

# COST ACCOUNTING AND FINANCIAL MANAGEMENT

INTERMEDIATE

## STUDY NOTES



**The Institute of Cost Accountants of India**

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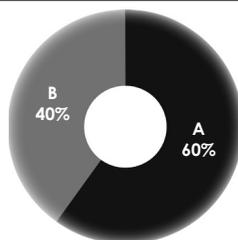
# Syllabus

## PAPER 8: COST ACCOUNTING AND FINANCIAL MANAGEMENT (CAFM)

### Syllabus Structure:

The syllabus comprises the following topics and study weightage:

A	Cost Accounting – Prime Costs and Overheads	60%
B	Financial Management	40%



### ASSESSMENT STRATEGY

There will be written examination paper of three hours

### OBJECTIVES

To provide an in depth study of the Generally Accepted Cost Accounting Principles and Techniques for identification, analysis and classification of cost components to facilitate managerial decision making. To understand the concepts of Financial Management and its application for managerial decision making.

### Learning aims

The syllabus aims to test the student's ability to:

- Understand and explain the conceptual framework of Cost & Management Accounting
- Explain the basic concepts and processes in determination of products and services cost
- Identify and apply the concepts of Financial Management

### Skill set required

Level B: Requiring the skill levels of knowledge, comprehension, application and analysis.

<b>Section A : Cost Accounting – Prime Costs &amp; Overheads</b>	<b>60%</b>
1. General Purpose Cost Statement	
2. Business Process Analysis – Cost Centre and Cost Allocation	
(a) Materials (CAS 6)	
(b) Employee Costs (CAS 7)	
(c) Direct expenses and problems connected therewith (CAS 10)	
(d) Overhead (with reference to all Cost Accounting Standards related to Overhead)	
<b>Section B : Financial Management</b>	<b>40%</b>
3. Overview of Financial Management	
4. Tools for Financial Analysis & Planning	
5. Working Capital Management and Leverage Analysis	
6. Cost of Capital, Capital Structure Theories and Dividend Decisions	
7. Capital Budgeting	

### SECTION A: COST ACCOUNTING – PRIME COSTS & OVERHEADS [60 MARKS]

1. **General Purpose Cost Statement:** Cost Accounting Standards (CASs) (issued by the Institute of Cost Accountants of India from time to time), Generally Accepted Cost Accounting Principles (GACAP) – Purpose, Objective and Applicability
2. **Business Process Analysis – Cost Centre and Cost Allocation**
  - (a) **Materials (CAS 6):**
    - (i) Procurement of materials – classification and coding, inventory management and control, JIT (just in time), return to suppliers, pricing of receipts, Physical verification and related issues
    - (ii) Scrap, wastage, pilferage, obsolescence, normal loss, abnormal loss (CASs related to above items) – framework
  - (b) **Employee Costs (CAS 7):**
    - (i) Employee routines, classification of Employee, time keeping, time booking, payroll preparation, disbursement of wages. Principles and methods of remuneration, Productivity Linked Incentive (PLI) Schemes
    - (ii) Accounting control and reporting, Accounting for Employee Cost, Computation of Employee Cost rates, Idle time, Overtime, Employee turnover, Employee cost reporting
  - (c) **Direct expenses and problems connected therewith (CAS 10)**
  - (d) **Overhead (with reference to all Cost Accounting Standards related to Overhead):**

- (i) Classification of overheads; Overhead Cost Accounting
- (ii) Accounting and control of overheads, computation of pre-determined overhead recovery rates, treatment of over and under absorption of overhead costs. Reports of control of overhead costs
- (iii) Miscellaneous items of expenses – capacity costs, treatment of depreciation in costs

**Note : All related further pronouncements of CASs will also be applicable**

**SECTION B : FINANCIAL MANAGEMENT [40 MARKS]**

**3. Overview of Financial Management**

- (a) Financial Management – meaning, objectives, scope, related finance disciplines, planning environment, key-decision areas
- (b) Sources of Finance ( Shares, Debentures, Debt, Public Deposits, Lease Financing, etc.); criteria for selecting sources of finance including finance for International Investments and Venture Capital Funds
- (c) Other Financial services – Hire Purchase, Forfeiting, Bill Discounting, Factoring, Asset Securitization
- (d) Financial Decision – Making – Emerging role of finance managers
- (e) Compliance of regulatory requirements in formulation of financial strategies
- (f) Role of Treasury Function in terms of setting Corporate objectives, Funds Management-National and International
- (g) Contemporary developments – WTO, GATT, Corporate Governance, TRIPS, TRIMS, SEBI Regulations (as amended from time to time)
- (h) Concepts of Value and Return – Time preference for money, Future Value, Present Value, Net Present Value (NPV)

**4. Tools for Financial Analysis & Planning**

- (a) Funds flow and Cash flow Analysis
- (b) Analysis Financial Ratio and Cash Flow Ratios – Ratios in the areas of performance, profitability, financial adaptability, liquidity, activity, shareholder investment and financing, interpretation of ratios and limitations of ratio analysis
- (c) Identification of information required to assess financial performance, Effect of short-term debt on the measurement of gearing

**5. Working Capital Management and Leverage Analysis**

- (a) Working Capital policies related to Inventory, Receivables, Payables, Cash and Marketable securities
- (b) Financing of working capital
- (c) Concepts and nature of Leverages, Analysis of Operating and Financial Leverages, Operating Risk and Financial Risk and Combined Leverages
- (d) Operating leverages and Cost-Volume-Profit (CVP) analysis, Earning Before Interest and Tax (EBIT), Earning Per Share (EPS), Indifference point

**6. Cost of Capital**

- (a) Meaning, components, methods of determination of cost of capital related to debt, preference shares, equity shares, retained earnings, depreciation fund
- (b) Capital Asset Pricing Models (CAPM)
- (c) Weighted Average Cost of Capital and Marginal Cost of Capital

