap markets are banks (or other intermediaries on the one side) and medium and large size corporate on the other. Individual borrowers generally do not perform swap.

### **Features of Interest Rate Swap**

- (a) It is treated as an off - the balance sheet transaction.
- (b) It is structured as a separate contract distinct from the underlying loan agreement.
- (c) There is no exchange of principal repayment obligations.
- (d) It effectively translates a floating rate borrowing into a fixed rate borrowing and vice versa.
- (e) The motivation of interest rate swap is to save interest cost.

## **Types of Interest Rate Swaps**

- (a) *Liability Swap* : Where there is an exchange of interest obligation i.e., interest is to be paid, the swap is liability swap.
- (b) *Asset Swap* : Where there is an exchange of interest receipts i.e., interest is to be received, the swap is asset swap.

*Purpose* : Interest Rate Swap is intended to hedge against the interest rate fluctuations to some extent through careful planning with the help of swap dealer .

## **Provision of Interest Rate Swaps**

Some of the provisions of IRS are as follows :

1. The notional principal value upon which the interest rate is to be applied.
2. The fixed interest rate to be exchanged for another rate.
3. Formula type of index used to determine the floating rate.
4. Frequency of payments, such as quarterly or every six months is also agreed.
5. Life time of the swap.

## **Currency Swaps**

These involve an exchange of liabilities between currencies.

*Stages* : A currency swap can consist of three stages:

- (a) A spot exchange of principal.
- (b) Continuing exchange of interest payments during the term of the swap.
- (c) Re-exchange of principal on maturity.

*Benefits* : A currency swap has the following benefits:

- (a) Treasurers can hedge currency risk.
- (b) It can provide considerable cost savings. So a strong borrower in the Deutschmark market may get a better US dollar rate by raising funds in the Deutschmark market and swapping them for US dollars.
- (c) The swap market permits funds to be accessed in currencies, which may otherwise command a high premium.
- (d) It offers diversification of borrowings.
- (e) Cost cutting is the major motivation behind currency swap.
- (f) It enables access to a sector of international capital market otherwise not available.

In a currency swap the principal sum is usually exchanged:

- At the start;
- At the end;
- At a combination of both; or neither.

## Question 11

*What is the difference between Futures and Forward Contracts?*

### Answer

Distinction between forward and futures contracts are as follows:

1. *Organised exchanges/Trading* : Forward contracts are traded in over the counter market. Futures contracts are traded on organised exchanges with a designated physical location for example: National Stock Exchange (NSE), Bombay Stock Exchange (BSE).
2. *Transaction costs* : Cost of forward contracts is based on bid-ask spread. Futures contracts entail brokerage fees for buy and sell orders.
3. *Marking to Market* : Forward contracts are not subject to marking to market. Futures contracts are subject to marking to market in which the loss or profit is debited or credited in the margin account on daily basis due to change in price.
4. *Margins* : Margins are not required in forward contract. In futures contracts every participant is subject to maintain margin as decided by the exchange authorities.
5. *Liquidity* : Forward contracts are exposed to the problem of liquidity whereas in futures there is no liquidity problem as they are traded in stock exchange.
6. *Disclosure* : In forward contracts, price is not publicly disclosed whereas in future contracts price is transparent.

## Question 12

*Differentiate between Futures and Options.*

### Answer

#### Difference between Futures and Options

<i>Futures</i>	<i>Options</i>
Both the parties are obliged to perform the contract.	Only the seller (writer) is obligated to perform the contract.
No premium is paid by either party.	The buyer pays the seller (writer) a premium.
The holder of the contract is exposed to the entire spectrum of downside risk and has potential for all the upside return,	The buyer's loss is restricted to downside risk to the premium paid, but retains upward indefinite potentials.
The parties of the contract must perform at the settlement date. They are not obligated to perform before the date.	The buyer can exercise his option any time prior to the expiry date.

### Question 13

*Write a short note on Arbitrage.*

#### Answer

*Meaning* : Arbitrage by definition is a financial transaction that makes an immediate profit without involving any risk.

Arbitrage is a strategy to take advantage of price differential of a product in different markets. An arbitrageur makes money by buying an asset at low price in a market and selling it in any other market at a relatively higher price.

For instance, If one can buy an asset for Rs.5, sell it for Rs.20 and make a profit of Rs.15 that is arbitrage. The Rs.15 gain represents an arbitrage profit.

Arbitrage profits are the result of:

- (i) the difference in exchange rates at two different exchange centers,
- (ii) the difference due to interest yield which can be earned at different exchanges.

#### Types of Arbitrage

- (i) Geographical/Space Arbitrage
- (ii) Cross - Rate Arbitrage
- (iii) Time Arbitrage

### Question 14

*Explain the various types of risks to which the Swap Dealer is exposed to.*

#### Answer

In the process of swap, the role of swap dealer is significant in so far as it brings together two counter-parties whose interests are complementary to each other. For this role, it takes a small part of the interest payment flow. Since the principal amount is large, even a small percentage of the interest payment adds considerably to its profit. But, on the other hand, the swap dealer has to face a variety of risks. These different forms of risks are as follows:

- (a) Interest-rate Risk
- (b) Exchange-rate Risk
- (c) Credit Risk
- (d) Mismatch Risk
- (e) Sovereign Risk
- (f) Delivery Risk

## Question 15

*Write a short note on Forward Rate Agreements.*

### Answer

*Meaning* : In finance, a forward rate agreement (FRA) is a forward contract in which one party pays a fixed interest rate, and receives a floating interest rate and vice versa. In other words, it is an agreement to borrow or lend at a specified future date at an interest rate that is fixed today.

*How It Is Quoted* : FRAs are quoted in the format  $A \times B$ , with (A) representing the number of months until the loan is set to begin, and (B) representing the number of months until the loan ends. To find the length of the loan, subtract A from B.

Under an FRA

- The buyer (borrower) is the party seeking to protect itself against a rise in interest rates.
- The seller (lender) is the party seeking to protect itself against a fall in interest rates.

FRAs are commonly used to hedge against the risk of rising interest rates by a company with a borrowing. In general, FRA's are used by corporate for the following broad purposes:

- (i) To lock in the cost of borrowing on an existing floating-rate loan.
- (ii) To guarantee the rate of interest a company has to pay on future draw downs.
- (iii) To guarantee the interest rate earned on surplus funds for any period.

### Users of FRAs

1. FRAs are far more widely used than futures by corporates. Usually, this is because corporates, being less interest-rate sensitive on the whole than financial institutions, do not place such a high value on the facility futures offer of being in and out of the market in minutes. The forward rate agreement provides corporate treasurers with approximately the same hedging benefits of futures, but with none of the technical and administrative difficulties.
2. Banks are also heavy users of the FRA market. The most common use of FRAs by banks is to iron out mismatches in the short-term structure of their assets and liabilities.

## Question 16

*Write a short note on swaptions.*

### Answer

A swaption is an option granting its owner the right but not the obligation to enter into an underlying swap. Although options can be traded on a variety of swaps, the term "swaption" typically refers to options on interest rate swaps.

## Types of Swaption

**Contracts :** There are two types of swaption contracts:

- i) *Payer swaption* : It gives the owner of the swaption, the right to enter into a swap where they pay the fixed leg and receive the floating leg.
- ii) *Receiver swaption* : It gives the owner of the swaption, the right to enter into a swap where they will receive the fixed leg, and pay the floating leg.

**The buyer and seller of the swaption agree on:** the premium (price) of the swaption the strike rate (equal to the fixed rate of the underlying swap) length of the option period (which usually ends two business days prior to the start date of the underlying swap), the term of the underlying swap, notional amount, amortization, if any frequency of settlement of payments on the underlying swap

## Uses of swaptions

- (a) Swaptions can be used as an effective tool to swap into or out of fixed rate or floating rate interest obligations, according to a treasurer's expectation on interest rates. Swaptions can also be used for protection if a particular view on the future direction of interest rates turned out to be incorrect.
- (b) Swaptions can be applied in a variety of ways for both active traders as well as for corporate treasurers. Swap traders can use them for speculation purposes or to hedge a portion of their swap books. It is a valuable tool when a borrower has decided to do a swap but is not sure of the timing.
- (c) Swaptions have become useful tools for hedging embedded option which is common in the natural course of many businesses.
- (d) Swaptions are useful for borrowers targeting an acceptable borrowing rate. By paying an upfront premium, a holder of a payer's swaption can guarantee to pay a maximum fixed rate on a swap, thereby hedging his floating rate borrowings.
- (e) Swaptions are also useful to those businesses tendering for contracts. A business, would certainly find it useful to bid on a project with full knowledge of the borrowing rate should the contract be won.
- (f) Swaptions also provide protection on callable/puttable bond issues.
- (g) Swap also provide arbitrage opportunity. The more innovative borrowers can use this arbitrage opportunity to their advantage in order to bring down their funding cost.

## Question 17

*Write a short note on interest rate cap/floor*

### Answer

#### Interest Rate Cap

An interest rate cap is a derivative in which the buyer receives payments at the end of each period in which the interest rate exceeds the agreed strike price.

It is a type of European Call Option and for this buyer is required to pay premium.

In other words, a caplet is an interest rate call option that provides the purchaser an upper limit on interest rates.

The payoff (Gross Profit) of a cap is given by the following formula:

$$\text{(Actual Interest Rate - Strike or Floating Rate)} \times \text{(Days to maturity / 360)} \times \text{(Nominal Loan Amount)}$$

### Interest Rate Floor

An interest rate floor is a derivative in which buyer of the floor receives money if on the maturity, the interest rate is below the agreed strike price of the floor.

It is a type of European Put Option and for this buyer is required to pay premium.

A floor let is an interest rate put option that provides the purchaser an lower limit on interest rates

The payoff (Gross Profit ) of a Floor is given by the following formula:

$$\text{(Strike or Floating Rate - Actual Interest Rate)} \times \text{(Days to maturity / 360)} \times \text{(Nominal Loan Amount)}$$

## Practical Questions

### Question 18

*An Indian importer has to settle an import bill for \$1,30,000. The exporter has given the Indian exporter two options :*

- (i) Pay immediately without any interest charges.*
- (ii) Pay after three months with interest @ 5% per annum.*

*The importer's bank charges 15% per annum on overdrafts. The exchange rates in the market are as follows :*

*Spot rate (Rs./\$) : 48.35/48.36*

*3-Month forward rate (Rs./\$): 48.81/48.83*

*The importer seeks your advice. Give your advice.*

### Answer

Evaluation of two options offered by exporter for settlement of payment

*Option I : Pay immediately without any interest charges*

Bill value converted to Indian rupees (\$ 1,30,000 x Rs.48.36)	Rs. 62,86,800
Add : Overdraft interest @ 15% p.a. for 3 months (Rs. 62,86,800 *15%*3/12)	Rs. 2,35,755
Total	Rs. 65,22,555

Option II : Pay after 3 months with interest @ 5% p.a.

Bill value	\$ 1,30,000
Add : Interest @ 5% p.a. for 3 months	\$1,625
	\$1,31,625

Therefore amount to be paid in Indian Rupees after 3 months under forward purchase contract

$$= \$ 1,31,625 * Rs.48.83 = Rs. 64,27,249$$

Difference in outflows in Option I and Option II

$$= Rs. 65,22,555 - Rs. 64,27,249 = Rs. 95,306$$

**Advice:** it is advisable to settle bill payable after three months (i.e. choose option II) since rupee outflow is less by Rs. 95,306.

### Question 19

Mandeep is planning to invest Rs. 25,00,000 in Bank Deposits for one year. All the banks offer an interest rate of 12% p.a. for 12 month deposits. Mandeep has enquired deposit application forms of 4 banks, particulars of which are as follows —

- Bank A: Interest will be credited on half-yearly basis.
- Bank B: Interest will be credited on quarterly basis.
- Bank C: Interest will be credited on monthly basis.
- Bank D: Interest will be credited on weekly basis.

If Mandeep cares for every extra rupee, which Bank will be preferred? What should be the minimum rate Bank B should offer to attract Mandeep's deposit?

If Bank A agrees to credit interest at continuous compounding basis, what will be return for Mandeep?

### Answer

#### 1. Computation of Factors

Compounding at	Amount (A) at the end of the period
Annual Interval / Rests	$A = P \times (1 + r)^n$
Less than Annual Interval / Rests	$A = P \times (1 + r/m)^{n \times m}$

Where: A = Amount received at the end of the period (1 Year or 12 Months)

P = Amount be compounded i.e. amount invested at the beginning Rs. 25 Lakhs

r = Rate of Interest per annum (12% or 0.12)

n = Number of Years = 1 Year

m = Number of Compounding in a year = (2 or 4 or 12 or 52)

## 2. Computation of Amount Receivable by Mandeep

<i>Banks</i>	<i>Method of Compounding</i>	<i>No. of compounding in an Year (m)</i>	<i>Amount Received</i>
<b>A</b>	Half Yearly	2 Half Years	$A = P \times (1 + r/m)^{n \times m}$ $= \text{Rs.}25,00,000 \times (1 + 0.12/2)^2$ $= \text{Rs.}25,00,000 \times (1 + 0.06)^2$ $= \text{Rs.}25,00,000 \times (1.06)^2$ $= \text{Rs.}25,00,000 \times 1.1236$ $= \text{Rs.}28,09,000$
<b>B</b>	Quarterly	4 Quarters	$A = P \times (1 + r/m)^{n \times m}$ $= \text{Rs.}25,00,000 \times (1 + 0.12/4)^4$ $= \text{Rs.}25,00,000 \times (1 + 0.03)^4$ $= \text{Rs.}25,00,000 \times (1.03)^4$ $= \text{Rs.}25,00,000 \times 1.12551$ $= \text{Rs.}28,13,775$
<b>C</b>	Monthly	12 Months	$A = P \times (1 + r/m)^{n \times m}$ $= \text{Rs.}25,00,000 \times (1 + 0.12/12)^{12}$ $= \text{Rs.}25,00,000 \times (1 + 0.01)^{12}$ $= \text{Rs.}25,00,000 \times (1.01)^{12}$ $= \text{Rs.}25,00,000 \times 1.126825$ $= \text{Rs.}28,17,063$
<b>D</b>	Weekly	52 Weeks	$A = P \times (1 + r/m)^{n \times m}$ $= \text{Rs.}25,00,000 \times (1 + 0.12/52)^{52}$ $= \text{Rs.}25,00,000 \times (1 + 0.002307)^{52}$ $= \text{Rs.}25,00,000 \times (1.002307)^{52}$ $= \text{Rs.}25,00,000 \times 1.1273$ $= \text{Rs.}28,18,250$

### 3. Change in Interest Rate offered by Bank B

Minimum rate offered by Bank B should yield the maximum of the above four returns i.e. Rs.28,18,250.

If Minimum Rate is r, then

$$\begin{aligned}A &= P \times (1 + r/m)^{n \times m} \\28,18,250 &= 25,00,000 (1+r/4)^4 \\(1+r/4)^4 &= 22,54,600 \div 25,00,000 \\1+r/4 &= 4 1273 .1 \\1+r/4 &= 1.03041 \\r/4 &= 1.03041-1 \\r &= 0.03041 \times 4 \\&= 0.12164 \text{ or } 12.164\%\end{aligned}$$

Therefore, Bank B should offer deposits (on half yearly basis) at 12.164% to attract Mandeep's Deposit.

### 4. Continuous Compounding by Bank A

If Bank A offers continuous compounding facility, then amount received at the end of the year will be

$$A = P \times e^{rt}$$

$$\begin{aligned}\text{Where : } P &= \text{Amount invested at the beginning of the period} = \text{Rs.25,00,000} \\E &= \text{Exponential Value (i.e. } \approx 2.71828) \\R &= \text{Rate of Interest} = 12\% \text{ or } 0.12 \\t &= \text{No. of Years i.e. Period/Year} = 1 \text{ Year} \\A &= \text{Rs. } 25,00,000 \times e^{0.12 \times 1} \\&= \text{Rs. } 25,00,000 \times 1.127497 \\&= \text{Rs. } 28,18,743\end{aligned}$$

### Question 20

*Shares of Sun Pharma Ltd. are being quoted at Rs. 600. 3-Months Futures Contract Rate is Rs. 636 per share for a lot size of 500 shares. If the Sun Pharma Ltd is not expected to distribute any dividend in the interim, risk free rate of return is 9%, what is the recommended course of action for a trader in shares? If the 3-Months Futures Contract Rate is Rs. 600, what should be the action?*

**Answer**

**1. Computation of Theoretical Forward Rate [TFP]**

<i>Particulars</i>	<i>Value</i>
Spot Price [Sx]	Rs.600
Risk Free Interest Rate [r]	9% or 0.09
Period [t]	3 Months or 3/12 Yrs i.e. 0.25
Theoretical Forward Rate [TFP <sub>x</sub> ] = $Sx \times e^{rt} = Rs.600 \times e^{0.09 \times 0.25}$ = $Rs.600 \times e^{0.0225} = Rs.600 \times 1.02276$	Rs.613.656

**2. Evaluation and Suggested Course of Action**

<i>Particulars</i>	<i>Case A</i>	<i>Case B</i>
3-Months Futures Contract Rate [AFP <sub>x</sub> ]	Rs.636	Rs.600
TFP <sub>x</sub> Vs. AFP <sub>x</sub>	AFP <sub>x</sub> is Higher	AFP <sub>x</sub> is Lower
Valuation in Futures Market	Overvalued	Undervalued
Action	Buy Spot. Sell Future.	Sell Spot. Buy Future.