**7. Capital Budgeting**

- (a) Purpose, objective, process
- (b) Understanding different types of projects
- (c) Techniques of decision making: non-discounted and discounted cash flow approaches – payback period method, accounting rate of return, net present value, internal rate of return, modified internal rate of return, discounted payback period and profitability index.
- (d) Ranking of competing projects, ranking of projects with unequal lives.
- (e) Modelling and forecasting cash flows and financial statements based on expected values for variables-economic and business

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## **Section A**

# **Cost Accounting – Prime Costs & Overheads**

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# Study Note - 1

## GENERAL PURPOSE COST STATEMENT



### This Study Note includes

- 1.1 Evolution of Cost Accounting
- 1.2 Cost Accounting Concepts
- 1.3 Generally Accepted Cost Accounting Principles (GACAP)
- 1.4 Cost Accounting Standards (CASs)

### 1.1 EVOLUTION OF COST ACCOUNTING

Way back to 15<sup>th</sup> Century, no accounting system was there and it was the barter system prevailed. It was in the last years of 15<sup>th</sup> century Luca Pacioli, an Italian found out the double entry system of accounting in the year 1494. Later it was developed in England and all over the world upto 20<sup>th</sup> Century. During these 400 years, the purpose of Cost Accounting needs are served as a small branch of Financial Accounting except a few cases like Royal wallpaper manufactory in France (17<sup>th</sup> Century), and some iron masters & potters in England (18<sup>th</sup> century)

The period 1880 AD- 1925 saw the development of complex product designs and the emergence of multi activity diversified corporations like Du Pont, General Motors etc. It was during this period that scientific management was developed which led the accountants to convert physical standards into Cost Standards, the latter being used for variance analysis and control.

During the World War I and II the social importance of Cost Accounting grew with the growth of each country's defence expenditure. In the absence of competitive markets for most of the material required for war, the governments in several countries placed cost-plus contracts under which the price to be paid was cost of production plus an agreed rate of profit. The reliance on cost estimation by parties to defence contracts continued after World War II.

In addition to the above, the following factors have made accountants to find new technique to serve the industry :-

- (i) Limitations placed on financial accounting
- (ii) Improved cost consciousness
- (iii) Rapid industrial development after industrial revolution and world wars
- (iv) Growing competition among the manufacturers
- (v) To control galloping price rise, the cost of computing the precise cost of product / service
- (vi) To control cost several legislations passed throughout the world and India too such as Essential Commodities Act, Industrial Development and Regulation Act...etc

Due to the above factors, the Cost Accounting has emerged as a specialised discipline from the initial years of 20<sup>th</sup> century i.e after World War I and II.

In India, prior to independence, there were a few Cost Accountants, and they were qualified mainly from I.C.M.A. (now CIMA) London. During the Second World War, the need for developing the profession in the country was felt, and the leadership of forming an Indian Institute was taken by some members of

Defence Services employed at Kolkata. However, with the enactment of the Cost and Works Accountants of India Act, 1959, the Institute of Cost and Works Accountants of India (Now called as Institute of Cost Accountants of India) was established at Kolkata. The profession assumed further importance in 1968 when the Government of India introduced Cost Audit under section 148 of the [Companies Act, 2013](#).

Many times we use Cost Accounting, Costing and Cost Accountancy interchangeably. But there are differences among these terms. As a professional, though we use interchangeably we must know the meaning of each term precisely.

**Cost Accounting** : Cost Accounting may be defined as “Accounting for costs classification and analysis of expenditure as will enable the total cost of any particular unit of production to be ascertained with reasonable degree of accuracy and at the same time to disclose exactly how such total cost is constituted”. Thus Cost Accounting is classifying, recording an appropriate allocation of expenditure for the determination of the costs of products or services, and for the presentation of suitably arranged data for the purpose of control and guidance of management.

Cost Accounting can explained as follows:-

Cost Accounting is the process of accounting for cost which begins with recording of income and expenditure and ends with the preparation of statistical data.

It is the formal mechanism by means of which cost of products or services are ascertained and controlled.

Cost Accounting provides analysis and classification of expenditure as will enable the total cost of any particular unit of product / service to be ascertained with reasonable degree of accuracy and at the same time to disclose exactly how such total cost is constituted. For example it is not sufficient to know that the cost of one pen is ₹ 25/- but the management is also interested to know the cost of *material* used, the amount of *labour* and *other expenses* incurred so as to control and reduce its cost.

It establishes budgets and standard costs and actual cost of operations, processes, departments or products and the analysis of variances, profitability and social use of funds.

Thus Cost Accounting is a quantitative method that collects, classifies, summarises and interprets information for product costing, operation planning and control and decision making.

**Costing** : Costing is defined as the technique and process of ascertaining costs.

The technique in costing consists of the body of principles and rules for ascertaining the costs of products and services. The technique is dynamic and changes with the change of time. The process of costing is the day to day routine of ascertaining costs. It is popularly known as an arithmetic process and daily routine. For example If the cost of producing a product say ₹200/-, then we have to refer material, labour and expenses accounting and arrive the above cost as follows:

Material	₹	100
Labour	₹	40
Expenses	₹	60
Total	₹	200

Finding out the breakup of the total cost from the recorded data is a daily process. That is why it is called daily routine. In this process we are classifying the recorded costs and summarizing at each element and total is called technique.

**Cost Accountancy**: Cost Accountancy is defined as ‘**the application of Costing and Cost Accounting principles, methods and techniques to the science, art and practice of cost control and the ascertainment of profitability**’. It includes the presentation of information derived there from for the purposes of managerial decision making. Thus, Cost Accountancy is the science, art and practice of a Cost Accountant.



- (a) It is **science** because it is a systematic body of knowledge having certain principles which a cost accountant should possess for proper discharge of his responsibilities.
- (b) It is an **art** as it requires the ability and skill with which a Cost Accountant is able to apply the principles of Cost Accountancy to various managerial problems.
- (c) **Practice** includes the continuous efforts of a Cost Accountant in the field of Cost Accountancy. Such efforts of a Cost Accountant also include the presentation of information for the purpose of managerial decision making and keeping statistical records.