**Question 21**

Compute the theoretical forward price of the following securities for 1 month, 3 months and 6 months —

<i>Securities of</i>	<i>AM Ltd.</i>	<i>BM Ltd.</i>	<i>DM Ltd.</i>
Spot Price [So]	Rs.4,550	Rs.360	Rs.900
Dividend Expected	Rs.50	Rs.20	Rs.50
Dividend Receivable in	2 Months	3 Months	4 Months
6 Month's Futures Contract Rate	Rs.4600	Rs.390	Rs.920

## Answer

Securities of	AM Ltd.	BM Ltd.	DM Ltd.
Spot Price [Sx]	Rs.4,550	Rs.360	Rs.900
Dividend Expected [DF]	Rs.50	Rs.20	Rs.50
Dividend Receivable in [t]	2 Months or 1/6 Year or 0.1667	3 Months or Year or 0.25	4 Months or 1/3 year or 0.333
Risk Free Interest Rate [r]	9% or 0.09	9% or 0.09	9% or 0.09
Present Value of Dividend [DP]	$DF \times e^{-rt}$ or $DF \div e^{rt}$ $= Rs.50 \div e^{0.09 \times 0.1667}$ $= Rs.50 \div e^{0.015}$ $= Rs.50 \div 1.01511$ $= Rs.49.256$	$DF \times e^{-rt}$ or $DF \div e^{rt}$ $= Rs.20 \div e^{0.09 \times 0.25}$ $= Rs.20 \div e^{0.0225}$ $= Rs.20 \div 1.022755$ $= Rs.19.555$	$DF \times e^{-rt}$ or $DF \div e^{rt}$ $= Rs.50 \div e^{0.09 \times 0.3333}$ $= Rs.50 \div e^{0.03}$ $= Rs.50 \div 1.030455$ $= Rs.48.522$
Adjusted Spot Price [SAdj] = Sx - DP	Rs.4550 - Rs.49.256 = Rs.4500.744	Rs.360 - Rs.19.555 = Rs.340.445	Rs.900 - Rs.48.522 = Rs.851.478
Theoretical Forward Price [TFP <sub>x</sub> ]	$= 4500.744 \times e^{0.09 \times 0.50}$ $= 4500.744 \times e^{0.045}$ $= 4500.744 \times 1.04603$ $= Rs.4704.91$	$= 340.445 \times e^{0.09 \times 0.50}$ $= 340.445 \times e^{0.045}$ $= 340.445 \times 1.04603$ $= Rs.356.312$	$= 851.478 \times e^{0.09 \times 0.50}$ $= 851.478 \times e^{0.045}$ $= 851.478 \times 1.04603$ $= Rs. 890.672$
6 Months Futures Contract Rate [AFP <sub>x</sub> ]	Rs.4600	Rs.390	Rs.900
TFP x Vs. AFP <sub>x</sub>	AFP <sub>x</sub> is Lower	AFP <sub>x</sub> is Higher	AFP <sub>x</sub> is Higher
Valuation in Futures Market	Undervalued	Overvalued	Overvalued
Recommended Action	Sell Spot. Buy Future.	Buy Spot. Sell Future.	Buy Spot. Sell Future.

## Question 22

A four month European call option on a dividend paying stock is currently selling for Rs.5. The stock price is Rs.66, the strike price is Rs.60, and a dividend of Rs.0.80 is expected in one month. The risk free interest rate is 12% per annum for all maturities. Do you have arbitrage opportunity?

### Answer

Particulars	Amount
Spot Price [Sx]	Rs.66
Dividend Expected [DF]	Rs.0.80
Dividend Receivable in [t]	1 Month or 1/12 Year or 0.0833
Risk Free Interest Rate [r]	12% or 0.12
Present Value of Dividend [DP]	$DF \times e^{-rt}$ or $DF \div e^{rt}$ $= Rs.0.80 \div e^{0.12 \times 1/12}$ $= Rs.0.80 \div e^{0.01}$ $= Rs.0.80 \div 1.01005$ $= Rs.0.7920$
Adjusted Spot Price [SAdj] = Sx - DP	$Rs. 66 - Rs.0.7920$ $= Rs.64.208$
Theoretical Forward Price [TFP <sub>x</sub> ] = SAdj x e <sup>rt</sup>	$= 65.208 \times e^{0.12 \times 4/12}$ $= 65.208 \times e^{0.04}$ $= 65.208 \times 1.0408$ $= Rs. 67.868$

Since Adjusted spot price is lower than theoretical forward price, hence arbitrage is possible.

## Question 22

The following data relate to JB Ltd.'s share Price:

- 1) Current Price Per Share - Rs.1,820; 2.6 months' Futures price per share - Rs.2,028.
- 2) Assuming it is possible borrow money in the market for transactions in securities at 12% per annum, you are required - to calculate the theoretical minimum price of a 6 months forward purchase; and to explain arbitrating opportunity.

## Answer

### 1. Computation of Theoretical Futures Price

Securities of JB Ltd.	
Spot Price [S <sub>x</sub> ]	1,820
Required Rate of Return	12%
Tenor / Time Period [t] in Years	6 Months or 0.50 Year
Theoretical Forward Price [TFP <sub>x</sub> ] $TFP_x = AS_x \times e^{(r-y)xt}$	= Rs. 1,820 x $e^{0.2 \times 0.50}$ = Rs. 1,820 x $e^{0.06}$ = Rs. 1,820 x 1.0618 = Rs. 1,932.476
3-Months Futures Contract Rate [AFP <sub>x</sub> ]	Rs. 2,028
TFP <sub>x</sub> Vs. AFP <sub>x</sub>	AFP <sub>x</sub> is Higher
Inference	AFP <sub>x</sub> is overvalued
Recommended Action	Buy Spot. Sell Future.

### 2. Cash Flows and Activity Flow for Arbitrage Advantage

- Borrow Rs.1,820 for a period of 6 months at the rate of 12% p.a.
- Buy the Stock at Rs.1,820 at T<sub>0</sub>
- Receive the Dividend at the time of 6 months [Rs.10 X 30% = Rs.3].
- Sell the stock in the Futures Market at the Forward Price at the end of 6 months [Rs.2,028].
- Repay the amount of Loan with Interest at the end of the period at Rs.1,932.476.
- Riskless Profit = **Rs.95.524.**

### Question 23

*The price of HP Stock of a face value of Rs.10 on 31st December, 2014 was Rs.414 and the futures price on the same stock on the same date i.e., 31st December, 2014 for March, 2015 was Rs.444.*

*Other features of the contract and the related information are as follows:*

- Time to expiration 3 months (0.25 year)*
- Annual dividend on the stock of 30% payable before 31.3.2014.*
- Borrowing Rate is 20 % p.a.*

Based on the above information, calculate future price for HP stock on 31st December, 2014. Please also explain whether any arbitrage opportunity exists.

**Answer**

Securities of	HP
Spot Price [S <sub>x</sub> ]	Rs.414
Expected rate of Dividend [y]	30% or 0.30
Borrowing Rate	20%
Tenor / Time Period [t] in Years	3 Months or 0.25 Year
Present Value of Dividend	= 30% x 10 x e <sup>-0.20x0.25</sup> = 30% X 10 ÷ 1.05127 = 2.8537
Adjusted Spot Price [Spot Price- Present Value of Dividend] [AS <sub>x</sub> ]	= 414 - 2.8537 = Rs. 411.1463
Theoretical Forward Price [TFP <sub>x</sub> ] TFP <sub>x</sub> = AS <sub>x</sub> x e <sup>(r-y)xt</sup>	= Rs.411.1463 x e <sup>0.20x0.25</sup> = Rs.411.1463 x e <sup>0.05</sup> = Rs.411.1463 x 1.05127 = Rs.432.23
3-Months Futures Contract Rate [AFP <sub>x</sub> ]	Rs.444
TFP <sub>x</sub> Vs. AFP <sub>x</sub>	AFP <sub>x</sub> is Higher
Inference	AFP <sub>x</sub> is overvalued
Recommended Action	Buy Spot. Sell Future.

**2. Cash Flows to Gain on the Arbitrage Opportunity Activity Flow:**

- (a) Borrow Rs.414 for a period of 3 months at the rate of 20% p.a.
- (b) Buy the Stock at Rs.414 at T<sub>0</sub>
- (c) Receive the Dividend at the time of 3 months [Rs.10 X 30% = Rs.3].
- (d) Sell the Index Futures at the Forward Price at the end of 3 months [Rs.444].
- (e) Repay the amount of Loan with Interest at the end of the period.

### Cash Flows arising out of the Activities to gain on the Arbitrage.

Sl. No.	Particulars	Rs.
(a)	Borrow for a period of 3 months and Buy Stock at To	414
(b)	Receive the Dividend at the end of 3 months	3
(c)	Sell the Futures at the Forward Price at the end of 3 months	444
(d)	Repay the amount of borrowing together with Interest = $[414(1+0.20 \times 0.25)]$	(434.7)
(e)	Net Cash Inflow [(c)-(d)]	9.3

### Question 24

The following data relates to DCB Bank Ltd's share prices:

Current price per share	Rs. 170
Price per share in the futures market - 6 months	Rs. 190

It is possible to borrow money in the market for securities transactions at the rate of 12 % p.a.

Required—

- Calculate the theoretical minimum price of 6 month-futures contract.
- Explain if any arbitraging opportunities exist.

### Answer

#### 1. Theoretical Futures Price

Particulars	Value
6-months Futures Price	Rs.190
Current Stock Price [S <sub>x</sub> ]	Rs.170
Borrowing Rate (r)	12% or 0.12
Time (in years)	6/12 = 0.5 year
Theoretical Futures Price [F <sub>x</sub> ]	$= S_x \times e^{rt}$ $= Rs.170 \times e^{0.12 \times 0.5}$ $= Rs.170 \times e^{0.06}$ $= Rs.170 \times 1.06184$ $= Rs.180.513$

**Inference:** Since the Theoretical Futures Price is less than the Expected Futures Price, the recommended action would be to sell in the Futures Market.

**2. Cash Flows to gain from Arbitrage Opportunity Activity Flow:**

- a. Arbitrageur can borrow the amount required to buy the Shares at the current Market Price i.e. Rs.170 at the rate of 12% p.a. for 6 months.
- b. Enter into a Futures Contract to sell Shares at the rate of Rs.190.
- c. On the expiry date, sell the shares at the 6-month Futures rate of Rs.190.
- d. Pay the amount of Borrowing together with Interest i.e.  $[170 \times e^{0.12 \times 0.5}]$  Rs.180.513.

<i>Particulars</i>	<i>Time</i>	<i>Rs.</i>
1. Borrow at the rate of 12% for 6 months	T0	170
2. Enter into a Futures Contract to sell Shares.	T0	-
3. On the Expiry Date, sell the shares at 6-month Forward Rate.	T1	190
4. Repay the amount of Borrowing together with Interest $[170 \times e^{0.12 \times 0.5}] = [170 \times 1.06184]$	T1	180.513
5. Net Gain made [(3) - (4)]	T1	9.487

**Question 25**

Given the following information—

<i>BSE Sensex</i>	<i>50,000</i>
<i>Value of Portfolio</i>	<i>Rs.1,01,00,000</i>
<i>Risk Free Interest Rate</i>	<i>9% p.a.</i>
<i>Dividend Yield on Index</i>	<i>6% p.a.</i>
<i>Beta of Portfolio</i>	<i>2.0</i>

We assume that a futures contract on the BSE Sensex with 4 months maturity is used to hedge the value of portfolio over next 3 months. One future contract is for delivery of 50 times the index. Based on the information, Calculate — (a) Price of future contract, (b) The gain on short futures position if Sensex turns out to be 45,000 in 3 months.

## Answer

### 1. Computation of Price of Futures Contract

Spot Price [S <sub>x</sub> ]	Rs.50,000
Dividend Yield Expected [y]	6% or 0.06
Tenor / Time Period [t] in Years	4 Months or 0.3333 Year
Risk Free Interest Rate [r]	9% or 0.09
Price of Futures Contract of Sensex [TFP <sub>x</sub> ] TFP <sub>x</sub> = S <sub>x</sub> × e <sup>(r-y)xt</sup>	$= \text{Rs.}50,000 \times e^{(0.09 - 0.06) \times 0.3333}$ $= \text{Rs.}50,000 \times e^{0.03 \times 0.3333}$ $= \text{Rs.}50,000 \times e^{0.01}$ $= \text{Rs.}50,000 \times 1.0101$ $= \text{Rs.}50,505$

### 2. Gain on Short Futures Position

#### (a) Computation of No. of Contracts to be entered into:

Particulars	Value
Portfolio Value	Rs.101,00,000
4-Month's Futures Price per Unit of BSE Sensex	Rs.50,500
No. of Units per BSE Sensex Futures Contract	50
Value per BSE Sensex Futures Contract [50 Units X Rs.50,500 per Unit]	Rs.25,25,000
No. of Contract to be entered [Portfolio Value X Beta of Portfolio w.r.t Index ÷ Value per BSE Sensex Futures Contract] = [Rs.101,00,000 X 2.0 ÷ Rs.25,25,000]	8 Contracts

#### (b) Computation of Gain on Short Futures Position

Particulars	Value
Position	SELL
Contracted Sale Price per Unit of BSE Sensex	Rs. 50,500
Less: Index Position in 3-Months	Rs. 45,000
<b>Gain per Unit of BSE Index Future</b>	<b>Rs. 5,500</b>

No. of Units per Contract	50
Gain per Contract [Rs.5,500 X 50 Units]	Rs. 2,75,000
No. of Contract entered into	6
<b>Total Gain [8 Contracts x Rs. 2,75,000 per Contract]</b>	<b>22,00,000</b>

### Question 26

The January Pepper future traded at Rs. 16.80, the January Rs. 18.00 call at Rs. 0.45 and the January Rs. 18.00 put at Rs. 0.58. Both are options on the January future. Find out whether any arbitrage opportunity exists.

### Answer

- a) Cost of future = Rs.16.80
- b) Cost of Pepper = Present Value of Exercise Price + Value of Call - Value of Put  
= Rs.0.45 - 0.58 + 18 = **Rs.17.87**

**Conclusion:** Since there is difference between Spot Price and Futures Price, Arbitrage opportunity exists.

### Question 27

Mr. A sold in June Nifty -50 future contract for Rs.3,60,000 on June 15, For this he had paid an initial margin of Rs.50,000 to his broker. Each Nifty futures contract is for the delivery of 50 Nifties. On June 25, the index was closed on 7400. How much profit / loss A has made?

### Answer

- 1) Sale Price per NIFTY Future = Contract Amount ÷ Lot size  
= Rs. 3,60,000 ÷ 50 = **Rs.7200**
- 2) Futures Price as on June 25 = Rs.7400
- 3) Loss on Sale of Futures Contract = (7400 - 7200) x 50 = **Rs.10,000.**

### Question 28

A portfolio manager owns 3 stocks

Stock	Shares owned	Stock price (Rs.)	Beta
1	1 lakh	400	1.1
2	2 lakhs	300	1.2
3	3 lakhs	100	1.3

The spot Nifty Index is at 1350 and futures price is 1352. Use stock index futures to (a) decrease the portfolio beta to 0.8 and (b) increase the portfolio beta to 1.5. Assume the index factor is Rs.100. Find out the number of contracts to be bought or sold of stock index futures.

**Answer**

**1. Computation of Existing Portfolio Beta**

Security	Market Value of security (Rs. Lakhs)	Proportion	Beta of the security	Weighted Beta
1	400	4/13	1.1	0.34
2	600	6/13	1.2	0.55
3	300	3/13	1.3	0.30
	1,300			1.19

$$\begin{aligned} \text{Value per Futures Contract} &= \text{Index Price per Unit} \times \text{Lot Size per Futures Contract} \\ &= \text{Rs. } 1350 \times 100 = \text{Rs. } 1,35,000 \end{aligned}$$

**2. Activity to Reduce Portfolio Beta to 0.8**

**(a) Object:** Reduce Portfolio Beta

**(b) Activity:** Sell Index Futures

- Beta of Existing Portfolio =  $\beta_1 = 1.19$
- Desired Beta of the New Portfolio =  $\beta_N = 0.8$
- Contract Size = 100 Units
- Value per Futures Contract in NIFTY =  $VF = \text{Rs. } 1,350 \times 100 = \text{Rs. } 1,35,000$
- Value of the Portfolio =  $VP = \text{Rs. } 1,300 \text{ Lakhs}$

**No. of Futures Contract to be sold:**

$$\begin{aligned} &= \text{Portfolio Value} \times [\text{Beta of the Portfolio} - \text{Desired Value of Beta}] \div \text{Value of a Futures Contract} \\ &= \text{Rs. } 1,300 \text{ Lakhs} \times [(1.19 - 0.8) \div \text{Rs. } 1,35,000] \\ &= \text{375 Contracts} \end{aligned}$$

**3. Activity to increase the Portfolio Beta to 1.7**

**(a) Object:** Increase Portfolio Beta

**(b) Activity:** Buy Index Futures

- Beta of Existing Portfolio =  $\beta_1 = 1.19$
- Desired Beta of the New Portfolio =  $\beta_N = 1.7$

- Value per Futures Contract in NIFTY = VF = Rs.1,350 X 100 = Rs.1,35,000
- Value of the Portfolio = VP = Rs.1300 Lakhs

**No. of Futures Contract to be sold:**

$$\begin{aligned}
 &= \text{Portfolio Value X [Beta of the Portfolio – Desired Value of Beta] } \div \text{Value of a Futures Contract} \\
 &= \text{Rs.1300 Lakhs x [(1.70 - 1.19) } \div \text{Rs.1,35,000]} \\
 &= \mathbf{491 \text{ Contracts}}
 \end{aligned}$$

**Question 29**

*Given the following:*

<i>Strike price of IDFC Ltd</i>	<i>Rs.200</i>
<i>Current stock price IDFC Ltd.</i>	<i>Rs.185</i>
<i>Risk free rate of interest</i>	<i>5 % p.a</i>

- (a) Calculate the theoretical minimum price of a European put option after 6 months.  
 (b) If European put option price is Rs.5, then how can an arbitrageur make profit.

**Answer**

**1. Computation of Theoretical Minimum Price**

<b>Particulars</b>	<b>Value</b>
Exercise price	Rs.200
Current Stock Price	Rs.185
Risk Free Rate of Return (r)	5% or 0.05
Time (in years)	6 ÷ 12 = 0.5
Theoretical Minimum Price	$  \begin{aligned}  &= \text{Present Value of Exercise Price - Current Stock Price} \\  &= 200 \times e^{-rt} - 185 \\  &= 200 \times e^{-(0.05 \times 0.5)} - 185 = (200 \div 1.02532) - 185 \\  &= 195.0611 - 185 = 10.0611  \end{aligned}  $

**2. Cash Flows to make Profit for the Arbitrageur Activity Flow:**

- (1) Arbitrageur can borrow the amount required to buy the Put Option and Stock at the rate of 5% p.a. for 6 months.

- (2) Buy Put Option.
- (3) Take the opposite position and buy stock at spot price.
- (4) At the end of six months, exercise the Put option and realise the receipts.
- (5) Pay the amount of Borrowing together with Interest.

<i>Particulars</i>	<i>Time</i>	<i>Rs.</i>
1. Borrow at the rate of 5% for 6 months [185+5]	T <sub>0</sub>	190
2. Buy Put Option	T <sub>0</sub>	(5)
3. Buy Stock at Spot Price	T <sub>0</sub>	(185)
4. Exercise the Put Option and realise the Sale Proceeds	T <sub>1</sub>	200
5. Repay the amount of Borrowing together with Interest [190 e0.05×0.5] = [190 X 1.02532]	T <sub>1</sub>	194.81
6. Net Gain made [(4) - (5)]	T <sub>1</sub>	<b>5.19</b>

### Question 30

Equity share of Arvind Ltd. is presently quoted at Rs.320. The Market Price of the share after 6 months has the following probability distribution:

Market Price (Rs.)	180	260	280	320	400
Probability	0.1	0.2	0.5	0.1	0.1

A put option with a strike price of Rs.300 can be written.

You are required to find out expected value of option at maturity (i.e. 6 months)

### Answer

Expected Value of Option

(300 – 180)	x	0.1	=	12
(300 – 260)	x	0.2	=	08
(300 – 280)	x	0.5	=	10
(300 – 320)	x	0.1	=	Not Exercised*
(300 – 400)	x	0.1	=	Not Exercised*
<b>Total</b>			=	<b>30</b>

\* If the strike price goes beyond Rs.300, option is not exercised at all.

In case of Put option, since Share price is greater than strike price Option Value would be zero.

### Question 31

Determine the value of option, both call and put, on expiry for the stock of SRF Ltd. from the following information-

- Exercise Price - Rs.510
- Spot Price on Exercise Date Ranges between Rs.495 and Rs.525, with interval of Rs.5.

Also state what will be the action on the above range of prices for both the options.

### Answer

#### 1. Call Option (Right to Buy)

<i>Situation</i>	<i>Exercise Price (EP)</i>	<i>Spot Price on Expiry Date (SPE)</i>	<i>Value of Call [Maximum of (SPE - EP), 0]</i>	<i>Action</i>
<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4) = Max [(3)- (2), 0]</b>	<b>(5)</b>
A	Rs.510	Rs.495	Rs.495 - Rs.510 = - 15 → Rs.0	Lapse
B	Rs.510	Rs.500	Rs.500 - Rs.510 = - 10 → Rs.0	Lapse
C	Rs.510	Rs.505	Rs.505 - Rs.510 = - 5 → Rs.0	Lapse
D	Rs.510	Rs.510	Rs.510 - Rs.510 = 0 → Rs.0	Lapse
E	Rs.510	Rs.515	Rs.515 - Rs.510 = 5 → Rs.5	Exercise
F	Rs.510	Rs.520	Rs.520 - Rs.510 = 10 → Rs.10	Exercise
G	Rs.510	Rs.525	Rs.525 - Rs.510 = 15 → Rs.15	Exercise

#### 2. Put Option (Right to Sell)

<i>Situation</i>	<i>Exercise Price (EP)</i>	<i>Spot Price on Expiry Date (SPE)</i>	<i>Value of Put [Maximum of {EP - SPE}, 0]</i>	<i>Action</i>
<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4) = Max [(2)-(3), 0]</b>	<b>(5)</b>
A	Rs.510	Rs.495	Rs.510 - Rs.495 = 15 → Rs.15	Exercise
B	Rs.510	Rs.500	Rs.510 - Rs.500 = 10 → Rs.10	Exercise

C	Rs.510	Rs.505	$Rs.510 - Rs.505 = 5 \rightarrow Rs.5$	Exercise
D	Rs.510	Rs.510	$Rs.510 - Rs.510 = 0 \rightarrow Rs.0$	Lapse
E	Rs.510	Rs.515	$Rs.510 - Rs.515 = -5 \rightarrow Rs.0$	Lapse
F	Rs.510	Rs.520	$Rs.510 - Rs.520 = -10 \rightarrow Rs.0$	Lapse
G	Rs.510	Rs.525	$Rs.510 - Rs.525 = -15 \rightarrow Rs.0$	Lapse

### Question 32

Mr. Raja established the following spread on the XYZ Corporation's stock:

- (i) Purchased one 3-month call option with a premium of Rs.20 and an exercise price of Rs.550.
- (ii) Purchased one 3-month put option with a premium of Rs.10 and an exercise price of Rs.450.

XYZ Corporation's stock is currently selling at Rs.500. Determine profit or loss, if the price of XYZ Corporation's:

- (i) remains at Rs.500 after 3 months.
- (ii) falls at Rs.350 after 3 months.
- (iii) rises to Rs.600.

Assume the size option is 100 shares of XYZ Corporation.

### Answer

<b>1. Pay off for Call Option</b>				
<i>Spot Price</i> (1)	<i>Exercise Price</i> (2)	<i>Action</i> (3)	<i>Gross Value</i> (4) = (2)-(1)	<i>Net Pay-Off</i> (5) = (4) — Premium of Rs.30
350	550	Lapse	Nil	<b>(20)</b>
500	550	Lapse	Nil	<b>(20)</b>
600	550	Exercise	50	<b>30</b>

<b>2. Pay off for Put Option</b>				
<i>Spot Price</i> (1)	<i>Exercise Price</i> (2)	<i>Action</i> (3)	<i>Gross Value</i> (4) = (2)-(1)	<i>Net Pay-Off</i> (5) = (4) — Premium of Rs.Rs.10
350	450	Exercise	100	<b>90</b>
500	450	Lapse	Nil	<b>(10)</b>
600	450	Lapse	Nil	<b>(10)</b>

<b>3. Net Payoff Table</b>					
<i>Spot Price</i> (1)	<i>Net Payoff in Call Option</i> (2)	<i>Net Payoff in Put Option</i> (3)	<i>Total</i> (4)	<i>No. of Options</i> (5)	<i>Net Profit of Spread</i> (6) = 4 X 5
350	- 20	90	70	100	7000
500	- 20	(- 10)	- 30	100	-3000
600	30	- 10	20	100	2000

### Question 33

Companies X and Y face the following interest rates:

	X	Y
<i>U.S. Dollars (floating rate)</i>	<i>LIBOR + 0.5%</i>	<i>LIBOR+ 1.0%</i>
<i>Canadian (fixed rate)</i>	<i>5.0%</i>	<i>6.5%</i>

X wants to borrow U.S. Dollars at a floating rate of interest and Y wants to borrow Canadian dollars at a fixed rate of interest. X financial institution is planning to arrange a swap and requires a 50 basis point spread. If the swap is attractive to X and Y at 60:40 ratio, what rates of interest will X and Y end up paying?

**Answer**

<i>Particulars</i>	<i>Value</i>
1. Difference in Floating Rates [(LIBOR + 1%) - (LIBOR + 0.5%)]	0.5%
2. Difference in Fixed Rates [6.5% - 5%]	1.5%
3. Net Difference {[ (a) - (b) ] in Absolute Terms}	1.0%
4. Amount paid for arrangement of Swap Option	(0.5%)
<b>5. Net Gain [(c) - (d)]</b>	<b>0.5%</b>
6. Company X's share of Gain [0.5% X 60%]	0.3%
7. Company Y's share of Gain [0.5% X 40%]	0.2%

	<i>Company X</i>	<i>Company Y</i>
1.	Company X will borrow at Fixed Rate.	Company Y will borrow at Floating Rate.
2.	Pay interest to Bankers at Fixed Rate (i.e. 5.0%)	Pay interest to its Bankers at Floating Rate (i.e. LIBOR+1.0%)
3.	Will collect from Company Y interest amount differential i.e. Interest computed at Fixed Rate (5.0%) Less Interest Computed at Floating Rate of (LIBOR+0.5%) = 4.5% - LIBOR	Will pay interest amount differential to Company X i.e. Interest computed at Fixed Rate (5.0%) Less Interest Computed at Floating Rate of (LIBOR+0.5%) = 4.5% - LIBOR
4.	Receive its share of Gain from Company Y = 0.3%	Pay to Company X its share of Gain = 0.2%  Pay Commission Charges to the Financial Institution for arranging Interest Rate Swaps i.e. 0.5%
5.	Effective Interest Rate: 2 - 3 - 4 = Fixed Rate paid by Company X - Interest Differential Received from Company Y - Share of Gain. = (5.0%) - (4.5% - LIBOR) - 0.3% = LIBOR + 0.2%	Effective Interest Rate: 2 + 3 + 4 + 5 = Floating Rate to Company Y (LIBOR+1.0%) + Interest Differential paid to Company X (4.5% - LIBOR) + Share of Gain paid to Company X (0.25%) + Commission charges paid (0.5%) = LIBOR + 1.0 % + 4.5% - LIBOR + 0.2% + 0.5% = <b>6.2%</b>

### Question 34

Company PQR and DEF have been offered the following rate per annum on a \$ 200 million five year loan;

Company	Fixed Rate	Floating Rate
PQR	12.0	LIBOR+ 0.1%
DEF	13.4	LIBOR + 0.6%

Company PQR requires a floating - rate loan; Company DEF requires a fixed rate loan. Design a swap that will net a bank acting as intermediary at 0.5 percent per annum and be equally attractive to both the companies.

### Answer

Particulars	Rs.
(a) Difference in Floating Rates [(LIBOR + 0.1%) - (LIBOR + 0.6%)]	<b>0.5%</b>
(b) Difference in Fixed Rates [13.4% - 12%]	<b>1.4%</b>
(c) Net Difference {[a] - [b]} in Absolute Terms}	<b>0.9%</b>
(d) Amount paid for arrangement of Swap Option	<b>(0.5%)</b>
<b>(e) Net Gain [(c) - (d)]</b>	<b>0.8%</b>
(f) Company PQR's share of Gain [0.8% X 50%]	<b>0.4%</b>
(g) Company DEF's share of Gain [0.8% X 50%]	<b>0.4%</b>

PQR is the stronger Company (due to comparative interest advantage). PQR has an advantage of 1.40% in Fixed Rate and 0.50% in Floating Rate. Therefore, PQR enjoys a higher advantage in Fixed Rate loans. Therefore, PQR will opt for Fixed Rate Loans with its Bankers. Correspondingly DEF Ltd will opt for Floating Rate Loans with its bankers.

Company PQR	Company DEF
1. Company PQR will borrow at Fixed Rate.	1. Company DEF will borrow at Floating Rate.
2. Pay interest to Bankers at Fixed Rate (i.e. 12.0%)	2. Pay interest to its Bankers at Floating Rate (i.e. LIBOR + 0.6%)
3. Will <b>collect from</b> Company DEF	3. Will <b>pay to</b> Company PQR interest

<p>interest amount differential i.e. Interest computed at Fixed Rate (12.0%) <b>Less</b> Interest Computed at Floating Rate of (LIBOR + 0.1%) = 11.9% - LIBOR</p> <p>4. Receive share of Gain from Company DEF (0.4%)</p> <p>5. <b>Effective Interest Rate: 2 - 3 = 12.0% - (11.90% - LIBOR) - 0.4% = LIBOR - 0.3%</b></p>	<p>amount differential i.e. Interest computed at Fixed Rate (12.0%) <b>Less</b> Interest Computed at Floating Rate of (LIBOR + 0.1%) = 11.9% - LIBOR</p> <p>4. Pay to Company PQR its share of Gain = 0.4%</p> <p>5. Pay Commission Charges to the Financial Institution for arranging Interest Rate Swaps i.e. 0.5%.</p> <p>6. <b>Effective Interest Rate: 2 + 3 + 4+5</b></p> <p>= Floating Rate to Company DEF (LIBOR + 0.6%) + Interest Differential paid to Company PQR (11.9% - LIBOR) + Commission charges paid for arranging Swaps + Share of gain paid to Company PQR</p> <p>= LIBOR + 0.60 % + 11.9% - LIBOR + 0.5% + 0.4% = <b>13.4%</b></p>
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### Question 35

*Company X wishes to borrow U.S. dollars at a fixed rate of interest. Company Y wishes to borrow Japanese yen at a fixed rate of interest. The amount required by the two companies are roughly the same at the current exchange rate. The companies have been quoted the following interest rates:*

	<i>Yen</i>	<i>Dollars</i>
<i>Company X</i>	<i>6.0%</i>	<i>9.6%,</i>
<i>Company Y</i>	<i>7.5%</i>	<i>10.0%</i>

*Design a swap that will net a bank, acting as an intermediary, 50 basis points per annum. Make the swap appear equally attractive to the two companies.*

### Answer

Let x be the spread in the yen market (in this case 150 basis points) and let y be the spread in the dollar market (40 basis points). The total gain available is  $x - y = 110$  basis points. The bank will take 50 basis points, so that leaves 60 basis points to be split equally between x and y. Therefore, x must end up paying 9.3% in dollars and y must end up paying 7.2% in yen. One way to accomplish this is as follows:

<b>X</b>	Pay 6% in yen to outside lenders
	Pay 9.3% in dollars to the bank in the swap
	Receive 6% in yen from the bank in the swap
<b>Total</b>	<b>9.3% in dollars</b>
<b>Y</b>	Pay 10% in dollars to outside lenders
	Pay 7.2% in yen to the bank in the swap
	Receive 10% in dollars from the bank in the swap
<b>Total</b>	<b>7.2% in yen</b>

Note that the bank's profits of 50 basis points come from receiving 7.2% and paying 6% in yen (thereby gaining 120 basis points in yen) while receiving 9.3% and paying 10% in dollars (thus losing 70 basis points in dollars). Also, the final exchange of principal will expose X and, Y to exchange rate risk, but not the bank.

### Question 36

*Mr. A purchased a 3 month call option for 100 shares in XYZ Ltd. at a premium of Rs.30 per share, with an exercise price of Rs.550. He also purchased a 3 month put option for 100 shares of the same company at a premium of Rs.5 per share with an exercise price of Rs.450. The market price of the share on the date of Mr. A's purchase of options, is Rs.500. Calculate the profit or loss that Mr. A would make assuming that the market price falls to Rs.350 at the end of 3 months.*

### Answer

Since the market price at the end of 3 months falls to Rs.350 which is below the exercise price under the call option, the call option will not be exercised. Only put option becomes viable.

The gain will be:

Gain per share (Rs.450 – Rs.350)	100
Total gain per 100 shares	10,000
Cost or premium paid (Rs.30 x 100) + (Rs.5 x 100)	3,500
<b>Net gain</b>	<b>6,500</b>

### Question 37

*The current market price of an equity share of Penchant Ltd is Rs.420. Within a period of 3 months, the maximum and minimum price of it is expected to be Rs.500 and Rs.400 respectively.*

*If the risk free rate of interest be 8% p.a., what should be the value of a 3 months Call option under the "Risk Neutral" method at the strike rate of Rs.450 ? Given  $e^{0.02} = 1.0202$*

## Answer

Let the probability of attaining the maximum price be  $p$

$$\begin{aligned}(500 - 420) \times p + (400 - 420) \times (1-p) &= 420 \times (e^{0.02}-1) \\ \text{or, } 80p - 20(1 - p) &= 420 \times 0.0202 \\ \text{or, } 80p - 20 + 20p &= 8.48 \\ \text{or, } 100p &= 28.48 \\ p &= 0.2848 \\ \text{The value of Call Option in Rs.} &= \frac{0.2848 \times (500 - 450)}{1.0202} \\ &= \frac{0.2848 \times 50}{1.0202} \\ &= \mathbf{13.96}\end{aligned}$$

## Question 38

The following quotes are available for 3-month options in respect of a share currently traded at Rs. 31 :

	Rs.
Strike price	30
Call option	3
Put option	2

A funds manager devises a strategy of buying a call and selling the share and a put option. Draw his profit/loss profile if it is given that the rate of interest is 10% per annum.

What would be the profit/loss if the strategy adopted is selling a call and buying a put and a share ?

## Answer

*Strategy I: (Buying a Call and Selling a Put and a Share)*

Initial Cash Inflow (Rs.31 – Rs.3 + Rs.2)	Rs. 30
Interest Rate	10%
Amount grows in 3 months to $30 + [30 \times 10/100 \times 3/12]$	Rs. 30.75*

If the share price is greater than Rs.30, he would exercise the call option and buy one share for Rs.30 and his net profit is Rs.0.75 (i.e., Rs.30.75 – 30).

However, if the share price is less than Rs. 30, the counter-party would exercise the put option and the investor would buy one share at Rs. 30. The net profit to the investor is again Rs. 0.75.

*Strategy II: (Selling a Call and Buying a Put and a Share)*

In this case, the investor has to arrange a loan @ 10% of Rs.30 (i.e., Rs.31 + 2 - 3). This amount would be repaid after 3 months. Amount payable is:

$$30 + [30 \times 10/100 \times 3/12] = \text{Rs.30.75}^*$$

After 3 months, if the market price is more than Rs. 30, the counter-party would exercise the call option and the investor would be required to sell the share at Rs.30. The loss to the investor would be Rs.0.75 (i.e., Rs.30.75 - 30).

However, if the rate is less than Rs. 30, the investor would exercise the put option and would get Rs. 30 from the rate of share. The loss to the buyer would again be Rs.0.75.

*\*Note: Interest can also be calculated on compound interest or continuous compound interest instead of simple interest; in that case profit /loss will be Rs.0.72 or Rs.0.76 in strategy I and II respectively.*

\*\*\*

# 11

## Treasury Management

### Question 1

*What do you understand by Treasury Management? What are its main objectives?*

### Answer

Treasury management means "To plan, organise and control cash and borrowings so as to optimise interest and currency flows, and minimise the cost of funds " or in other words "the handling of all financial matters, the generation of external and internal funds for business, the management of currencies and cash flows, and the complex strategies, policies, and procedures of corporate finance" It involves ensuring that proper funds are available with the company at the time of outflow required & also that funds are not kept unutilized for a good long time. This requires the management of cash flows, banking, money-market and capital-market transactions; the effective control of the risks associated with those activities; and the pursuit of optimum performance consistent with those risks.

### Objectives of Treasury management are:

1. *Availability of right quantity* - It ensures that the funds have been arranged in required quantity. This quantity is available to the firm either as external loans or as internal generation.
2. *Availability of right time* - The requisite funds for day to day working of the firm are available in time in addition to being available in quantity. The right time is the reasonable time taken to procure the funds.
3. *Deployment of fund in right quantity* - It ensures that right quantity of funds is deployed. For developing the right amount of funds, the treasury manager keeps track of all receipts of funds and time table of deployment of funds is to be drawn up.
4. *Deployment of fund in right time* - A logical corollary of sourcing funds at the right time is that funds should be deployed at the right time. The treasury manager has to honour the outstanding commitments on working capital account within a short span of time.
5. *Profiting from availability and deployment* - One of the prime objectives of a treasury manager is to ensure timely procurement of right amount of funds and timely deployment of right amount of funds. The objective results in administrative smoothening and paves way for register achievement of performance targets of the form. Modern day treasury manager has another objective which is to profit from such sourcing and deployment.