### **Objectives of Cost Accounting**

The following are the main objectives of Cost Accounting:-

- (a) To ascertain the Costs under different situations using different techniques and systems of costing
- (b) To determine the selling prices under different circumstances
- (c) To determine and control efficiency by setting standards for Materials, Labour and Overheads
- (d) To determine the value of closing inventory for preparing financial statements of the concern
- (e) To provide a basis for operating policies which may be determination of Cost Volume relationship, whether to close or operate at a loss, whether to manufacture or buy from market, whether to continue the existing method of production or to replace it by a more improved method of production....etc

### **Scope of Cost Accountancy**

The scope of Cost Accountancy is very wide and includes the following:-

- (a) **Cost Ascertainment:** The main objective of Cost Accounting is to find out the Cost of product / services rendered with reasonable degree of accuracy.
- (b) **Cost Accounting:** It is the process of Accounting for Cost which begins with recording of expenditure and ends with preparation of statistical data.
- (c) **Cost Control:** It is the process of regulating the action so as to keep the element of cost within the set parameters.
- (d) **Cost Reports:** This is the ultimate function of Cost Accounting. These reports are primarily prepared for use by the management at different levels. Cost reports helps in planning and control, performance appraisal and managerial decision making.
- (e) **Cost Audit:** Cost Audit is the verification of correctness of Cost Accounts and check on the adherence to the Cost Accounting plan. Its purpose is not only to ensure the arithmetic accuracy of cost records but also to see the principles and rules have been applied correctly.

To appreciate fully the objectives and scope of Cost Accounting, it would be useful to examine the position of Cost Accounting in the broader field of general accounting and other sciences. i.e Financial Accounting , Management Accounting, Engineering and Service Industry.

**Cost Accounting and Financial Accounting:** Financial Accounting is primarily concerned with the preparation of financial statements, which summarise the results of operations for selected period of time and show the financial position of the company at particular dates. In other words Financial Accounting reports on the resources available (Balance Sheet) and what has been accomplished with these resources (Profit and Loss Account). Financial Accounting is mainly concerned with requirements of creditors, shareholders, government, prospective investors and persons outside the management. Financial Accounting is mostly concerned with external reporting.

Cost Accounting, as the name implies, is primarily concerned with determination of cost of something, which may be a product, service, a process or an operation according to costing objective of

management. A Cost Accountant is primarily charged with the responsibility of providing cost data for whatever purposes they may be required for.

The main differences between Financial and Cost Accounting are as follows:

<b>Financial Accounting</b>	<b>Cost Accounting</b>
(a) It provides the information about the business in a general way. i.e Profit and Loss Account, Balance Sheet of the business to owners and other outside partners.	(a) It provides information to the management for proper planning, operation, control and decision making.
(b) It classifies, records and analyses the transactions in a subjective manner, i.e according to the nature of expense.	(b) It records the expenditure in an objective manner, i.e according to the purpose for which the costs are incurred.
(c) It lays emphasis on recording aspect without attaching any importance to control.	(c) it provides a detailed system of control for materials, labour and overhead costs with the help of standard costing and budgetary control.
(d) It reports operating results and financial position usually at the end of the year.	(d) It gives information through cost reports to management as and when desired.
(e) Financial Accounts are accounts of the whole business. They are independent in nature.	(e) Cost Accounting is only a part of the financial accounts and discloses profit or loss of each product, job or service.
(f) Financial Accounts records all the commercial transactions of the business and include all expenses i.e Manufacturing, Office, Selling etc.	(f) Cost Accounting relates to transactions connected with Manufacturing of goods and services, means expenses which enter into production.
(g) Financial Accounts are concerned with external transactions i.e transactions between business concern and third party.	(g) Cost Accounts are concerned with internal transactions, which do not involve any cash payment or receipt.
(h) Only transactions which can be measured in monetary terms are recorded.	(h) Non-Monetary information like No of Units / Hours etc are used.
(i) Financial Accounting deals with actual figures and facts only.	(i) Cost Accounting deals with partly facts and figures and partly estimates / standards.
(j) Financial Accounting do not provide information on efficiencies of various workers / Plant & Machinery.	(j) Cost Accounts provide valuable information on the efficiencies of employees and Plant & Machinery.
(k) Stocks are valued at Cost or Market price whichever is lower.	(k) Stocks are valued at Cost only.
(l) Financial Accounting is a positive science as it is subject to legal rigidity with regarding to preparation of financial statements.	(l) Cost Accounting is not only positive science but also normative because it includes techniques of budgetary control and standard costing.
(m) These accounts are kept in such away to meet the requirements of Companies Act as per <a href="#">Sec 128</a> & Income Tax Act Sec 44AA.	(m) Generally Cost Accounts are kept voluntarily to meet the requirements of the management, only in some industries Cost Accounting records are kept as per the Companies Act.



## **Cost Accounting and Management Accounting:**

Management Accounting is primarily concerned with management. It involves application of appropriate techniques and concepts, which help management in establishing a plan for reasonable economic objective. It helps in making rational decisions for accomplishment of these objectives. Any workable concept or techniques whether it is drawn from Cost Accounting, Financial Accounting, Economics, Mathematics and Statistics, can be used in Management Accountancy. The data used in Management Accountancy should satisfy only one broad test. It should serve the purpose that it is intended for. A Management Accountant accumulates, summarizes and analysis the available data and presents it in relation to specific problems, decisions and day-to-day task of management. A Management Accountant reviews all the decisions and analysis from management's point of view to determine how these decisions and analysis contribute to overall organizational objectives. A Management Accountant judges the relevance and adequacy of available data from management's point of view.