## Question 2

*Discuss the scope and functions of Treasury Management.*

### Answer

Treasury management is concerned with both macro and micro facets of the economy. At the macro level, the inflows and outflows of cash, credit and other financial instruments are the functions of the government and the business sectors. These inflows are arranged by them as borrowing from the public. The micro units utilize these inflows and build up their capacities for production of output. This leads to establishment of a production system which logically leads us to the natural consequence, i.e. the establishment of distribution and consumption systems. Once the production, distribution and consumption systems are in place at the micro level, the generation of surpluses at the units begins. These surpluses are channeled back into the macro system as outflows from the micro system. The inflows are the taxes paid to the government and repayment of loans made to the banks and financial institutions. These inflows into the macro level have to be managed by the treasury managers at the macro level.

Functions of Treasury Management include:

1. *Cash Management* : The Treasury Manager controls the cash assets and liabilities of the organization
2. *Liquidity & Funds Management* : Analysis of cash flow arising out of asset liability transaction and funding various asset of balance sheet is the function of treasury management. It also involves policy inputs to strategic planning and yielding expected returns in credit and investment.
3. *Risk Management* : Treasury management plays an active role in risk management by managing the impact of the changes in interest rates, credit risk due to increasing NPA's. It includes customer credit management, vendor/contractor financial analysis, liability claims management, business disaster recovery, and employee benefits program risk.
4. *Reserve Management & Investment* : It includes selection of investment products, investment brokers and methods of borrowing. The treasury manager develops cash management information system and investment policy and processes.
5. Maintaining good relations with supplier of funds, particularly the investors and shareholders.
6. Looking after the financial implications of strategic and policy decisions.
7. Interaction with financial market in general and with capital market in particular.

## Question 3

*Treasury function is supplemental and complementary to the finance function in a firm. Comment*

## Answer

The treasury function is supplemental and complementary to finance function. As a supplemental function, it reinforces the activities of the finance function by taking care of the finer points while the latter delineates the broad contours. As a complementary function, the treasury manager takes care of even those areas which the finance function does not touch. Looked at from this point of view, the treasury function integrates better with manufacturing and marketing functions than the finance function. This is because the treasury department of a firm is involved in more frequent interaction with other departments. For the purpose performing this role, the treasury manager operates in various financial markets including the inter-corporate market, money market, G-sec market, forex market etc.

## Question 4

*Distinguish between Treasury Management and Financial Management.*

- (a) *Control Aspects* : The objective of Treasury Management is to execute the plan of finance function, whereas the objective of financial management is to establish, coordinate and administer as an integral part of the management, adequate plan for control of operation.
- (b) *Reporting Aspects* : Treasury management is concerned with monitoring the income and expense budget on a periodic basis vis-à-vis the budgets whereas Financial Management is concerned with the preparation of overall financial reports of the firm such as Profit & Loss Account and Balance Sheet.
- (c) *Strategic Aspects* : Treasury management would be maintenance of short-term liquidity. Whereas finance function is involved in formulating overall financial strategy for the firm.
- (d) *Nature of Aspects* : The Treasury Manager is concerned with the net current assets of the firm whereas the financial manager is concerned with management of fixed assets as well as current assets of the firm.
- (e) *Investment Aspects* : The Treasury manager is concerned with short term investments whereas the financial manager is concerned with long term and strategic management.

## Question 5

*What are the different roles performed by Treasury Manager in the overall functioning of the firm?*

## Answer

A treasury manager has a significant part to play in the overall functioning of the firm. The treasury manager has the following roles:

1. *Originating roles* : The treasury manager inducts and originates system of accounting for the firm. Routine accounting of the firm is then carried out along

these established systems. The treasury manager complies with exhaustive operations manual for the guidance of the users.

2. **Supportive roles** : The treasury manager supports the activities of other departments based on constructive coordination.
3. **Leadership roles** : This role comes into play during times of exigency which can occur during time of systems break down.
4. **Watch dog roles** : Treasury manager is the eyes and ears of the management. As a processor of the financial transactions, he keeps a watch on suspects bungling and frauds in the firm.
5. **Learning roles** : Treasury manager continuously learns the new accounting concepts and technological changes and adopts these changes with open mind; educates other departments of firms about damages.
6. **Informative roles** : The treasury manager is the source of information for the top management regarding performance of the firm *vis-à-vis* the budgets. For conveying this information, he develops a management information system suited for the organization. This system provides concise and timely information on all the relevant parameters which enable the top management to take decisions.

### **Question 6**

*Tools and techniques of treasury managers are very specific. Comment*

### **Answer**

There are number of tools and techniques used by the treasury managers. Some of them are explained as under:

1. *Analytic and planning tools*

In treasury function, planning and budgeting are essential targets to achieve and to keep effective control on costs. Analysis of the data and information is necessary for planning and budgeting. Performance budgeting is referred to as setting of physical targets for each line of activity. The financial outlay or expenditure needed for each is earmarked to choose the least cost mode of activity to achieve the targets. Productivity and efficiency improves by decentralization of responsibility and that is achieved by performance budgeting, where each department or section is made a profit center and is accountable for its targets, financial involvement and profits in financial terms, relative to the targets in physical terms. This type of planning involving performance budgeting is best suited for service industry say a financial services company or bank where every department can function in a decentralized manner and achieve the targets.

2. *Zero Based Budgeting (ZBB)*

Another tool of analysis and performance is ZBB wherein each manager establishes objectives for his function and gain agreement on them with top management. Then alternate ways for achieving these targets are defined and most practical way for

achieving the targets is selected. This alternative is then broken into incremental levels of effort required to achieve the objective. For each incremental level of activity, costs and benefits are assessed. The alternative with the least cost is then selected.

### 3. *Financial Statement Analysis*

Financial analysis of a company is necessary to help the treasury manager to decide whether to invest in the company. Such analysis also helps the company in internal controls. The soundness and intrinsic worth of a company is known only by such analysis. The market price of a share depends, among other things on the sound fundamentals of the company, the financial and operational efficiency and the profitability of that company. These factors can be known by a study of financial statements of the company.

### **Question 7**

*Internal Treasury control is a process of self improvement. Comment.*

### **Answer**

Internal treasury control is concerned with all flows of funds, cash and credit and all financial aspects of operations. Internal treasury control is exercised from time to time and on regular basis on financial targets. The financial aspects of operations include procuring of inputs, paying creditors, making arrangement for finance against inventory and receivables. The gaps between inflows and outflows are met by planned recourse to low cost mix of financing. The control aims at operational efficiency and removal of wastages and inefficiencies and promotion of cost effectiveness in the firm. The control is exercised under phases of planning and budgeting. These phases include setting up of targets, laying down financial standards, evaluation of performance as per these norms and reporting in a standard format. Hence it is true to say that Internal treasury control is a process of self improvement

### **Question 8**

*Discuss the role of Information Technology in Treasury management.*

### **Answer**

The major role the information technology in effective treasury management is as follows:

#### **1. Automate repetitive tasks**

Technology today is being leveraged to automate repetitive tasks such as data gathering, accounting, bank polling, portfolio tracking and reporting. By automating these processes, the delays and the possibility of human error may be minimized. Automation also facilitate information sharing across departments, offices and geographies, and provide an accurate audit trail. Furthermore, automating these processes enable to focus on more value added tasks, critical to providing effective decision support to management team.

## **2. Implement internal controls**

To ensure compliance with rules and regulations, sound and effective internal controls must be implemented. In treasury management, sophisticated rules must be implemented to ensure policy compliance. The solution that has obtained an internal audit and other compliance activities must be implemented.

## **3. Time saver and fraud & error detection Methodology**

In treasury management system, the source of cash transactions is the previous day's bank data. Through the treasury management system, all repetitive transactions are automatically tagged with the correct instructions. Most companies using a treasury management system get 90-95% of their transactions automatically tagged accurately without any manual intervention.

## **4. Forecast cash flows**

Effective forecasting helps manage financial risk by enabling to predict a cash shortfall or liquidity crisis, taking into account interest rate changes and foreign exchange fluctuations. Forecasting also helps to enhance financial returns, enabling to make more effective decisions regarding investments and borrowing needs. Finally, forecasting helps maintain financial control by identifying unexpected occurrences for further review and action.

## **5. Communicate with operating units**

There should be a two-way flow of information by providing feedback to the operating units based on how the actuals are compared to the forecasts. The treasury forecast performance matters must be compared to forecasts generated by other groups and/ or divisions.

## **6. Choose a Web-based treasury management system**

The full benefits of technology without unnecessary costs or delays may be achieved by selecting a web-based treasury management system. Web-based solutions significantly reduce implementation costs and timeframes, and enable to access the system from anywhere at any time.

## **7. Rethink treasury processes**

There should be reassessing of the treasury management at transparent intervals to evaluate processes and identify how they can be revised to maximize efficiencies. While reevaluating treasury management system, the focus should not only be on data, but on experience and knowledge.

## **8. Pay for performance**

To reinforce the importance of forecasting, portfolio management, cash consolidation, and other value added activities across treasury department, benchmarks should be defined. The proper and effective use of information technology in treasury operation increases the efficiency and effectiveness of corporate officers across the treasury, investor relations, corporate finance and corporate communication function.

### **Question 9**

*Distinguish between 'Liquidity Management' and 'Treasury Management'*

#### **Answer**

Liquidity management ensures that the right amount of cash is available, at the right time and in the right place, is firmly positioned as a pivotal task for every treasurer. Liquidity management is in fact a part of the treasury management. Over the past few years, many treasurers have made substantial progress towards increasing the visibility of their cash flow and centralizing cash within countries or regions. However, liquidity management and particularly cash flow forecasting remain the greatest challenges facing treasurers. With credit more expensive and elusive for many companies, it is now imperative to tackle these challenges effectively. Liquidity management of a financial institution or bank or company is somehow different to that of other trading units. The process starts with tapping of funds at lower rate in shape of deposits/borrowing and ends with investing the same in higher rate to earn profit out of business with a margin of small portion of cash-in-hand kept to meet day to day operation. The main functions of treasury management basically includes making availability of funds in right quantity, at right time, Deployment of funds in right quantity and right time and earning profit from availability and deployment of fund.

### **Question 10**

*Zero based budgeting plays a vital role in treasury management. Comment.*

#### **Answer**

Treasury manager is required to work in a fast changing and competitive environment. For carrying out his activities, he has resort to certain tools and techniques.

One of the tools of analysis and performance is zero based budgeting wherein each manager establishes objectives for his function and gain agreement on them with top management. Then alternate ways for achieving these targets are defined and most practical way for achieving the targets is selected. This alternative is then broken into incremental levels of effort required to achieve the objective. For each incremental level of activity, costs and benefits are assessed. The alternative with the least cost is then selected.

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# 12

## Foreign Exchange Management

### Question 1

*Write a short note on Leading and Lagging.*

#### Answer

Leading implies speeding up collections on receivables if the foreign currency in which they are invoiced is expected to appreciate. Lagging implies delaying payments of payables invoiced in a foreign currency that is expected to depreciate. At the level of an individual transaction this is a specific protection measure; but at the corporate level this requires forecasting of currency movements, centralisation of information on transactions, and evolving guidelines for subsidiaries. Hence, it has been located here as a general protection measure.

Leading and lagging is primarily an intra-firm measure, because in third party trade there is a clear conflict of interest between buyer and seller. It involves both costs and benefits. There are three elements in this calculation:

- (i) cash cost/benefit represented by the interest rate differential between the lead and lag countries;
- (ii) an expected cash gain/loss to be realised on the altered transactional exposure in the said countries, and
- (iii) an expected translation gain/loss on the altered translation exposure. The corporate policy should take them into account and also consider effective tax rates in the two countries as also the currency of intra-firm invoicing.

### Question 2

*Write a short note on Netting.*

#### Answer

All transactions-gross receipts and payments among the parent firm and subsidiaries should be adjusted and only net amounts should be transferred. This technique is called netting. This again involves centralisation of data at the corporate level, selection of the time period at which netting is to be done, and choice of the currency in which netting is to be done. The currency could be the home currency of the firm. Netting reduces costs of remittance of funds, and increases control of intra-firm settlements. It also produces savings in the form of lower float (funds in the pipe-line) and lower exchange costs.

Advantages derived from netting system includes:

- (1) It reduces the number of cross-border transactions between subsidiaries thereby decreasing the overall administrative costs of such cash transfers
- (2) It reduces the need for foreign exchange conversion and hence decreases transaction costs associated with foreign exchange conversion.
- (3) It improves cash flow forecasting since net cash transfers are made at the end of each period
- (4) It gives an accurate report and settles accounts through co-ordinated efforts among all subsidiaries

### **Question 3**

*What is Exchange Rate Forecasting?*

#### **Answer**

Participants in the international markets face problems, in making decisions which are based on future exchange rates. The future exchange rates are required by many companies to hedge against potential losses, arranging short-and long-term funds, performing investment analysis, and to assess earnings of a foreign subsidiary. The quality of decision, in such cases, depends on the accuracy of exchange rate projections.

The percentage change between the current and the forecasted exchange rates may be calculated to find out appreciation or depreciation in the currency. A positive percentage change represents currency appreciation whereas a negative percentage change shows depreciation.

The exchange rates may be fixed or floating. Different methods are used to forecast fixed and floating exchange rates.

The floating exchange rates are determined by the market forces of demand and supply. These are not influenced by the government intervention. Fixed exchange rates, on the other hand, are decided by the regulating agencies. The floating exchange rates may be forecast with the help of various methods. Fundamental and technical analyses are commonly used for this purpose. Fundamental analysis studies the relationship between macro economic variables (such as inflation rates, national income growth, and changes in money supply) and exchange rates to forecast the latter. Technical analysis uses past prices and volume movements to project future currency exchange rates.

### **Question 4**

*The forward rate is an accurate predictor of the future spot rate. Do you agree?*

#### **Answer**

Theoretically, in the efficient market and in the absence of intervention or control in the exchange or financial markets, the forward rate is an accurate predictor of the future spot rate. These requirements are, generally, satisfied if the following three conditions are found:

- (i) *Interest Rate Parity* : According to interest rate parity principle, the forward premium (or discount) on currency of a country vis-à-vis the currency of another

country will be exactly offset by the interest rate differential between the countries. The currency of the country with lower interest rate is quoted at a forward premium and vice-versa.

- (ii) *Purchasing Power Parity (PPP)* : According to the PPP Principle, the currency of a country will depreciate vis-à-vis the currency of another country on the basis of differential in the rates of inflation between them. The rate of depreciation in the currency of a country would roughly be equal to the excess inflation rate in the country over the other country.
- (iii) *International Fisher Effect* : The interest rate differential between two countries, according to the Fisher effect, will reflect differences in the inflation rates in them. The high interest country will experience higher inflation rate.

However, even if these conditions are satisfied, the future spot rate might not be identical to the forward rate. Random differences between the two rates may be found.

### **Question 5**

*Differentiate between Interest Rate Parity and Purchasing Power Parity*

#### **Answer**

#### **'Interest Rate Parity' and 'Purchasing Power Parity'**

*Interest Rate Parity* : According to interest rate parity principle, the forward premium (or discount) on currency of a country vis-à-vis the currency of another country will be exactly offset by the interest rate differential between the countries. The currency of the country with lower interest rate is quoted at a forward premium and vice versa.

*Purchasing Power Parity* : According to the Purchasing Power Parity (PPP), Principle, the currency of a country will depreciate vis-à-vis the currency of another country on the basis of differential in the rates of inflation between them. The rate of depreciation in the currency of a country would roughly be equal to the excess inflation rate in the country over the other country.

### **Question 6**

*Briefly discuss the various participants in Forex market.*

#### **Answer**

#### **Participants in foreign exchange market**

1. *Authorised Money Changers* : In order to provide facilities for encashment of foreign currency to visitors from abroad, especially foreign tourists, Reserve Bank has granted licences to certain established firms, hotels and other organisations permitting them to deal in foreign currency notes, coins and travellers cheques subject to directions issued to them from time to time. Authorized money changers are of two types: Full-fledged money changers and Restricted money changers.
2. *Authorised Dealers in Foreign Exchange* : Banks and some financial institutions that have been authorized to deal in foreign exchange by the Reserve Bank are known as

authorized dealers. An authorized dealer should comply with the directions and instructions of the Reserve Bank given from time to time. These authorized dealers deals in foreign exchange from the customs (importers, exporters and others receiving or making personal remittances).

3. *Reserve Bank of India* : The Reserve Bank participates in the market to acquire or spend their country's foreign exchange reserves as well as to influence the price at which their own currency is traded. It may act to support the value of rupee because of policies adopted at the national level or because of commitments entered into at international level.

### Question 7

*What are the various types of Foreign Exchange Risk exposures?*

### Answer

1. **Transaction Exposure:** A transaction exposure occurs when a value of a future transaction, through known with certainty, is denominated in some currency other than the domestic currency. In such cases, the monetary value is fixed in terms of foreign currency at the time of agreement which is completed at a later date.

Transaction exposure basically covers the following:

- (a) *Rate Risk:* this will occur
    - (i) When there is mismatch of maturities and borrowings:
    - (ii) In foreign exchange, it results in net exchange positions (long or short).
  - (b) *Credit Risk:* A situation when the borrower is not in a position to pay.
  - (c) *Liquidity Risk:* Same as in the case of credit risk.
2. **Translation Exposure:** This is also called the accounting exposure. It refers to and deals with the probability that the firm may suffer a decrease in assets value due to devaluation of a foreign currency even if no foreign exchange transaction has occurred during the year. This exposure needs to be measured so that the financial statements i.e the balance sheet and the income statement reflect the change in value of assets and liabilities.
  3. **Economic Exposure:** The economic exposure refers to the probability that the change in foreign exchange rate will affect the value of the firm. Since the intrinsic value of the firm is equal to the sum of the present values of future cash flows discounted at an appropriate rate of return, the risk contained in economic exposure requires a determination of the effect of changes in exchange rates on each of the expected future cash flows.

### Question 8

*Differentiate between Ask price and Bid price.*

## Answer

The Ask Price is the rate at which the foreign exchange dealer asks its customers to pay in local currency in exchange of the foreign currency. In other words, ask price is the selling rate or the offer rate and refers to the rate at which the foreign currency can be purchased from the dealer. On the other hand, the Bid price is the rate at which the dealer is ready to buy the foreign currency in exchange for the domestic currency. So, the bid price is the rate which the dealer is ready to pay in domestic currency in exchange for the foreign currency and therefore, it is the buying rate.

## Question 9

*What is the role of Company Secretary as a forex manager?*

## Answer

### Company Secretary as a forex manager

The developments in international trade have resulted in the emergence of a new brand of manager called the forex manager. The forex manager is a category apart from the finance manager or the treasury manager. He has to transact with dealers, brokers and bankers in the foreign exchange market. He has to face special kind of risk. Yet his vocation is full of opportunities and challenges. For effective management of forex transactions, the forex manager is expected to have awareness of historical development of world trade, ability to forecast future trends in exchange movements, have comparative analysis skills, have in-depth knowledge of forex market and movement of interest rates,. He should also be able to hedge his position. By virtue of their training and education, a company secretary is competent in dealing with all these situations.

## Practical Questions

### Question 10

*On 25th March 2012, a customer requested his bank to remit DG 12,50,000 to Holland in payment of import of diamonds under an irrevocable LC. However due to bank strikes, the bank could affect the remittance only on 2nd April 2012. The inter-bank market rates were as follows-*

Place	25.03.2012	02.04.2012
Bombay [US \$/Rs. 100]	2.2873 - 2.2962	2.3063 - 2.3159
London[US\$/Pound]	1.9120 - 1.9135	1.9050 - 1.9070
DG/Pound	4.1125 - 4.1140	4.0120 - 4.0130

*The bank wishes to retain an exchange margin of 0.25%. How much does the customer stand to gain or lose due to the delay?*

## Answer

### 1. Determination of Rupee Value of DG 1 on 25.03.2012

**Process:** Buy US \$ at Ask Rate at Bombay

⇒ Buy Pound (using US \$) at Ask Rate at London

⇒ Sell Pound at Bid Rate for DG

Therefore, Rs. / DG = Ask Rate at Bombay (for Purchase of Dollar) X Ask Rate for Pound at London (for Purchase of Pound) X Bid Rate for DG (for conversion of Pound into DG) =  $100/2.2873 \times 1.9135 \times (1/4.1125) = \text{Rs. } 20.34 \text{ per DG}$

## 2. Determination of Rupee Value of DG 1 on 02.04.2012

**Process:** Buy US \$ at Ask Rate at Bombay

⇒ Buy Pound (using US \$) at Ask Rate at London

⇒ Sell Pound at Bid Rate for DG

Therefore, Rs. / DG = Ask Rate at Bombay (for Purchase of Dollar) X Ask Rate for Pound at London (for Purchase of Pound) x Bid Rate for DG (for conversion of Pound into DG)

=  $100/2.3063 \times 1.9070 \times (1/4.0120) = \text{Rs. } 20.61 \text{ per DG}$

## 3. Loss because of Delay

**(a) Loss without considering Banker's Margin (Extra Money payable by the Company)**

= Amount Payable x (Exchange Rate on the date of actual payment - Exchange Rate on the date on which payable) =  $\text{DG } 12,50,000 \times (\text{Rs. } 20.61 - \text{Rs. } 20.34) = \text{Rs. } 3,37,500$

**(b) Banker's Margin on Loss** =  $\text{Rs. } 3,37,500 \times 0.25\% = \text{Rs. } 844$

**(c) Total Loss to the Company** =  $\text{Rs. } 3,37,500 + \text{Rs. } 844 = \text{Rs. } 3,38,344$

## Question 11

Mr. Amit has the following quotes from Bank X and Bank Y—

	Bank X	Bank Y
Spot	USD/CHF 1.4650/55	USD/CHF 1.4653/60
3 Months	5/10	
6 Months	10/15	
Spot	GBP/USD 1.7645/60	GBP /USD 1.7640/50
	25/20	
	35/25	

Calculate —

(a) How much minimum CHF amount Mr. Amit has to pay for 1 Million GBP spot?

(b) Considering quotes from Bank X only, for GBP / CHF, what are the Implied Swap Points for spot over 3 months?

**Answer**

**1. Determination of Exchange Rates based on Cross Currency Quotes**

**Note:** The Cheapest available Quote among Bank X and Bank Y has been chosen wherever applicable.

For Buying GBP using CHF, the relevant rate is the ask rate for GBP in CHF

$$\begin{aligned} \text{Ask}_{\text{CHF/GBP}} &= \text{Ask Rate}_{\text{CHF/USD}} \times \text{Ask Rate}_{\text{USD/GBP}} \\ &= 1 / (\text{Bid Rate}_{\text{USD/CHF}}) \times 1 / (\text{Bid Rate}_{\text{GBP/USD}}) \\ &= (1 \div 1.4653) \times (1 \div 1.7645) = 0.3868 \end{aligned}$$

Therefore to buy 1 Million GBP, the required CHF = 10,00,000 X 0.3868 = CHF 386848.30

$$\begin{aligned} \text{Similarly, Bid}_{\text{CHF/GBP}} &= \text{Bid}_{\text{CHF/USD}} \times \text{Bid}_{\text{USD/GBP}} \\ &= 1 / (\text{Ask Rate}_{\text{USD/CHF}}) \times 1 / (\text{Ask Rate}_{\text{GBP/USD}}) \\ &= (1 \div 1.4655) \times (1 \div 1.7650) = 0.3866 \end{aligned}$$

**2. Determination of Swap Points based on Bank X Quotes alone**

**The Spot Rates for GBP/CHF -**

$$\begin{aligned} \text{Bid}_{\text{GBP/CHF}} &= \text{Bid}_{\text{USD/CHF}} \times \text{Bid}_{\text{GBP/USD}} \\ &= 1.4650 \times 1.7645 = 2.5850 \end{aligned}$$

$$\begin{aligned} \text{Ask}_{\text{GBP/CHF}} &= \text{Ask}_{\text{USD/CHF}} \times \text{Ask}_{\text{GBP/USD}} \\ &= 1.4655 \times 1.7660 = 2.5881 \end{aligned}$$

**The Futures Rates for GBP/CHF -**

$$\begin{aligned} \text{Bid}_{\text{GBP/CHF}} &= \text{Bid}_{\text{USD/CHF}} \times \text{Bid}_{\text{GBP/USD}} \\ &= 1.4655 \times 1.7620 = 2.5822 \end{aligned}$$

$$\begin{aligned} \text{Ask}_{\text{GBP/CHF}} &= \text{Ask}_{\text{USD/CHF}} \times \text{Ask}_{\text{GBP/USD}} \\ &= 1.4665 \times 1.7640 = 2.5869 \end{aligned}$$

The implied SWAP points is the difference between the Spot and Forward rates = **0.0028/0.0012 or 28/12.**

**Question 12**

Following information is given:

\$/£	1.3670/1.3708
S.Fr/DEM	1.0030/1.0078

$\$/S.Fr$	$0.8790 / 0.8803$
And if DEM / £ in the market are 1.5560 /1.5576	

Find out if any arbitrage opportunity exists.

If so, show how \$10,000 available with Mr. X can be used to generate risk-less profit.

## Answer

### 1. Calculation of Cross Rate

$$(a) \text{ Bid}_{[DEM/\pounds]} = \text{Bid}_{[\$/\pounds]} \times \text{Bid}_{[S.Fr./\$]} \times \text{Bid}_{[DEM/S.Fr.]}$$

$$= \text{Bid}_{[\$/\pounds]} \times 1 / \text{Ask}_{[\$/S.Fr.]} \times 1 / \text{Ask}_{[S.Fr./DEM]}$$

$$= 1.3670 \times 1 / 0.8803 \times 1 / 1.0078 = 1.54086$$

$$(b) \text{ Ask}_{[DEM/\pounds]} = \text{Ask}_{[\$/\pounds]} \times \text{Ask}_{[S.Fr./\$]} \times \text{Ask}_{[DEM/S.Fr.]}$$

$$= \text{Ask}_{[\$/\pounds]} \times 1 / \text{Bid}_{[\$/S.Fr.]} \times 1 / \text{Bid}_{[S.Fr./DEM]}$$

$$= 1.3708 \times 1 / 0.8790 \times 1 / 1.0030 = 1.55483$$

	Cross Rate	Market Rate
DEM / £	1.54086 - 1.55483	1.5560 - 1.5576

Since both the rates are apart there exist an arbitrage opportunity.

### Arbitrage

Sell US \$10,000 @1.3708 =Receive £7,295.01 (US \$10,000 ÷ 1.3708)
Sell £ at the available DEM / £ 1.5560 =Receive DEM 11,351.04 (£7,295.01 x 1.55560)
Sell DEM 11,351.04 @1.0030 =Receive S.Fr. 11,385.09 (DEM 11,351.04 x 1.003)
Sell S. Fr 11,385.09 @ 0.8790 =Receive US \$10,007.49 11,385 x 0.8790
Gain of US \$ 7.49

### Question 13

Vikrant Ltd., an Indian company, has an export exposure of ₹ 100 lakh value at September end. Yen is not directly quoted against rupee. The current spot rates are INR/USD = 62.685 and JPY/USD = 194.625. It is estimated that Yen will depreciate to 216 level and rupee to depreciate against dollar to 64.50. Forward rate for September, 2013 was JPY/USD = 206.025 and INR/ USD = 64.335. If the spot rate on 30th September, 2013 was eventually INR/ USD = 64.17 and JPY/USD = 206.775, is the decision to take forward cover justified?

### Answer

#### Working Notes

##### 1. Calculation of Exchange rates

$$\text{Exchange Rate}_{(\text{INR}/\text{JPY})} = \text{Exchange rate}_{(\text{INR}/\text{USD})} \times \text{Exchange Rate}_{(\text{USD}/\text{JPY})}$$

Rate (INR/JPY)	Computation
Spot Rate	= [62.685] * [1/194.625] = 0.3221 = Rs.32.21 per 100 JPY
Expected Rate	= [64.5]* [1/216] = 0.2986 = Rs.29.86 per 100 JPY
Forward Rate	= [64.335] * [1/206.025] = 0.3123 = Rs.31.23 per 100 JPY
Spot Rate as on September 30 <sup>th</sup> 2013	= [64.17] * [1/206.775] = 0.3103 = Rs.31.03 per 100 JPY

##### (i) Expected Loss if the Forward Contract is not undertaken

Particulars	Rs.
Exposure of 100 lakhs Yen at Current Spot Rate of Rs.32.21 per 100 yen	32,21,000
Exposure of 100 lakhs Yen at Estimated Rate of Rs.29.86 per 100 yen	29,86,000
<b>Expected Loss without Forward Cover</b>	<b>2,35,000</b>

(ii) Calculation of exposure if the Forward Contract is undertaken

<i>Particulars</i>	<i>Rs.</i>
Exposure of 100 lakhs Yen at Forward Rate of Rs.31.23 per 100 yen	31,23,000
Exposure of 100 lakhs Yen at current spot rate Rs. 32.21 per 100 yen	32,21,000
<b>Loss due to Forward Cover [Rs.31,23,000 - Rs.32,21,000]</b>	<b>98,000</b>

(iii) Exposure in case of given forward rate

Exposure of 100 lakhs Yen at Forward Rate of Rs.31.03 per 100 yen	Rs. 31,03,000
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**Loss without forward cover Rs. 31,03,000 – Rs. 32,21,000 = Rs.1,18,000. Hence decision to take forward cover is justified.**

#### Question 14

*The following 2 – way quotes appears in the foreign exchange market –*

	<i>Spot Rate</i>	<i>2-Months Forward</i>
<i>Rs./ US \$</i>	<i>Rs. 46.00/ Rs. 46.25</i>	<i>Rs. 47.00/ Rs. 47.50</i>

*Required –*

- How many US Dollars should a firm sell to get Rs. 25 Lakhs after two months?*
- How many Rupees is the firm required to pay to obtain US \$2,00,000 in the spot market?*
- Assume the firm has US \$ 69,000 current account's earning interest. ROI on Rupee Investment is 10% p.a. should the firm encash the US \$ now or 2 months later?*

#### Answer

##### 1. US dollars for Rs. 25 Lakhs in the forward Market

<i>Action</i>	<i>Sell Foreign Currency in Forward Market</i>
Relevant Rate	Forward Bid Rate = Rs. 47.00
US \$ Required to get Rs. 25,00,000	25,00,000 ÷ Rs. 47.00 = US \$ 53,191.49

## 2. Required to obtain US dollars 2,00,000 in the Spot Market

<i>Action</i>	<i>Buy Foreign Currency in Spot Market</i>
Relevant Rate	Spot Ask Rate = Rs. 46.25
Rupees Required to obtain \$2,00,000	US \$ 2,00,000 x Rs. 46.25 = US \$= Rs. 92,50,000

## 3. Evaluation of Investment in Rupee

<i>Particulars</i>	<i>Encash Now</i>	<i>Encash 2 Months Later</i>
Relevant Rate	Spot Bid Rate = 46.00	Forward Bid Rate = 47.00
Available for US \$ 69,000	31,74,000	32,43,000
<b>Add:</b> Interest for 2 Months (if converted now)	52,900 (31,74,000 x 10% x 2/12)	Not Applicable
<b>Amount Available after Two Months</b>	<b>32,26,900</b>	<b>32,43,000</b>

**Conclusion:** Encashing two months later yields higher Rupee Return than encashing now and investing in Rupee Deposits. Therefore, the firm should wait for two months to encash under forward market.

### Question 15

*Jasmine Ltd. is engaged in the production of synthetic yarn and is planning to expand its production. In this context, the company is planning to import a multi-purpose machine from Osaka in Japan at a cost of ₹2,400 lakh. The company is in a position to borrow funds to finance import at 12% interest per annum with quarterly rests. India-based Osaka branch has also offered to extend credit of 90-days at 2% per annum against opening of an irrevocable letter of credit. Other information are as under:*

*Present exchange rate : 100 = ₹246*

*90-day forward rate : 100 = ₹250*

*Commission charges for letter of credit is 4% per 12 months. Advise, whether the offer from the foreign branch should be accepted.*

**Answer**

Option I: Financing import by borrowing @ 12% p.a.

Cost of machine

*Rs. in Lakh*

2,400 lakh yen in Rs. ( @ Rs. 100 = 246 yen)	975.61
Add: interest @ 3% for the quarter	29.27
Total outflow (1)	1,004.88

Option II: offer from foreign branch

*Rs. In Lakhs*

Cost of letter of credit (commission) @ 1% (for quarter) on 2400 Lakh Yen @ Rs.100 per 246 yen	9.76
Add: Interest for quarter (3% on Rs. 9.76 Lakhs)	0.29
Total (a)	10.05

Payment at the end of 90 days

Cost of machine	2,400 lakh yen
Interest at 2% p.a. ( $2,400 \times 2/100 \times 90/365$ )	11.84 lakh yen
Total	2411.84 lakh yen
Conversion cost at Rs. 100 = 250 Yen	
Conversion cost of 2,411.84 lakhs yen ( $2,411.84 \times 100/250$ ) (b)	Rs. 964.74lakh
Total cost (a) + (b) (Rs. 964.74 lakh + Rs. 10.05 lakh)	Rs. 974.79 lakh

*Recommendation:*

Option II, that is offer from foreign branch is cheaper and hence better. Therefore, it should be accepted.

### Question 16

Radhika Papers Ltd. (RPL) on 1st July 2012 entered into a 3 Month forward contract for buying GBP 1,00,000 for meeting an import obligation. The relevant rates on various dates are-

<b>Date</b>	<b>Nature of Quote</b>	<b>Quote</b>
01.07.2012	Spot	Rs. 81.50 - 81.85
3-Month Forward	Rs. 81.90 - 82.30	
01.08.2012	Spot	Rs. 82.10- 82.40
2-Month Forward	Rs. 82.25 - 82.60	
01.09.2012	Spot	Rs. 81.70 - 82.05
1-Month Forward	Rs. 82.00 - 82.30	
2-Month Forward	Rs. 82.40 - 82.70	
01.10.2012	Spot	Rs. 82.50 - 82.75
1-Month Forward	Rs. 82.60 - 82.90	

Explain the further course of action if RPL—

(a) Honours the contract on:

- 01.10.2012
- 01.09.2012; and meets the import obligation on the same date.

(b) Cancels the contract on:

- 01.08.2012
- 01.09.2012
- 01.10.2012; as the import obligation does not materialize.

(c) Rolls over the contract for:

- 2 Months on 01.09.2012
- 1 Month on 01.10.2012; as the import obligation gets postponed to 01.11.2012. Also determine the cost / gain of that action. Ignore transaction costs.

**Answer**

(a) RPL honours the contract on:

<i>On (Date)</i>	<i>Action</i>	<i>Cost/ Gain</i>
01.10.2012	No Further Action	NIL
01.09.2012	<ul style="list-style-type: none"> <li>• Original deal (Buy Contract) should be cancelled.</li> <li>• Sell Forward : Therefore, APL should enter into a 1-Month Forward Contract for sale of GBP 1,00,000 at 82.00 (Forward Bid Rate) for reversal of original contract.</li> <li>• Settlement of Difference : Net difference between the original contract and the new contract should be settled i.e. GBP 1,00,000 X (3-Month Buy Rate (Ask Rate) as on 01.07.2012 Rs. 82.30 Less 1-Month Sell Rate (Bid Rate) as on 01.09.2012 Rs. 82.00) = Rs. 30,000 to be paid to the Banker.</li> <li>• Buy Spot: Buy GBP 1.00.000 at Spot Ask Rate of Rs. 82.05 and settle the import obligation.</li> </ul>	Cost of Settlement 30,000.

(b) RPL Cancels the Contract

<i>On (Date)</i>	<i>Action</i>	<i>Cost/Gain</i>
01.08.2012	<ul style="list-style-type: none"> <li>• Original deal (Buy Contract) should be cancelled.</li> <li>• <i>Sell Forward</i> : Therefore, RPL should enter into a 2-Month Forward Contract for sale of GBP 1,00,000 at Rs. 82.25 (Forward Bid Rate) for reversal of original contract.</li> <li>• <i>Settlement of Difference</i> : Net difference between the original contract and the new contract should be settled i.e. GBP 1,00,000 X (3-Month Buy Rate (Ask Rate) as on 01.07.2012 Rs. 82.30 Less 2-Month Sell Rate (Bid Rate) as on 01.08.2012 Rs. 82.25)</li> <li>• 5,000 to be paid to the Banker.</li> </ul>	Cost of Cancellation 5,000.