The scope of Management Accounting is broader than the scope of Cost Accountancy. In Cost Accounting, primary emphasis is on cost and it deals with its collection analysis relevance interpretation and presentation for various problems of management. Management Accountancy utilizes the principles and practices of Financial Accounting and Cost Accounting in addition to other management techniques for efficient operations of a company. It widely uses different techniques from various branches of knowledge like Statistics, Mathematics, Economics, Laws and Psychology to assist the management in its task of maximising profits or minimising losses. The main thrust in Management Accountancy is towards determining policy and formulating plans to achieve desired objective of management. Management Accountancy makes corporate planning and strategy effective.

From the above discussion we may conclude that the Cost Accounting and Management Accounting are interdependent, greatly related and inseparable.

## **Advantages of Cost Accounting**

Cost Accounting has manifold advantages, a summary of which is given below. It is not suggested that having installed a system of Cost Accounting, a concern will expect to derive all the benefits stated here. The nature and the extent of the advantages obtained will depend upon the type, adequacy and efficiency of the cost system installed and the extent to which the various levels of management are prepared to accept and act upon the advice rendered by the cost system.

The Cost Accounting System has the following advantages:-

- (i) A cost system reveals unprofitable activities, losses or inefficiencies occurring in any form such as
  - (a) Wastage of man power, idle time and lost time.
  - (b) Wastage of material in the form of spoilage, excessive scrap etc., and
  - (c) Wastage of resources, e.g. inadequate utilization of plant, machinery and other facilities.
- (ii) Cost Accounting locates the exact causes for decrease or increase in the profit or loss of the business. It identifies the unprofitable products or product lines so that these may be eliminated or alternative measures may be taken.
- (iii) Cost Accounts furnish suitable data and information to the management to serve as guides in making decisions involving financial considerations.
- (iv) Cost Accounting is useful for price fixation purposes. Although sale price is generally related more to economic conditions prevailing in the market than to cost, the latter serves as a guide to test the adequacy of selling prices.
- (v) With the application of Standard Costing and Budgetary Control methods, the optimum level of efficiency is set.
- (vi) Cost comparison helps in cost control. Comparison may be period to period, of the figures in respect of the same unit or factory or of several units in an industry by employing Uniform Costs and Inter-Firm Comparison methods. Comparison may be made in respect of cost of jobs, process or cost centres.

- (vii) A cost system provides ready figures for use by the Government, wage tribunals and boards, and labour and trade unions.
- (viii) When a concern is not working to full capacity due to various reasons such as shortage of demands or bottlenecks in production, the cost of idle capacity can readily worked out and repealed to the management.
- (ix) Introduction of a cost reduction programme combined with operations research and value analysis techniques leads to economy.
- (x) Marginal Costing is employed for suggesting courses of action to be taken. It is a useful tool for the management for making decisions.
- (xi) Determination of cost centres or responsibility centres to meet the needs of a Cost Accounting system, ensures that the organizational structure of the concern has been properly laid responsibility can be properly defined and fixed on individuals.
- (xii) Perpetual inventory system which includes a procedure for continuous stock taking is an essential feature of a cost system.
- (xiii) The operation of a system of cost audit in the organization prevents manipulation and fraud and assists in furnishing correct and reliable cost data to the management as well as to outside parties like shareholders, the consumers and the Government.

#### **Limitations of Cost Accounting system**

Like any other system of accounting, Cost Accountancy is not an exact science but an art which has developed through theories and accounting practices based on reasoning and commonsense. Many of the theories cannot be proved nor can they be disproved. They grownup in course of time to become conventions and accepted principles of Cost Accounting. These principles are by no means static, they are changing from day to day and what is correct today may not hold true in the circumstances tomorrow.

Large number of Conventions, Estimates and Flexible factors: No cost can be said to be exact as they incorporate a large number of conventions, estimations and flexible factors such as:-

- (i) Classification of costs into its elements.
- (ii) Materials issue pricing based on average or standard costs.
- (iii) Apportionment of overhead expenses and their allocation to cost units/centres.
- (iv) Arbitrary allocation of joint costs.
- (v) Division of overheads into fixed and variable.

Cost Accounting lacks the uniform procedures and formats in preparing the cost information of a product/ service. Keeping in view this limitation, all Cost Accounting results can be taken as mere estimates.

#### **Installation of Cost System or Cost Accounting System**

From what has been stated in the preceding sections, it will be seen that there cannot be a readymade cost system suitable for a business. Such system has to be specially designed for an undertaking to meet its specific needs. Before installing a cost system proper care should be taken to study and taken into account all the aspects involved as otherwise the system will be a misfit and full advantages will not be realized from it. The following points should be looked into and the prerequisites satisfied before installing a cost system:-

- (i) The nature, method and stages of production, the number of varieties and the quantity of each product and such other technical aspects should be examined. It is to be seen how complex or how simple the production methods are and what is the degree of control exercised over them.
- (ii) The size, layout and organisation of the factory should be studied.