<i>On (Date)</i>	<i>Action</i>	<i>Cost / Gain</i>
01.09.2012	<p>Original deal (Buy Contract) should be cancelled.</p> <ul style="list-style-type: none"> <li>• Sell Forward: Therefore, RPL should enter into a 1-Month Forward Contract for sale of GBP 1,00,000 at Rs. 82.00 for reversal of original contract.</li> <li>• Settlement of Difference : Net difference between the original contract and the new contract should be settled i.e. GBP 1,00,000 x (3-Month Buy Rate (Ask Rate) as on 01.07.2012 Rs. 82.30 Less 1-Month Sell Rate (Buy Rate) as on 01.09.2012 Rs. 82.00) = Rs. 30,000 to be paid to the Banker.</li> </ul>	Cost of Cancellation 30,000

01.10.2012	<ul style="list-style-type: none"> <li>• Original deal (Buy Contract) should be cancelled.</li> <li>• Sell Spot : Therefore. RPL should sell GBP 1,00,000 at the Spot Bid Rate of Rs. 82.50 for reversal of original contract.</li> <li>• Settlement of Difference: Net difference between the original contract and the spot sale contract should be settled i.e. GBP 1,00,000 x (3-Month Buy Rate-(Ask Rate) as on 01.07.2012 Rs. 82.30 Less Spot Bid Rate as on 01.10.2012 Rs. 82.50) = (Rs. 20,000) i.e. Rs. 20,000 to be received from the Banker.</li> </ul>	Gain on Cancellation 20,000.
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**(c) RPL Rolls over the Contract for a further period of Two Months**

<i>On (Date)</i>	<i>Action</i>	<i>Cost / Gain</i>
01.09.2012	<ul style="list-style-type: none"> <li>• Original deal (Buy Contract) should be cancelled.</li> <li>• Sell Forward: Therefore, RPL should sell GBP 1,00,000 at the 1-Month Forward Bid Rate of Rs. 82.00 for reversal of original contract.</li> <li>• Settlement of Difference: Net difference between the original 3-Month Forward Buy</li> </ul>	Cost of Roll Over 30,000.

	<p>Contract and 1-Month Forward Sell Contract should be settled i.e. GBP 1,00,000 X (3-Month Buy Rate (Ask Rate) as on 01.07.2012 Rs. 82.30 Less 1-Month Sell Rate (Bid Rate) as on 01.09.2012 Rs. 82.00) = Rs. 30,000 i.e. Rs. 30,000 to be paid to the Banker.</p> <ul style="list-style-type: none"> <li>Buy Forward: RPL should buy GBP 1,00,000 at 2-Month Forward Ask Rate of Rs. 82.70.</li> </ul>	
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01.10.2012	<ul style="list-style-type: none"> <li>Original deal (Buy Contract) should be cancelled.</li> <li>Sell Spot: Therefore. RPL should sell GBP 1,00,000 at the Spot Bid Rate of Rs. 82.50 for reversal of original contract.</li> <li>Settlement of Difference: Net difference between the original 3-Month Forward Buy Contract and the Spot Bid Rate of Rs. 82.50 should be settled i.e. GBP 1,00,000 x (3-Month Buy Rate (Ask Rate) as on 01.07.2012 Rs. 82.30 Less Spot Bid Rate as on 01.10.2007 Rs. 82.50) = (Rs. 20,000) i.e. Rs. 20,000 to be received from the Banker.</li> <li>Buy Forward: RPL should buy GBP 1,00,000 at 1-Month Forward Ask Rate of Rs. 82.90.</li> </ul>	Gain on Roll Over 20,000.
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### Question 17

*Sunny Ltd. (SL), have exported goods to UAE for UAE Dirham(AED)5,00,000 at a credit period of 90 days. Rupee is appreciating against the AED and SL is exploring alternatives to mitigate loss due to AED Depreciation. From the following information, analyze the possibility of Money Market Hedge —*

<i>Foreign Exchange Rates</i>			<i>Money Market Rates</i>		
	<i>Bid</i>	<i>Ask</i>		<i>Deposit</i>	<i>Borrowings</i>
<i>Spot</i>	<i>Rs. 11.50</i>	<i>Rs. 11.80</i>	<i>AED</i>	<i>9%</i>	<i>12%</i>
<i>3-Month Forward</i>	<i>Rs. 11.20</i>	<i>Rs. 11.40</i>	<i>Rupees</i>	<i>8%</i>	<i>10%</i>

## Answer

### Inference:

- ⇒ AED 5,00,000 Receivable is an Asset
- ⇒ Under Money Market Hedge, liability in AED should be created
- ⇒ SL should borrow AED for 3 Months, which along with interest would amount to AED 5,00,000 in 3 Months.

Action	Date	Activity
<b>Borrow</b>	Now	Borrow an amount of AED at 12% p.a. for 3 Months so that, the total liability including interest for 3 months, is AED 5,00,000. ⇒ $AED\ 5,00,000 \div (1 + \text{Interest Rate for 3 Months})$ ⇒ $AED\ 5,00,000 \div (1 + 12\% \times 3\ \text{Months} / 12\ \text{Months})$ ⇒ $AED\ 5,00,000 \div 1.03 = UA\ 4,85,436.8932$ should be borrowed.
<b>Convert</b>	Now	Convert AED 98,765.4321 into Rupees at Spot Rate (Bid Rate since AED is sold) ⇒ $AED\ 4,85,436.8932 \times Rs.\ 11.50 = Rs.\ 55,82,524$
<b>Invest</b>	Now	Invest Rs. 55,82,824 in Rupee Deposit for 3 Months at 8% p.a.
<b>Realize</b>	3 Months hence	Realize the maturity value of rupee deposit. Amount received will be - ⇒ $Rs.\ 55,82,524 \times (1 + \text{Interest Rate for 3 Months})$ ⇒ $Rs.\ 55,82,524 \times (1 + 8\% \times 3\ \text{Months} / 12\ \text{Months})$ ⇒ $Rs.\ 55,82,524 \times (1 + 0.02) = Rs.\ 55,82,524 \times 1.02 = Rs.\ 56,94,175$
<b>Receive</b>	3 Months hence	Receive the AED 5,00,000 from the customer abroad.
<b>Repay</b>	3 Months hence	Repay the AED Loan using the money received from the customer abroad. Amount Payable = Amount Borrowed AED 4,85,436.8932 X (1 + 12% p.a. for 3 Months) = AED 4,85,436.8932 x 1.03 = AED 5,00,000.

## 2. Amount saved by utilizing Money Market Hedge

**Action:** Enter into a 3-Month Forward Sale Contract for sale of AED 5,00,000 at Rs. 11.20.  
Sell AED 5,00,000 3 Months from now at Rs. 11.20

**Effect:** Amount in Rs. in hand in 3 Months = AED 5,00,000 X 1.20 = Rs. 56,00,000

### Amount Saved under Money Market Hedge

Under Money Market Hedge is Rs. 56,94,175

**Less:** Under Forward Contract is Rs. 56,00,000

**Amount Saved** Rs. 94,175

**Conclusion:** Hedging risks using Money Market Operations will be advantageous to SL.

### Question 18

*An Indian importer has to settle an import bill for \$1,30,000. The exporter has given the Indian exporter two options :*

*(i) Pay immediately without any interest charges.*

*(ii) Pay after three months with interest @ 5% per annum.*

*The importer's bank charges 15% per annum on overdrafts. The exchange rates in the market are as follows : Spot rate (Rs./\$) : 48.35/48.36 3-Month forward rate (Rs./\$): 48.81/48.83 The importer seeks your advice. Give your advice.*

### Answer

Evaluation of two options offered by exporter for settlement of payment

Option I: Pay immediately without any interest charges

(a) Bill value converted to Indian rupees ( $\$ 1,30,000 \times \text{Rs. } 48.36$ ) =	Rs. 62,86,800
(b) Interest on the borrowing from bank (o/d) @ 15% p.a. For three months $\text{Rs. } 62,86,800 \times 15/100 \times 3/12 =$	<u>Rs. 2,35,755</u>
Total :	Rs. 65,22,555
Option II: Pay after 3 months with interest @ 5% p.a.	
(a) Bill value	\$ 1,30,000
(b) Interest @ 5% p.a. for 3 months $= \$ 1,30,000 \times 0.05 \times 0.25$	<u>\$ 1,625</u>
	\$ 1,31,625
(c) Forward Rs./\$ rate ( $\$ 1,31,625 \times \text{Rs. } 48.83$ ) =	Rs. 64,27,249
Difference in outflows in Option I and Option II $= \text{Rs. } 65,22,555 - \text{Rs. } 64,27,249$ $= \text{Rs. } 95,306.$	

*Advice :* it is advisable to settle bill payable after three months since rupee outflow is less by Rs. 95,306.

### Question 19

The spot exchange rate is Rs.15/€ and the three months forward exchange rate is Rs.15.20/€. The three month interest rate is 8% per annum in India and 5.8% per annum in Germany. Assume that you can borrow as much as Rs.15 lakh or € 10 lakh.

- (i) Determine whether the interest rate parity is currently holding.
- (ii) How would you carry out covered interest arbitrage ? Show all steps and determine the arbitrage profit.

### Answer

(i) Spot Exchange Rate = Rs.15/€

3 months forward exchange = 15.20/€

3 months interest rate = 8% p.a. (India)

3 months interest rate = 5.8% p.a. (Germany)

For interest rate parity to hold true

$$(1 + r_h) = F/S (1 + r_f)$$

$r_h$  = rate of interest in home currency

$r_f$  = rate of interest in foreign currency

$$\text{LHS} = (1 + 0.02)$$

$$\text{RHS} = (1 + r_f) (F/S) = (1.0145) (1.52/1.50) = 1.0280 \text{ (€ return)}$$

Since LHS  $\neq$  RHS, Interest Rate Parity does not hold exactly.

(ii) Step 1 Borrow Rs.15 lakh, repayment will be Rs.15,30,000.

Step 2 buy € 10,00,000 using spot rate

Step 3 invest €10 lakh at the Germany interest rate, maturity value will be € 10,14,500

Step 4 sell €10,14,500 forward for Rs.15,42,040

Arbitrage Profit = Rs.12,040.

### Question 20

A Mobile phone is priced at \$ 105.00 at Chicago. The same mobile phone is priced at Rs. 4,250 in Delhi. Determine Exchange Rate in Delhi.

(a) If, over the next one year, price of the Mobile phone increases by 7% in Delhi and by 4% in Chicago, determine the price of the mobile phone at Delhi and Chicago? Also determine the exchange rate prevailing at Chicago for Rs. 100.

(b) Determine the appreciation or depreciation in Re. in one year from now.

## Answer

### 1. Exchange Rate in Delhi (Purchasing Power Parity Theory)

Exchange Rate in Delhi per \$ = mobile phone price in Rs. at Delhi / mobile phone price in \$ at Chicago

$$= \text{Rs. } 4,250 \div \text{USD } 105 = \text{Rs. } 40.4762$$

### 2. Price in a Year's time

Delhi = Prevailing Price x (1 + Increase in Rate) = Rs. 4250 X (1 + 7%)

$$= \text{Rs. } 4,250 \times 1.07 = \text{Rs. } 4,547.50$$

Chicago = Prevailing Price x (1 + Increase in Rate) = USD 105 X (1 + 4%)

$$= \text{USD } 105 \times 1.04 = \text{USD } 109.20$$

### 3. Exchange Rate in Chicago (after one year)

Exchange Rate in Chicago per Rs. 100 = Mobile phone price in \$ at Chicago / Mobile phone price in Rs. at Delhi x Rs. 100

$$= (\text{USD } 109.20 \div \text{Rs. } 4,547.50) \times \text{Rs. } 100 = \text{USD } 2.4013$$

### 4. Depreciation (in %) of Re. over the year

Depreciation = [(1 + Indian Inflation Rate) / (1 + US Inflation Rate)] - 1

$$= [(1 + 7\%) / (1 + 4\%)] - 1 = 1.07 / 1.04 - 1 = 2.88\%$$

Alternatively = (Future Spot Rate Rs. / \$ - Spot Rate of Rs. / \$) ÷ Spot Rate X 100

Future Spot = Mobile phone Price in Delhi / Mobile phone Price in Chicago in one year

$$= \text{Rs. } 4,547.50 / \text{USD } 109.20$$

$$= \text{Rs. } 41.6438$$

Depreciation = { (Future Spot Rs. 41.6438 - Spot Rate Rs. 40.4762) ÷ Spot Rate Rs. 40.4762} x 100

$$= \text{Rs. } \{1.1676 \div \text{Rs. } 40.4762\} \times 100 = 2.88\%$$

## Question 21

*You sold Hong Kong \$1,00,00,000 value spot to your customer at Rs.5.70/HK \$ and covered yourself in London market on the same day, when the exchange rates were : US \$1=HK \$7.5880 and HK \$7.5920. Local inter-bank market rates for US\$ were – Spot US \$1=Rs.42.70 and Rs.42.85. Calculate — (i) cover rate; and (ii) ascertain profit or loss in transaction. Ignore taxation.*

## Answer

In this case, the cover rate can be calculated as the Cross Rate between Rs. and HK \$ in the London market. The cross rates in the London Market can be stated as follows:

$$\frac{\text{Rs.}}{\text{HK\$}} = \frac{\text{Rs.}}{\text{\$}} \times \frac{\text{\$}}{\text{HK\$}}$$

$$= \text{Rs./\$} \times \frac{1}{\text{HK\$/\$}}$$

$$= 42.85 \times 1 / 7.5880 = \text{Rs.}5.64707$$

As the rate in London is less, the HK\$ can be bought in London and the Profit is:

$$\text{Profit} = 1,00,00,000 \times (5.70 - 5.64707)$$

$$= \text{Rs. } 5,29,300$$

### Question 22

Verify whether there is any scope for covered interest arbitrage by borrowing in rupee.

<i>Rs / GBP</i>	<i>82.60/90</i>	<i>Interest rate(Annualized)</i>	<i>India</i>	<i>London</i>
<i>3 Months Forward</i>	<i>20/70</i>	<i>3 Months</i>	<i>8%</i>	<i>5%</i>
<i>6 Months Forward</i>	<i>50/75</i>	<i>6 Months</i>	<i>10%</i>	<i>8%</i>

### Answer

<i>Particulars</i>	<i>3 Months</i>	<i>6 Months</i>
A. Outflow at the end of the period	1,00,000	1,00,000
Amount Borrowed in Rs.	2,000	5,000
Add : Interest Payable-	(1,00,000 x 8% x 3 / 12 )	(1,00,000 x 10% x 6/12)
Total Outflow at the end of the period [A]	1,02,000	1,05,000

B. Inflow at the end of the Period:

a) GBP obtained by converting money borrowed at Spot Rate [Ask Rate]	GBP 1,206.2726 (1,00,000/82.90)	GBP 1,206.2726 (Rs. 1,00,000/ 82.90)
b) Invest the GBP 1206.2726 @	5% p.a. for 3 Months	8% p.a. for 6 Months
c) Interest Receivable at the end of the period	GBP 15.0784 (GBP 1,206.2726 x 5% x3 / 12 )	GBP 48.2509 (GBP 1,206.2726 x 8% x 6/12)
d) Total Amount Receivable in	GBP 1,221.3510	GBP 1,254.5235

GBP at the end of the period [a + c]		
e) Forward Rate [Bid Rate]	Rs. 82.80 [Rs. 82.60 + 0.20 Premium]	Rs. 83.10 [Rs. 82.60 + 0.50 Premium]
f) Convert GBP Received in Re. at Forward Rate [d X e] [B]	Rs. 1,01,128 [Rs. 82.80 x GBP 1,221.3510]	Rs. 1,04,251 (Rs. 83.10 x GBP 1,254.5235]
C. Total Cash Loss [A-B]	Rs. 872	Rs. 749
D. Cash Loss in % of Money Invested	0.872% [Rs. 872 /Rs. 1,00,000]	0.749% [Rs. 749/Rs. 1,00,000]

**Conclusion:** Amount of rupee received is less than the amount repaid, there is no scope for Covered interest arbitrage by borrowing in Rupee.

### Question 23

Following information is available for a Japanese exporter of electronic products:

Invoice amount is \$3,50,000.

Credit period is three months.

Exchange rates in Tokyo		Rate of interest in money market		
Particulars	Exchange rate	Currency	Deposit	Loan
Spot Rate (\$/¥)	1.5805 - 1.5865	\$	7%	9%
3 Month forward rate (\$/¥)	1.6100 - 1.6140	¥	5%	8%

Compute and show how a money market hedge can be put in place. Compare and contrast the outcome with a forward contract.

### Answer

The Given Quotes are indirect Quotes for the USD (\$) in terms of Japanese Yen (¥). The same when converted in terms of JY per USD (¥/\$) using the formula Bid Rate = (1 ÷ Ask Rate) is as follows –

Spot Rate (¥/\$) 0.6287- 0.6303

3-month Forward Rate (¥/\$) 0.6196-0.6211

**Facts:** The Exporter sell USD 3,50,000 in 3 Months

**Evaluation:** Money Market Hedge is possible only if the 3-Month Forward Rate is lower than value of Spot Bid in the next three 3 Months (computed by applying USD Borrowing Rate and JY Deposit Rate).

The Exporter should borrow USD for 3 Months, which along with interest would amount to USD 3,50,000 in 3 Months.

<i>Action</i>	<i>Date</i>	<i>Activity</i>
<b>Borrow</b>	Now	Borrow an amount of USD at 9% p.a. for 3 Months so that, the total liability including interest for 3 months, is USD 3,50,000. $\Rightarrow \text{USD } 3,50,000 \div (1 + \text{Interest Rate for 3 Months})$ $\Rightarrow \text{USD } 3,50,000 \div (1 + 9\% \times 3 \text{ Months} / 12 \text{ Months})$ $\Rightarrow \text{USD } 3,50,000 \div 1.0225 = \text{USD } 3,42,298.2885$ should be borrowed.
<b>Convert</b>	Now	Convert USD 3,42,298.2885 into JY at Spot Rate (Bid Rate since USD is sold) $\Rightarrow \text{USD } 3,42,298.29 \times 0.6287 = \text{JY } 2,15,202.93$
<b>Invest</b>	Now	Invest JY 2,15,202.93 in Yen Deposit for 3 Months at 5% p.a.
<b>Realize</b>	3 Months Hence	Realize the mature value of Yen Deposit, Amount received will be - $\Rightarrow \text{JY } 2,15,202.93 \times (1 + \text{Interest Rate for 3 Months})$ $\Rightarrow \text{JY } 2,15,202.93 \times (1 + 5\% \times 3 \text{ Months} / 12 \text{ Months})$ $\Rightarrow \text{JY } 2,15,202.93 \times (1 + 0.0125) = \text{JY } 2,17,892.97$
<b>Receive</b>	3 Months Hence	Receive the USD 3,50,000 from the customer abroad.
<b>Repay</b>	3 Months Hence	Repay the USD Loan using the money received from the customer abroad. Amount Payable = Amount Borrowed $\text{USD } 3,42,298.2885 \times (1 + 9\% \text{ p.a. for 3 Months}) = \text{USD } 3,42,298.2885 \times 1.0225 = \text{USD } 3,50,000.$

### Amount Saved by Utilizing Money Market Hedge

**Action:** Enter into a 3-Month Forward Sale Contract for sale of USD 3,50,000 at 0.6196 Sell USD 3,50,000, 3 Months from now at 0.6196

**Effect:** Amount JY in hand in 3 Months = USD 3,50,000 x 0.6196 = JY 2,16,860

### Amount Saved under Money Market Hedge

Under Money Market Hedge is JY 2,17,893

**Less:** Under Forward Contract is JY 2,16,860

**Amount Saved JY 1,033.00**

**Conclusion:** Hedging risks using Money Market Operations will be advantageous to the exporter.

### Question 24

An Indian Company Mukta Ltd. has availed the services of two London based Architects on 1<sup>st</sup> April 2012 and are required to pay GBP 50,000 in 3 Months. From the following information, advice the course of action to minimize rupee outflow -

Foreign Exchange Rates (Rs. / GBP)			Money Market Rates (p.a.)		
	Bid	Ask		Deposit	Borrowings
Spot	Rs. 81.60	Rs. 81.90	GBP	6%	9%
3 - Months Forward	Rs. 82.70	Rs. 83.00	Rupees	8%	12%

### Answer

#### (i) Forward Rate

Particulars	Rs.
Amount to be settled (Rs.)= GBP 50,000 x 3 Months forward Rate Rs. 83.00	41,50,000

#### (ii) Money Market Hedge

Action	Date	Activity
<b>Borrow</b>	01.04.2012	Borrow in Rupee at 12%, an amount equivalent to GBP, which if invested at 6% p.a., will yield GBP 50,000 in 3 Months. Therefore, GBP required to be invested

		$\Rightarrow \text{GBP } 50,000 \div (1 + \text{GBP Deposit Interest Rate for 3 Months})$ $\Rightarrow \text{GBP } 50,000 \div (1 + 6\% \text{ p.a.} \times 3 \text{ Months} / 12 \text{ Months})$ $\Rightarrow \text{GBP } 50,000 \div (1 + 1.5\%)$ $\Rightarrow \text{GBP } 50,000 \div 1.015 = \text{GBP } 49,261.0837$ Amount to be borrowed = GBP to be invested X Spot Rate (Ask Rate) = GBP 49,261.0837 x Rs. 81.90/GBP = Rs. 40,34,483
<b>Convert</b>	01.04.2012	Convert Rs. 40,34,483 into GBP at Spot Rate (Ask Rate since GBP is bought). $\Rightarrow \text{Rs. } 40,34,483 \div \text{Rs. } 81.90 / \text{GBP} = \text{GBP } 49,261.0837$
<b>Invest</b>	01.04.2012	Invest GBP 49,261.0837 in GBP Deposit for 3 Months at 6% p.a.
<b>Realize</b>	01.07.2012	Realize the maturity value of GBP Deposit along with Interest. Amount receive will be GBP 50,000
<b>Settle</b>	01.07.2012	Settle the GBP 50,000 liability to the Architects, using the maturity proceeds of the GBP Deposits.
<b>Repay</b>	01.07.2012	Repay the Rupee Loan. Amount Payable = Amount Borrowed Rs. 40,34,483 x (1 + 12% p.a. for 3 Months) = Rs. 40,34, 483 x 1.03 = Rs. 41,55,517

### Analysis and Conclusion

<i>Alternatives</i>	<i>Forward Rate</i>	<i>Money Market Hedge</i>	<i>Spot Settlement</i>
Present Value of Outflow in Rupees	Rs. 41,50,000	Rs. 41,55,517	Rs. 40,95,000

If the Company Settles now, Rupee outflow will be GBP 50,000 X 81.90 = Rs. 40,95,000

### Question 25

*Following information relates to Utkal Ltd, which manufactures spare parts of an electronic device which are exported to USA, Japan and Europe on 90 days credit terms.*

*Cost and Sales information —*

<i>Particulars</i>	<i>Japan</i>	<i>USA</i>	<i>Europe</i>
<i>Variable Cost per Unit</i>	<i>Rs. 225</i>	<i>Rs. 395</i>	<i>Rs. 510</i>
<i>Export sale price per Unit</i>	<i>Yen 650</i>	<i>US \$10.23</i>	<i>Euro 11.99</i>
<i>Receipts from sale due in 90 Days</i>	<i>Yen 78,00,000</i>	<i>US \$ 1,02,300</i>	<i>Euro 95,920</i>

*Foreign exchange rate information*

<i>Particulars</i>	<i>Yen/Rs.</i>	<i>US \$/Rs.</i>	<i>Euro/Rs.</i>
<i>Spot Market</i>	<i>2.417-2.437</i>	<i>0.0214-0.0217</i>	<i>0.0177- 0.0180</i>
<i>3-Months Forward</i>	<i>2.397-2.427</i>	<i>0.0213 - 0.0216</i>	<i>0.0176 - 0.0178</i>
<i>3 months spot</i>	<i>2.423-2.459</i>	<i>0.02144 0.02156</i>	<i>- 0.0177- 0.0179</i>

*Advice Utkal Ltd by calculating average contribution to sales ratio whether it should hedge it's foreign currency risk or not.*

**Answer**

**1. Computation of Exchange Rate (Direct Quotes)**

<i>Particulars</i>	<i>Rs. /Yen</i>		<i>Rs. /USD</i>		<i>Rs. / Euro</i>	
	<i>Bid Rate</i>	<i>Ask Rate</i>	<i>Bid Rate</i>	<i>Ask Rate</i>	<i>Bid Rate</i>	<i>Ask Rate</i>
<i>Spot Market</i>	0.410 (1/2.437)	0.414 (1/2.417)	46.08 (1/0.0217)	46.73 (1/0.0214)	55.56 (1/0.0180)	56.50 (1/0.0177)
<i>3-Months Forward</i>	0.412 (1/2.427)	0.417 (1/2.397)	46.30 (1/0.0216)	46.95 (1/0.0213)	56.18 (1/0.0178)	56.82 (1/0.0176)

3 months spot	0.407 (1/2.459)	0.413 (1/2.423)	46.38 (1 /0.02156)	46.64 (1/0.02144)	55.87 (1/0.0179)	56.50 (1/0.0177)
Higher of 3 Months forward rate and Spot rate [Bid]	0.412 [Forward]		46.38 [Spot]		56.18 [Forward]	

## 2. Computation of Contribution per Unit in Foreign Currency [Based on 3-Months Rate]

### [3-Months Forward vs. 3-Months' Spot ]

<i>Particulars</i>	<i>Japan</i>		<i>USA</i>		<i>Europe</i>	
	<i>Spot</i>	<i>Forward</i>	<i>Spot</i>	<i>Forward</i>	<i>Spot</i>	<i>Forward</i>
(a) Variable Cost per Unit	Rs. 225.00	Rs. 225.00	Rs. 395.00	Rs. 395.00	Rs. 510.00	Rs. 510.00
(b) Export sale price per Unit [Foreign Currency]	Yen 650	Yen 650	USD 10.23	USD 10.23	Euro 11.99	Euro 11.99
(a) Relevant Bid Rate	Rs. 0.407	Rs. 0.412	Rs. 46.38	Rs. 46.30	Rs. 55.87	Rs. 56.18
(b) Export Sale Proceeds p.u. [b] x (c)]	Rs. 264.55	Rs. 267.80	Rs. 474.47	Rs. 473.65	Rs. 669.88	Rs. 673.60
(c) Contribution per Unit [(d) - (a)]	Rs. 39.55	Rs. 42.80	Rs. 79.47	Rs. 78.65	Rs. 159.88	Rs. 163.60
(d) Contribution Ratio [(e) ÷ (d)]	15.0%	16.0%	16.7%	16.6%	23.9%	24.3%
(e) Advice	Hedge using Forward Cover		Do Not Hedge		Hedge using Forward Market Cover	

**Recommendation:** The Company should hedge its foreign currency risk / exposure in Japanese Yen and Euro, since by hedging, the Company stands to gain a higher Contribution to Sales Ratio and therefore, higher profit margin. However, for sale to USA, the Company need not hedge its exposure in Dollars, since movement in Spot Market is more beneficial than hedging through Forward Market Cover.

### Question 26

*Good Morning Ltd., London will have to make a payment of \$3,64,897 in six month's time. It is currently 1st October. The company is considering the various choices it has in order to hedge its transaction exposure.*

*Exchange rates:*

<i>Spot rate</i>		<i>\$1.5617 – 1.5773</i>
<i>Six month forward rate</i>		<i>\$1.5455 – 1.5609</i>
<i>Exercise Price</i>	<i>Call option (March)</i>	<i>Put option (March)</i>
<i>\$1.70</i>	<i>\$ 0.037</i>	<i>\$ 0.096</i>

*By making the appropriate calculations and ignoring time value of money (in case of Premia) decide which of the following hedging*

- (a) Forward market;*
- (b) Cash (Money) market;*
- (c) Currency options.*

### Answer

#### (a) Forward Market

<i>Particulars</i>	<i>Computation</i>	<i>Amount (\$)</i>
Amount Payable	Given	\$ 3,64,897
Amount under Forward Contract	$\$3,64,897 \div 1.5455$ (Forward Bid Rate)	£2,36,103

#### (b) Cash Money Market

<i>Particulars</i>	<i>Amount</i>
Amount Payable After 6 Months	US \$ 3,64,897
Amount to be Invested at 4.5% p.a. for realizing US \$ 3,64,897=	US \$ 3,56,867

US \$ 3,64,897 ÷ (1 + Interest Rate of 4.5% p.a. X 6/12) = \$ 3,64,897 ÷ 1.0225	
Amount be borrowed Amount to be invested in US \$ 3,64,897 ÷ 1.5617 (Spot Bid Rate)	£2,28,512
Interest payable On money borrowed @ 7% p.a. for 6 Months = Rs. 2,28,512 X 7% X 6 Months / 12 Months	£ 7,998
<b>Total Amount Payable Amount Borrowed £ 2,28,512+ Interest £ 7,998</b>	<b>£2,36,510</b>

### (c) Currency Options

Payment is to be made in Pounds after 6 months, hence Put option to sell Pounds is relevant.

#### Number of Options Contract

Value of one Options Contract = Value per unit x Exercise price = £ 12,500 x 1.70 = £21,250

Number of Contracts to be purchased = Amount payable in 6 month's time ÷ Value per contract

= 3,64,897 ÷ 21,250 = 17.17 Contracts

**Alternative 1:** 17 Options Contracts are undertaken and the balance through Forward Contract.

Value covered under Options = 17 Contracts x \$ 21,250 per Contract = \$ 3,61,250

Value under Forward Contract = Amount payable after 6 months - Value under Options

= \$ 3,64,897 - \$ 3,61,250 = \$3,647

#### Cash Flows under Options

<i>Particulars</i>	<i>Amount</i>
Value of Forward Contract in £ = (\$ 3,64,897 \$ ] ÷ 1.5455)	£ 2360
Premium Payable [\$0.096 X 17 x 12,500 = \$ 20,400 = \$ 20,400 ÷ 1.5617 (Spot Bid Rate)	£ 13,063
Value of the 17 Options Contract [ 17 x 12,500]	£2,12,500
<b>Total Outflow under Options</b>	<b>£ 2,27,923</b>

**Alternative 2:** 18 Option Contracts are undertaken and the excess Dollars are sold in the Forward Market

Value covered under Options = 18 Contracts x \$ 21,250 per Contract = \$ 3,82,500

Value sold under Forward Contract = Amount payable after 6 months - Value under Options

$$= \$3,64,897 - \$ 3,82,500 = \$17,603$$

### Cash Flows under Options

<i>Particulars</i>	<i>Amount</i>
Value of Forward Contract in £ = ( $\$ 17,063 \div 1.5609$ )	£ 11,277
Premium Payable [ $\$0,096 \times 18 \times 12,500 = \$ 21,600 = \$21,400 \div 1.5617$ (Spot Bid Rate)]	\$21,600
Value of the 18 Options Contract [ $18 \times 12,500$ ]	£ 2,25,000
Total Outflow under Options	£ 2,27,554

**Conclusion:** The Cash outflow under Options is the lowest and hence it may be undertaken.

### Question 27

*Your Company has to make a US \$ 1 Million payment in three month's time. The dollars are available now. You decide to invest them for three months and you are given the following information.*

- (i) *The US deposit rate is 8% p.a.*
- (ii) *The sterling deposit rate is 10% p.a.*
- (iii) *The spot exchange rate is S 1.80 / pound.*
- (iv) *The three month forward rate is \$ 1.78/ pound.*

*Where should your company invest for better results?*

*Assuming that the interest rates and the spot exchange rate remain as above, what forward rate would yield an equilibrium situation?*

*Assuming that the US interest rate and the spot and forward rates remain as in the original question, where would you invest if the sterling deposit rate were 14% per annum?*

*With the originally stated spot and forward rates and the same dollar deposit rate, what is the equilibrium sterling deposit rate?*

### Answer

#### (i) Invest for better results

Since the US \$ are available now, amount can be invested in

1. US \$ Deposits@ 8% p.a. or
2. Converted into Sterling Currency at the Spot Rate and invested in UK Deposits.

### Alternative 1

Particulars	Value
Invest in \$ deposits @	8% p.a. for 3 months.
Income = \$ 10,00,000 x 8/100x3/12	\$ 20,000

Gain in **Alternative 1** is higher. Hence, company should invest in US Deposits.

**(ii) Equilibrium Forward Rate 3 Months Forward; (for 1 £) = Spot Rate X [(1 + US Interest Rate for 3 Months) / (1 + Sterling Interest Rate for 3 Months)]**

$$= \$ 1.8 \times [(1 + 8\%/4) / (1 + 10\%/4)] = \mathbf{\$1.7912 / \text{£ [Interest Rate Parity Method]}}$$

$$\text{Equilibrium 3 months Forward Rate} = \$ 1.7912 / \text{£}$$

**(iii) Investment if Sterling Deposit: Rate is 14%**

<i>Particulars</i>	<i>Amount</i>
1. Amount invested in Sterling Deposit Rate	£ 5,55,556
2. Interest Income @ 14% for 3 months $\text{£ } 5,55.556 \times 14 \% \times 3 / 12$	£ 19,444
3. Total Cash Inflow at the end of 3 months [(2)+ (3)]	£ 5,75,000
4. Amount earned in US \$ = [(4) x 1.78 (Forward Rate) ]	US \$ 10,23,500
5. Gain in US \$ [10,23,500 - 10,00,000]	US \$ 23,500

**Conclusion:** Gain is highest of all the considered alternatives, therefore amount should be invested in Sterling Deposits @ 14%.

**(iv) Equilibrium Sterling Deposit Rate**

Assuming Sterling Interest Rate = x, applying the same in Interest Rate Parity Formula for determining Forward Rate:

$$1 \text{ £} = \$1.80 \times (1 + 8\%/4) / (1 + x/4) \quad 1 \text{ £} = \$1.80 \times (1 + 0.02) / (1 + x/4);$$

$$\Rightarrow \$1.78 = \$1.80 \times (1 + 0.02) / (1 + x/4):$$

$$\Rightarrow 1 + x/4 = \$1.80 \times 1.02 / \$1.78$$

$$\Rightarrow x/4 = 1.03146 - 1 = 0.03146 \text{ or } 3.146\%$$

$$\Rightarrow x = \mathbf{12.58\%}$$

Equilibrium Sterling Interest Rate = 12.58%

## Question 28

XYZ Ltd. is considering a new plan in Australia. The plan will cost 26 Million Australian Dollar (AUD). Incremental Cash Flows are expected to be 3 Million AUD per year for the first 3 years, 4 Million AUD for the next 3, 5 Million AUD in Years 7 to 9, and 6 Million AUD in years 10 through 19, after which the project will terminate with no residual value.

The present exchange rate is 1.90 AUD per dollar. The required rate of return on repatriated dollar is 16%.

(a) If the exchange rate stays at 1.90, what is the project NPV?

(b) If the AUD appreciates to 1.84 for years 1 - 3, to 1.78 for years 4-6, 1.72 for years 7-9, and to 1.65 for years 10-19, what happens to the NPV?