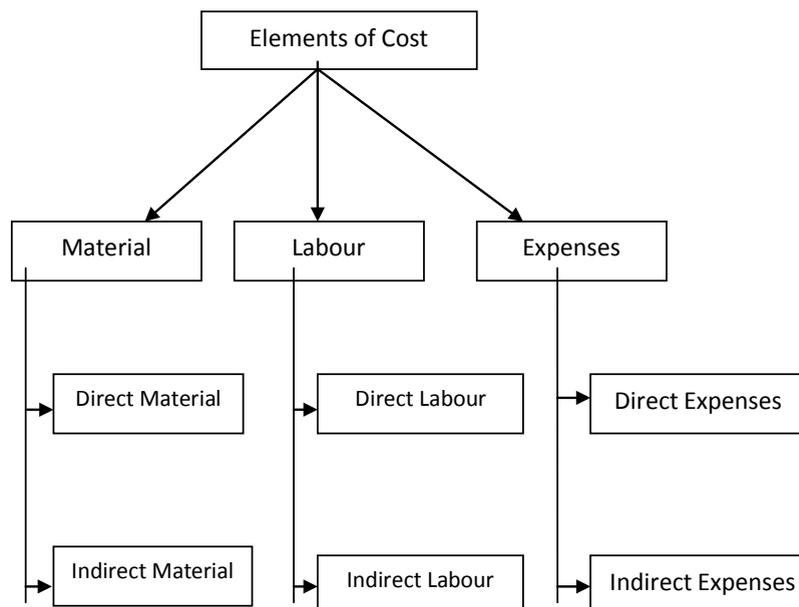
- (iii) The methods of purchase, receipt, storage and issue of materials should be examined and modified wherever considered necessary.
- (iv) The wage payment methods should be studied.
- (v) The requirements of the management and the policy adopted by them towards cost control should be kept in view.
- (vi) The cost of the system to be installed should be considered. It is needless to emphasize that the installation and operation of system should be economic.
- (vii) The system should be simple and easy to operate.
- (viii) The system can be effectively run if it is appropriate and properly suited to the organisation.
- (ix) Forms and records of original entry should be so designed and to involve minimum clerical work and expenditure.
- (x) The system should be so designed that cost control can be effectively exercised.
- (xi) The system should incorporate suitable procedure for reporting to the various levels of management. This should be based on the principles of exception.

## 1.2 COST ACCOUNTING CONCEPTS

**Cost: Cost is a measurement, in monetary terms, of the amount of resources used for the purpose of production of goods or rendering services.**

Cost in simple, words, means the total of all expenses. Cost is also defined **as the amount of expenditure (actual or notional) incurred on or attributable to a given thing or to ascertain the cost of a given thing.** Thus it is that which is given or in sacrificed to obtain something. The cost of an article consists of actual outgoings or ascertained charges incurred in its production and sale. Cost is a generic term and it is always advisable to qualify the word cost to show exactly what it meant, e.g., prime cost, factory cost, etc. Cost is also different from value as cost is measured in terms of money whereas value in terms of usefulness or utility of an article.

### Elements of Cost



Direct Material + Direct Labour + Direct Expenses = Prime Cost

Indirect Material+ Indirect Labour + Indirect Expenses = Overheads

### **Direct Material Cost**

Direct material cost can be defined as **'The Cost of material which can be attributed to a cost object in an economically feasible way'**. Direct materials are those materials which can be identified in the product and can be conveniently measured and directly charged to the product. Thus, these materials directly enter the product and form a part of the finished product. For example, timber in furniture making, cloth in dress making, bricks in building a house. The following are normally classified as direct materials :-

- (i) All raw materials, like jute in the manufacture of gunny bags, pig iron in foundry and fruits in canning industry.
- (ii) Materials specifically purchased for a specific job, process or order, like glue for book binding, starch powder for dressing yarn.
- (iii) Parts or components purchased or produced, like batteries for transistor-radios.
- (iv) Primary packing materials like cartons, wrappings, card-board boxes, etc.

### **Indirect Material Cost**

*Materials, the costs of which cannot be directly attributed to a particular cost object.* Indirect materials are those materials which do not normally form a part of the finished product. It has been defined as "materials which cannot be allocated but which can apportioned to or absorbed by cost centres or cost units". These are:

- (i) Stores used in maintenance of machinery, buildings, etc., like lubricants, cotton waste, bricks and cements.
- (ii) Stores used by the service departments, i.e., non-productive departments like Power House, Boiler House and Canteen, etc., and
- (iii) Materials which due to their cost being small, are not considered worthwhile to be treated as direct materials.

### **Direct Labour / Employee Cost**

*The cost of employees which can be attributed to a cost object in an economically feasible way.* In simple words, it is that labour which can be conveniently identified or attributed wholly to a particular job, product or process or expended in converting raw materials into finished goods. Wages of such labour are known as direct wages. Thus it includes payment made to the following groups of labour:

- (i) Labour engaged on the actual production of the product or in carrying out of an operation or process.
- (ii) Labour engaged in adding the manufacture by way of supervision, maintenance, tool setting, transportation of material etc.
- (iii) Inspectors, analysts etc., specially required for such production.

### **Indirect Labour/ Employee Cost**

*The labour / employee cost which cannot be directly attributed to a particular cost object.* The wages of that labour which cannot be allocated but which can be apportioned to or absorbed by cost centres or cost units is known as Indirect Labour. In other words paid to labour which are employed other than on production constitute indirect labour costs. Example of such labour are: charge-hands and supervisors; maintenance workers; men employed in service departments, material handling and internal transport; apprentices, trainees and instructors; clerical staff and labour employed in time office and security office.

### **Direct or Chargeable Expenses**

*Direct expenses are expenses relating to manufacture of a product or rendering a service which can be identified or linked with the cost object other than direct material cost and direct employee cost.* Direct expenses include all expenditure other than direct material or direct labour that is specifically



incurred for a particular product or process. Such expenses are charged directly to the particular cost account concerned as part of the prime cost. Examples of direct expenses are: (i) Excise duty; (ii) Royalty; (iii) Architect or Supervisor's fees; (iv) Cost of rectifying defective work; (v) Travelling expenses to the city; (vi) Experimental expenses of pilot projects; (vii) Expenses of designing or drawings of patterns or models; (viii) Repairs and maintenance of plant obtained on hire; and (ix) Hire of special equipment obtained for a contract.

### **Indirect Expenses**

Indirect expenses are expenses which cannot be allocated but which can be apportioned to or absorbed by cost centres or cost units such as rent, insurance, municipal taxes, general manager salary and canteen and welfare expenses, power and fuel, cost of training new employee lighting and heating, telephone expenses, etc.,

### **Overheads**

*Overheads comprise of indirect materials, indirect employee cost and indirect expenses which are not directly identifiable or allocable to a cost object.* Overheads may defined as the aggregate of the cost of indirect material, indirect labour and such other expenses including services as cannot conveniently be charged directly to specific cost units. Thus overheads are all expenses other than direct expenses. In general terms, overheads comprise all expenses incurred for or in connection with, the general organization of the whole or part of the undertaking, i.e., the cost of operating supplies and services used by the undertaking and includes the maintenance of capital assets.