## Answer

### 1. Net Present Value under Fixed Exchange Rate (\$ 1 = AUD 1.90)

Particulars	Years				
	0	1 - 3	4 - 6	7 - 9	10 - 19
(a) Cash Flows in AUD	(26.00)	3.00 p.a.	4.00 p.a.	5.00 p.a.	6.00 p.a.
(b) Exchange Rate [AUD / \$]	1.90	1.90	1.90	1.90	1.90
(c) Cash Flow in \$	(13.6842) [26.00/1.90]	1.5789 [3.00/1.90]	2.1053 [4.00/1.90]	2.6312 [5.00/1.90]	3.1579 [6.00/1.90]
(d) Discount Factor @ 16%	1	2.246	1.439	0.922	1.270
(e) Discounted Cash Flow	(13.6842)	3.5462	3.030	2.4260	4.0105

Net Present Value = **US \$ (0.6714) Million**

**Recommendation:** Since the Net Present Value is negative, the project should not be accepted.

### Net Present Value under Variable Exchange Rates

Particulars	Years				
	0	1-3	4-6	7-9	10-19
Cash Flows in AUD	(26.00)	3.00 p.a.	4.00 p.a.	5.00 p.a.	6.00 p.a.
Exchange Rate [AUD / \$]	1.90	1.84	1.78	1.72	1.65
Cash Flow in \$	(13.6842) [26.00/1.90]	1.6304 [3.00/1.84]	2.2472 [4.00/1.78]	2.9070 [5.00/1.72]	3.6364 [6.00/1.65]
Discount Factor @ 16%	1	2.246	1.439	0.922	1.270
Discounted Cash Flow	(13.6842)	3.6619	3.2337	2.6803	4.6182

Net Present Value = **US \$ 0.5099 Million**

**Recommendation:** Since the Net Present Value is positive, the project **may be** accepted.

### Question 29

*Astro Ltd. is planning to import a machine from Japan at a cost of 7,640 Yen. The company can avail loan at 12% interest per annum with quarterly rests with which it can import the machine. However, there is an offer from Tokyo branch of an India-based bank extending credit of 180 days at 1.5% per annum against opening of an irrevocable letter of credit.*

*Other information :*

*Present exchange rate Rs.100 = 382 Yen*

*180-Day forward rate Rs.100 = 388 Yen*

*Commission charges for letter of credit at 2% per 12 months. Advise whether the offer from the foreign branch should be accepted?*

### Answer

*Option I (To finance the purchase by availing loan at 12 p.a.)*

Cost of machine	Rs.
7,640 yen as Rs. 100 = 382 yen =	2,000.00
Add : interest at 3% I Quarter =	60.00
Add : interest at 3% II Quarter on 2060.00 =	61.80

Total outflow in rupees = 2,121.80  
 Alternatively, interest may also be calculated on compound basis, i.e. Rs. 2,000 x (1.03)<sup>2</sup> = Rs. 2,121.80

*Option II (To accept the offer from foreign branch)*

Cost of letter credit Rs.  
 At 2% on 7640 yen as Rs. 100 = 382 yen for 6 months = 20.000  
 Add : interest I Quarter = 0.600  
 Add : interest II Quarter = 0.618  
 (A) = 21.218

Payment at the end of 180 days :

Cost = 7,640.00 yen  
 Interest at 1.5% p.a. [7640 x 1.5% x 180/365] = 56.52 yen  
 7696.52 yen

Conversion at Rs. 100 = 388 yen,

[7696.52/388 x 100] (B) Rs. 1,983.64

Total Cost : (A + B) **Rs. 2,004.86**

*Advice* : Option No. II is cheaper. Hence the offer can be accepted.

### Question 30

*Following are the details of cash and outflows in foreign currency denominations of ABC Co., an Indian export firm, which has no foreign subsidiaries —*

<i>Currency</i>	<i>Inflow</i>	<i>Outflow</i>	<i>Spot rate</i>	<i>Forward rate</i>
<i>US \$</i>	<i>4,00,00,000</i>	<i>2,00,00,000</i>	<i>48.01</i>	<i>48.82</i>
<i>French Franc (F Fr)</i>	<i>2,00,00,000</i>	<i>80,00,000</i>	<i>7.45</i>	<i>8.12</i>
<i>UK £</i>	<i>3,00,00,000</i>	<i>2,00,00,000</i>	<i>75.57</i>	<i>75.98</i>
<i>Japanese Yen</i>	<i>1,50,00,000</i>	<i>2,50,00,000</i>	<i>3.20</i>	<i>2.40</i>

(a) *Determine the net exposure of each foreign currency in terms of Rupees.*

(b) *Are any of the exposure positions off-setting to some extent?*

## Answer

### (a) Computation of Net Exposure

<i>Particulars</i>	<i>US \$</i>	<i>F Fr</i>	<i>UK £</i>	<i>Japanese Yen</i>
Inflow (in Lakhs)	400.00	200.00	300.00	150.00
Less : Outflow	(200.00)	(80.00)	(200.00)	(250.00)
Net Exposure (Foreign Currency Terms)	200.00	120.00	100.00	(100.00)
Spot Exchange Rate	48.01	7.45	75.57	3.20
Net Exposure (in Rupee Terms based on Spot Exchange Rate)	9602 [200x48.01]	894 [120 x 7.45]	7557 [100 x 75.57]	(32) [100 x 3.20/10]

<i>Particulars</i>	<i>US \$</i>	<i>F Fr</i>	<i>UK£</i>	<i>Japanese Yen</i>
Forward Rate [Rs. , FC]	48.82	8.12	75.98	2.40
Less : Spot Exchange Rate [Rs. / FC]	48.01	7.45	75.57	3.20
Forward Premium/ (Discount)	0.81	0.67	0.41	(0.80)
Net Exposure in Rupee Terms based on extent of uncertainty represented by Premium / (Discount)	162.0 [200 x 0.81]	80.4 [120 x 0.67]	41.0 [100 x 0.41]	8.0 [(100) x (0.8)/ 10]

### (b) Off Setting Position

- (i) Net Exposure in all the currencies are offset by better forward rates. In the case of USD, F Fr and UK Pound, the net exposure is receivable, and the forward rates are quoted at a premium for these currencies.
- (ii) In case of Japanese Yen, the net exposure is payable, and the forward rate is quoted at a discount. Therefore, a better forward rate is also offsetting the net payable in Japanese Yen.

### Question 31

XYZ Ltd. is an export oriented business house based in Mumbai. The Company invoices in customers' currency. Its receipt of US \$ 1,00,000 is due on September 1, 2009.

Market information as at June 1, 2009 is:

Exchange Rates		Currency Futures	
US \$/Rs.		US \$/Rs.	Contract size Rs .4,72,000
Spot	0.02140	June	0.02126
1 Month Forward	0.02136	September	0.02118
3 Months Forward	0.02127		
		Initial Margin	Interest Rates in India
June		Rs.10,000	7.50%
September		Rs.15,000	8.00%

On September 1, 2005 the spot rate US \$Re. is 0.02133 and currency future rate is 0.02134. Comment which of the following methods would be most advantageous for XYZ Ltd.

- (a) Using forward contract
- (b) Using currency futures
- (c) Not hedging currency risks.

It may be assumed that variation in margin would be settled on the maturity of the futures contract.

### Answer

**Receipts using a forward contract** =  $1,00,000/0.02127$  = Rs. 47,01,457

### Receipts using currency futures

The number of contracts needed is  $(1,00,000/0.02118)/4,72,000$  = 10

Initial margin payable is  $10 \times \text{Rs. } 15,000$  = Rs. 1,50,000

On September 1 Close at 0.02133

Receipts =  $\text{US\$}1,00,000/0.02133$  = 46,88,233

Variation Margin =  $[(0.02134 - 0.02118) \times 10 \times 472000/-]/0.02133$

OR  $(0.00016 \times 10 \times 472000)/.02133 = 755.2/0.02133$  35,406 = 47,23,639

Less: Interest Cost –  $1,50,000 \times 0.08 \times 3/12$  = 3,000

Net Receipts = 47,20,639

### Receipts under different methods of hedging

Forward contract = 47,01,457

Futures = 47,20,639

## No hedge

$$\text{US\$ } 1,00,000 / 0.02133 = 46,88,233$$

The most advantageous option would have been to hedge with futures.

## Question 32

*You are given the following information :*

$$\text{Spot rate (1 US \$)} = \text{Rs. } 48.0123$$

$$\text{180 days forward rate (1 US \$)} = \text{Rs. } 48.8190$$

$$\text{Annualised interest rate for 6 months (Rs.)} = 12\%$$

$$\text{Annualised interest rate for 6 months (US \$)} = 8\%$$

*Is there any arbitrage possibility ? If yes, how can an arbitrageur take advantage of the situation if he is willing to borrow Rs. 40,00,000 or US \$ 83,312 ?*

## Answer

$$\text{Spot rate} = \text{Rs. } 40,00,000 / \$ 83,312 = \text{Rs. } 48.0123$$

Forward premium:

$$\text{Annualized interest rate for 6 months (Rupee)} = 12\%$$

$$\text{Annualized interest rate for 6 months (US\$)} = 8\%$$

$$\text{Interest rate differential} = 12\% - 8\% = 4\%$$

Since the interest rate differential is negative in the U.S and is greater than forward premium, there is a possibility of arbitrage inflow into India.

The advantage by using Money Market arbitrage possibility can be analyzed as follows:

*Step I*

$$\begin{aligned} &\text{Borrow \$ 83,312 for 6 months Amount repayable after 6 months along with interest} \\ &= \$ 83,312 + (\$ 83,312 \times 8/100 \times 6/12) = \$ 86,644.48 \end{aligned}$$

*Step II*

Convert \$ 83,312 into Rupees and get the principal amount of Rs. 40,00,000 deposited @12% for 6 months

$$\text{Total amount at the end of 6 months} = \text{Rs. } 40,00,000 + \text{Rs. } 2,40,000 = \text{Rs. } 42,40,000$$

*Step III*

Converting the total amount at forward rate and repay the \$ borrowing

$$= \frac{\text{Rs. } 42,40,000}{48.8193} = \$ 86,851.43$$

$$\therefore \text{Net gain} = (\$ 86,851.43 - \$ 86,644.48) = \$ 206.95$$

### Question 33

An Indian exporting company Fany Ltd. would be covering itself against a likely depreciation of pound sterling. The following data is given in this regard:

Receivables of Fany Ltd.: £ 500,000

Spot rate	:	Rs. 56.00/£
Payment date	:	3-months
3 months interest rate	:	India : 12 per cent per annum UK : 5 per cent per annum

What should the exporter do?

### Answer

The following steps are required to be taken by Fany Ltd. in order to cover the risk in the money market:

- (i) Borrow pound sterling for 3 months. The borrowing has to be such that at the end of three months, the amount becomes £ 500,000.

Say, the amount borrowed is £ x.

Therefore

$$x(1+.05 \times 3/12) = 500,000 \text{ or}$$

$$x = \text{£}493,827$$

- (ii) Convert the borrowed sum into rupees at the spot rate. This gives: £493,827 × Rs. 56 = 27,654,312

- (iii) The sum thus obtained is placed in the money market at 12 per cent to obtain at the end of 3 months:

$$= 27,654,312 (1+.12 \times 3/12) = 28,483,941$$

- (iv) The sum of £500,000 received from the client at the end of 3- months is used to refund the loan taken earlier.

From the calculations. It is clear that the money market operation has resulted into a net gain of Rs. 483,941 (Rs. 28,483,941 – Rs. 500,000 × 56).

If pound sterling has depreciated in the meantime. The gain would be even bigger.

### Question 34

The rate of inflation in India it is likely to be 6.5%. and in USA is likely to be 3% per annum The current spot rate of US \$ in India is Rs. 43.40. Find the expected rate of US \$ in India after one year and 3 years from now using purchasing power parity theory.

## Answer

According to Purchasing Power Parity forward rate is equal to

$$\frac{\text{Spotrate}(1+R_h)}{(1+R_f)}$$

So spot rate after one year

$$= \text{Rs.}43.40 \frac{[(1+.065)]^1}{[(1+.03)]^1}$$

$$= \text{Rs.} 43.4 (1.03399)$$

$$= \text{Rs.} 44.8751$$

After 3 years

$$= \text{Rs.}43.40 \frac{[(1+.065)]^3}{[(1+.03)]^3}$$

$$= \text{Rs.} 43.40 (1.10544)$$

$$= \text{Rs.} 47.9761$$

## Question 35

*ABC Company sells to a wholesaler in UK. The purchase price of a shipment is 50,000 GBP with term of 90 days. Upon payment, ABC Company will convert the GBP (£) to dollars. The present spot rate for GBP (£) per dollar is 1.71, whereas the 90-day forward rate is 1.70.*

*You are required to calculate and explain:*

- (i) If ABC Company were to hedge its foreign-exchange risk, what would it do? What transactions are necessary?*
- (ii) Is the GBP at a forward premium or at a forward discount?*
- (iii) What is the implied differential in interest rates between the two countries?*

## Answer

- (i) If ABC Company were to hedge its foreign exchange risk, it would enter into forward contract of selling GBP (£) 90 days forward. It would sell 50,000 GBP (£) 90 days forward. Upon delivery of £50,000 90 days hence, it would receive US \$ 29,412 i.e. £50,000 /1.70. If it were to receive US \$ payment today it would receive US \$ 29,240 i.e. £ 50,000 /1.71. Hence, ABC Company will be better off by \$ 172 if it hedges its foreign exchange risk.
- (ii) The GBP is at a forward premium. This is because the 90 days forward rate of GBP per dollar is less than the current spot rate of GBP per dollar. This implies that GBP is expected to be strengthen i.e. Fewer GBP
- (iii) The interest rate parity assumption is that high interest rates on a currency are offset by forward discount and low interest rate on a currency is offset by forward

premiums. Further, the spot and forward exchange rates move in tandem, with the link between them based on interest differential. The movement between two currencies to take advantage of interest rates differential is a major determinant of the spread between forward and spot rates.

The forward discount or premium is approximately equal to interest differential between the currencies i.e.

$$\text{Or } \frac{(F_{\text{GBP/USD}} - S_{\text{GBP/USD}}) \times 365}{90} = R_{\text{GBP}} - R_{\text{USD}}$$

$$\text{Or } \frac{(1.70 - 1.71) \times 365}{1.71} = R_{\text{GBP}} - R_{\text{USD}}$$

$$\text{Or } -0.0237 = R_{\text{GBP}} - R_{\text{USD}}$$

Therefore, the differential in interest rate is -2.37%, which means if interest rate parity holds, interest rate in the US should be 2.37% higher than in UK.

### Question 36

*An importer requests his bank to extend the forward contract for US\$ 20,000 which is due for maturity on 30th October, 2012, for a further period of 3 months. He agrees to pay the required margin money for such extension of the contract.*

*Contracted Rate - US\$ 1 = Rs. 42.32*

*The US Dollar quoted on 30-10-2012:*

*Spot - 41.5000/41.5200*

*3 months' Premium -0.87% /0.93%*

*Margin money for buying and selling rate is 0.075% and 0.20% respectively.*

*Compute:*

- (i) The cost to the importer in respect of the extension of the forward contract, and*
- (ii) The rate of new forward contract.*

### Answer

- (i) The contract is to be cancelled on 30-10-2012 at the spot buying rate of US\$ 1 = 41.5000

*Less : Margin Money 0.075% = 0.0311 = 41.4689 or 41.47*

*US\$ 20,000 @ Rs. 41.47 = Rs. 8,29,400*

*US\$ 20,000 @ Rs. 42.32 = Rs. 8,46,400*

*The difference in favour of the Bank/Cost to the importer 17,000*

- (ii) The Rate of New Forward Contract

*Spot Selling Rate US\$ 1 = Rs. 41.5200*

Add : Premium @ 0.93% = Rs. 0.3861 = Rs. 41.9061

Add : Margin Money 0.20% = Rs. 0.0838 = Rs. 41.9899 or Rs. 41.99

### Question 37

*A Ltd. an Australian firm will need £ 3,00,000 in 180 days. In this connection, the following information is available:*

*Spot rate 1 £ = AUD 2.00*

*180 days forward rate of £ as of today = AUD1.96*

*Interest rates are as follows:*

	<i>U.K.</i>	<i>Australia</i>
<i>180 days deposit rate</i>	<i>4.5%</i>	<i>5%</i>
<i>180 days borrowing rate</i>	<i>5%</i>	<i>5.5%</i>

*A call option on £ that expires in 180 days has an exercise price of AUD 1.97 and a premium of AUD 0.04. A Ltd. has forecasted the spot rates 180 days hence as below:*

	<i>Future rate</i>	<i>Probability</i>
<i>AUD</i>	<i>1.91</i>	<i>25%</i>
<i>AUD</i>	<i>1.95</i>	<i>60%</i>
<i>AUD</i>	<i>2.05</i>	<i>15%</i>

*Which of the following strategies would be most preferable to A Ltd.?*

*(a) A forward contract;*

*(b) A money market hedge;*

*(c) An option contract;*

*(d) No hedging.*

*Show calculations in each case*

### Answer

**(a)** Forward contract: AUD needed in 180 days = £3,00,000 x AUD 1.96 = AUD 5,88,000/-

**(b)** Money market hedge: Borrow AUD, convert to £, invest £, repay AUD loan in 180 days

Amount in £ to be invested = 3,00,000/1.045 = £ 2,87,081

Amount of AUD needed to convert into £ = 2,87,081 x 2 = AUD 5,74,162

Interest and principal on AUD loan after 180 days = AUD 5,74,162 x 1.055 = AUD 6,05,741

**(c) Call option**

<i>Expected Spot rate in 180 days</i>	<i>Prem./ unit</i>	<i>Exercise Option</i>	<i>Total price per unit</i>	<i>Total price Xi</i>	<i>Pi</i>	<i>Pi x xi</i>
1.91	0.04	No	1.95	5,85,000	0.25	1,46,250
1.95	0.04	No	1.99	5,97,000	0.60	3,58,200
2.05	0.04	Yes	2.01 (AUD 1.97 + \$0.04)	6,03,000	0.15	90,450
						AUD 5,94,900

**(d) No hedge option**

<i>Expected Future spot rate</i>	<i>AUD needed Xi</i>	<i>Prob. Pi</i>	<i>Pi xi</i>
1.91	5,73,000	0.25	1,43,250
1.95	5,85,000	0.60	3,51,000
2.05	6,15,000	0.15	92,250
			AUD 5,86,500

The probability distribution of outcomes for no hedge strategy appears to be most preferable because least number of AUD are needed under this option to arrange £3,00,000.

**Question 38**

*Following are the spot exchange rates quoted at three different forex markets :*

*USD/INR 48.30 in Mumbai*

*GBP/INR 77.52 in London*

*GBP/USD 1.6231 in New York*

*The arbitrageur has USD 1,00,00,000. Assuming that there are no transaction costs, explain whether there is any arbitrage gain possible from the quoted spot exchange rates.*

**Answer**

The arbitrage gain/loss be assessed by the under given process

Step 1 – Money realized from conversion of 1,00,00,000 USD in Indian Rupees at spot rate of 48.30 in Mumbai

i.e. 1,00,00,000 X Rs. 48.30      Rs. 48,30,00,000

Step 2 – Money realized from conversion of 48,30,00,000 INR in GBP at spot rate of 77.52 in London

i.e.  $48,30,00,000 / 77.52$           GBP 62,30,650.155

Step 3 – Money realized from conversion of 62,30,650.155 GBP in USD at spot rate of 1.6231 in New York

i.e.  $62,30,650.155 \times 1.6231$           USD 101,12,968.27

Arbitrage Gain i.e. USD (101,12,968.27-1,00,00,000) \$1,12,968.27

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