### **Prime Cost**

The aggregate of Direct Material, Direct Labour and Direct Expenses. Generally it constitutes 50% to 80% of the total cost of the product, as such, as it is primary to the cost of the product and called Prime Cost.

### **Cost Object**

Cost object is the technical name for a product or a service, a project, a department or any activity to which a cost relates. Therefore the term cost should always be linked with a cost object to be more meaningful. Establishing a relevant cost object is very crucial for a sound costing system. The Cost object could be defined broadly or narrowly. At a broader level a cost object may be named as a **Cost Centre**, where as at a lowermost level it may be called as a **Cost Unit**.

### **Cost Centre**

*CIMA defines a cost centre as "a location, a person, or an item of equipment (or a group of them) in or connected with an undertaking, in relation to which costs ascertained and used for the purpose of cost control".* The determination of suitable cost centres as well as analysis of cost under cost centres is very helpful for periodical comparison and control of cost. In order to obtain the cost of product or service, expenses should be suitably segregated to cost centre. The manager of a cost centre is held responsible for control of cost of his cost centre. The selection of suitable cost centres or cost units for which costs are to be ascertained in an undertaking depends upon a number of factors such as organization of a factory, condition of incidence of cost, availability of information, requirements of costing and management policy regarding selecting a method from various choices. Cost centre may be production cost centres operating cost centres or process cost centres depending upon the situation and classification.

Cost centres are of two types-Personal and Impersonal Cost Centre. A personal cost centre consists of person or group of persons. An impersonal cost centre consists of a location or item of equipment or group of equipments.

In a manufacturing concern, the cost centres generally follow the pattern or layout of the departments or sections of the factory and accordingly, there are two main types of cost centres as below :-

- (i) Production Cost Centre: These centres are engaged in production work i.e engaged in converting the raw material into finished product, for example Machine shop, welding shops...etc
- (ii) Service Cost Centre: These centres are ancillary to and render service to production cost centres, for example Plant Maintenance, Administration...etc

The number of cost centres and the size of each vary from one undertaking to another and are dependent upon the expenditure involved and the requirements of the management for the purpose of control.

### Responsibility Centre

A responsibility centre in Cost Accounting denotes a segment of a business organization for the activities of which responsibility is assigned to a specific person. Thus a factory may be split into a number of centres and a supervisor is assigned with the responsibility of each centre. All costs relating to the centre are collected and the Manager responsible for such a cost centres judged by reference to the activity levels achieved in relation to costs. Even an individual machine may be treated as responsibility centre for cost control and cost reduction.

### Profit Centre

Profit centre is a segment of a business that is responsible for all the activities involved in the production and sales of products, systems and services. Thus a profit centre encompasses both costs that it incurs and revenue that it generates. Profit centres are created to delegate responsibility to individuals and measure their performance. In the concept of responsibility accounting, profit centres are sometimes also responsible for the investment made for the centre. The profit is related to the invested capital. Such a profit centre may also be termed as investment centre.

### Cost Unit

Cost Unit is a device for the purpose of breaking up or separating costs into smaller sub divisions attributable to products or services. *Cost unit can be defined as a 'Unit of product or service in relation to which costs are ascertained'*. The cost unit is the narrowest possible level of cost object.

It is the unit of quantity of product, service of time (or combination of these) in relation to which costs may be ascertained or expressed. We may, for instance, determine service cost per tonne of steel, per tonne-kilometre of a transport service or per machine hour. Sometimes, a single order or contract constitutes a cost unit which is known as a job. A batch which consists of a group of identical items and maintains its identity through one or more stages or production may also be taken as a cost unit.

A few typical examples of cost units are given below:

Industry / Product	Cost Unit
Automobile	Number of vehicles
Cable	Metres / kilometres
Cement	Tonne
Chemicals / Fertilizers	Litre / Kilogram / tonne
Gas	Cubic Metre
Power - Electricity	Kilowatt Hour
Transport	Tonne-Kilometre, Passenger-Kilometre
Hospital	Patient Day
Hotel	Bed Night
Education	Student year
Telecom	Number of Calls
BPO Service	Accounts handled
Professional Service	Chargeable Hours



## Cost Allocation

When items of cost are identifiable directly with some products or departments such costs are charged to such cost centres. This process is known as cost allocation. Wages paid to workers of service department can be allocated to the particular department. Indirect materials used by a particular department can also be allocated to the department. Cost allocation calls for two basic factors - (i) Concerned department/product should have caused the cost to be incurred, and (ii) exact amount of cost should be computable.

## Cost Apportionment

When items of cost can not directly charge to or accurately identifiable with any cost centres, they are prorated or distributed amongst the cost centres on some predetermined basis. This method is known as cost apportionment. Thus we see that items of indirect costs residual to the process of cost allocation are covered by cost apportionment. The predetermination of suitable basis of apportionment is very important and usually following principles are adopted- (i) Service or use (ii) Survey method (iii) Ability to bear. The basis ultimately adopted should ensure an equitable share of common expenses for the cost centres and the basis once adopted should be reviewed at periodic intervals to improve upon the accuracy of apportionment.

## Cost Absorption

Ultimately the indirect costs or overhead as they are commonly known, will have to be distributed over the final products so that the charge is complete. This process is known as cost absorption, meaning thereby that the costs absorbed by the production during the period. Usually any of the following methods are adopted for cost absorption- (i) Direct Material Cost Percentage (ii) Direct Labour Cost Percentage (iii) Prime Cost Percentage (iv) Direct Labour Hour Rate Method (v) Machine Hour Rate, etc. The basis should be selected after careful maximum accuracy of Cost Distribution to various production units. The basis should be reviewed periodically and corrective action whatever needed should be taken for improving upon the accuracy of the absorption.

## Conversion Cost

This term is defined as the sum of direct wages, direct expenses and overhead costs of converting raw material to the finished products or converting a material from one stage of production to another stage. In other words, it means the total cost of producing an article less the cost of direct materials used. The cost of indirect materials and consumable stores are included in such cost. The compilation of conversion cost is useful in a number of cases. Where cost of direct materials is of fluctuating nature, conversion cost is used to cost control purpose or for any other decision making. In contracts/jobs where raw materials are on account of the buyers conversion cost takes the place of total cost in the books of the producer. Periodic comparison/review of the conversion cost may give sufficient insight as to the level of efficiency with which the production unit is operating.

## Cost Control

*Cost Control is defined as the regulation by executive action of the costs of operating an undertaking, particularly where such action is guided by Cost Accounting.*

Cost control involves the following steps and covers the various facets of the management:

**Planning:** First step in cost control is establishing plans / targets. The plan/target may be in the form of budgets, standards, estimates and even past actual may be expressed in physical as well as monetary terms. These serves as yardsticks by which the planned objective can be assessed.

**Communication:** The plan and the policy laid down by the management are made known to all those responsible for carrying them out. Communication is established in two directions; directives are issued by higher level of management to the lower level for compliance and the lower level executives report performances to the higher level.

**Motivation:** The plan is given effect to and performances starts. The performance is evaluated, costs are ascertained and information about results achieved are collected and reported. The fact that costs are being complied for measuring performances acts as a motivating force and makes individuals endeavour to better their performances.

**Appraisal and Reporting:** The actual performance is compared with the predetermined plan and variances, i.e deviations from the plan are analyzed as to their causes. The variances are reported to the proper level of management.

**Decision Making:** The variances are reviewed and decisions taken. Corrective actions and remedial measures or revision of the target, as required, are taken.

### **Advantages of Cost Control**

The advantages of cost control are mainly as follows

- (i) Achieving the expected return on capital employed by maximising or optimizing profit
- (ii) Increase in productivity of the available resources
- (iii) Reasonable price of the customers
- (iv) Continued employment and job opportunity for the workers
- (v) Economic use of limited resources of production
- (vi) Increased credit worthiness
- (vii) Prosperity and economic stability of the industry

### **Cost Reduction**

Profit is the resultant of two varying factors, viz., sales and cost. The wider the gap between these two factors, the larger is the profit. Thus, profit can be maximised either by increasing sales or by reducing costs. In a competition less market or in case of monopoly products, it may perhaps be possible to increase price to earn more profits and the need for reducing costs may not be felt. Such conditions cannot, however, exist paramount and when competition comes into play, it may not be possible to increase the sale price without having its adverse effect on the sale volume, which, in turn, reduces profit. Besides, increase in price of products has the ultimate effect of pushing up the raw material prices, wages of employees and other expenses- all of which tend to increase costs. In the long run, substitute products may come up in the market, resulting in loss of business. Avenues have, therefore, to be explored and method devised to cut down expenditure and thereby reduce the cost of products. In short, cost reduction would mean maximization of profits by reducing cost through economics and savings in costs of manufacture, administration, selling and distribution.

*Cost reduction may be defined as the real and permanent reduction in the unit costs of goods manufactured or services rendered without impairing their suitability for the use intended. As will be seen from the definition, the reduction in costs should be real and permanent. Reductions due to windfalls, fortuitous receipts, changes in government policy like reduction in taxes or duties, or due to temporary measures taken for tiding over the financial difficulties do not strictly come under the purview of cost reduction. At the same time a programme of cost reduction should in no way affect the quality of the products nor should it lower the standards of performance of the business.*

Broadly speaking reduction in cost per unit of production may be affected in two ways viz.,

- (i) By reducing expenditure, the volume of output remaining constant, and
- (ii) By increasing productivity, i.e., by increasing volume of output and the level of expenditure remains unchanged.

These aspects of cost reduction are closely linked and they act together - there may be a reduction in the expenditure and the same time, an increase in productivity.



**Cost Control vs. Cost Reduction:** Both Cost Reduction and Cost Control are efficient tools of management but their concepts and procedure are widely different. The differences are summarised below:

<b>Cost Control</b>	<b>Cost Reduction</b>
(a) Cost Control represents efforts made towards achieving target or goal.	(a) Cost Reduction represents the achievement in reduction of cost.
(b) The process of Cost Control is to set up a target, ascertain the actual performance and compare it with the target, investigate the variances, and take remedial measures.	(a) Cost Reduction is not concern with maintenance of performance according to standard.
(c) Cost Control assumes the existence of standards or norms which are not challenged.	(c) Cost Reduction assumes the existence of concealed potential savings in standards or norms which are therefore subjected to a constant challenge with a view to improvement by bringing out savings.
(d) Cost Control is a preventive function. Costs are optimized before they are incurred.	(d) Cost Reduction is a corrective function. It operates even when an efficient cost control system exists. There is room for reduction in the achieved costs under controlled conditions.
(e) Cost Control lacks dynamic approach.	(e) Cost Reduction is a continuous process of analysis by various methods of all the factors affecting costs, efforts and functions in an organization. The main stress is upon the why of a thing and the aim is to have continual economy in costs.

### **Classification of Costs and Methods of Costing**

Several methods and types of costing have been designed to suit the needs of individual business conditions. The basic principles underlying all these methods are the same i.e to collect and analyze the expenditure according to the elements of costs and to determine the cost of each Cost Centre and or Cost Unit. Classification of cost is the arrangement of items of costs in logical groups having regard to their nature or purpose. Items should be classified by one characteristic for a specific purpose without ambiguity. Scheme of classification should be such that every item of cost can be classified. In view of the above, cost classification may be explained as below:

As per Cost Accounting Standard 1 (CAS-1), the basis for cost classification is as follows:

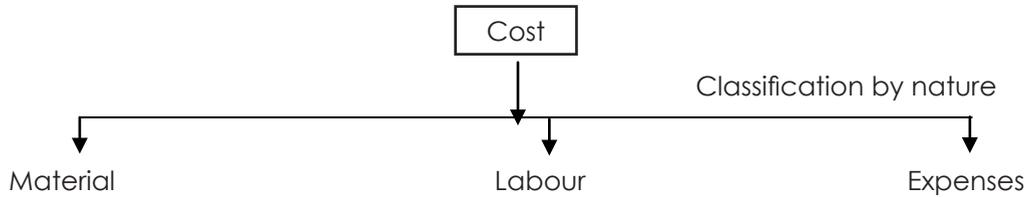
- (a) Nature of expense
- (b) Relation to Object – Traceability
- (c) Functions / Activities
- (d) Behaviour – Fixed, Semi-variable or Variable
- (e) Management decision making
- (f) Production Process
- (g) Time Period

Classification of cost is the process of grouping the components of cost under a common designation on the basis of similarities of nature, attributes or relations. It is the process of identification of each item and the systematic placement of like items together according to their common features.

#### **(a) Classification by Nature of Expense**

Costs should be gathered together in their natural grouping such as Material, Labour and Other Direct

expenses. Items of costs differ on the basis of their nature. The elements of cost can be classified in the following three categories. 1. Material 2. Labour 3. Expenses



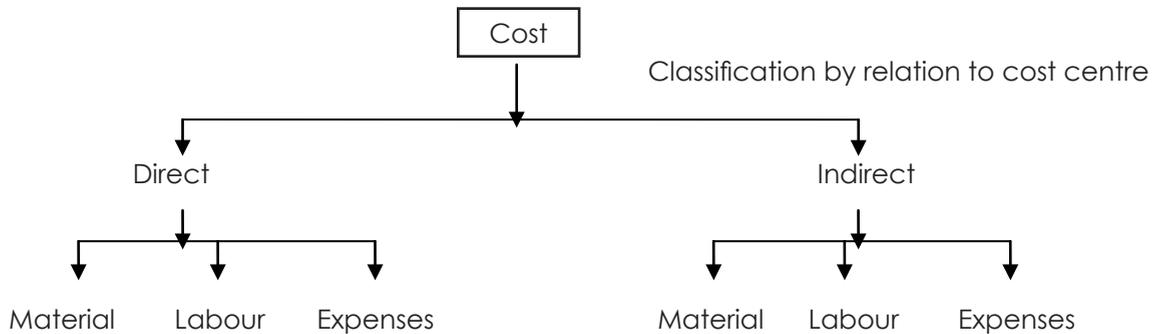
**Material Cost:** Material cost is the cost of material of any nature used for the purpose of production of a product or a service. It includes cost of materials, freight inwards, taxes & duties, insurance ...etc directly attributable to acquisition, but excluding the trade discounts, duty drawbacks and refunds on account of excise duty and vat.

**Labour Cost:** Labour cost means the payment made to the employees, permanent or temporary for their services. Labour cost includes salaries and wages paid to permanent employees, temporary employees and also to the employees of the contractor. Here salaries and wages include all the benefits like provident fund, gratuity, ESI, overtime, incentives...etc

**Expenses:** Expenses are other than material cost or labour cost which are involved in an activity.

**b) Classification by Relation to Cost Centre or Cost Unit:**

If expenditure can be allocated to a cost centre or cost object in an economically feasible way then it is called direct otherwise the cost component will be termed as indirect. According to this criteria for classification, material cost is divided into direct material cost and indirect material cost, Labour cost is divided into direct labour and indirect labour cost and expenses into direct expenses and indirect expenses. Indirect cost is also known as overhead.



**Direct Material Cost:** Cost of material which can be directly allocated to a cost centre or a cost object in an economically feasible way.

**Direct labour Cost:** Cost of wages of those workers who are readily identified or linked with a cost centre or cost object.

**Direct Expenses:** Expenses other than direct material and direct labour which can be identified or linked with cost centre or cost object.

$$\text{Direct Material} + \text{Direct labour} + \text{Direct Expenses} = \text{Prime Cost}$$

**Indirect Material:** Cost of material which cannot be directly allocable to a particular cost centre or cost object.

**Indirect Labour:** Cost of wages of employees which are not directly allocable to a particular cost centre.

**Indirect expenses:** Expenses other than of the nature of material or labour and cannot be directly allocable to a particular cost centre.

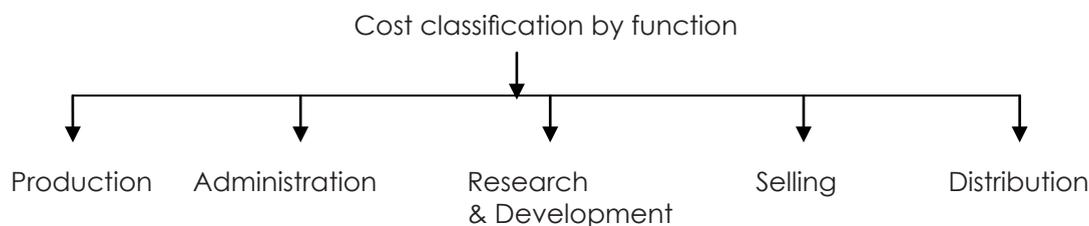
$$\text{Indirect Material} + \text{Indirect Labour} + \text{Indirect Expenses} = \text{Overheads}$$

### (c) Classification by Functions:

A business enterprise performs a number of functions like manufacturing, selling, research...etc.

Costs may be required to be determined for each of these functions and on this basis functional costs may be classified into the following types:-

- (i) Production or Manufacturing Costs
- (ii) Administration Costs
- (iii) Selling & Distribution cost
- (iv) Research & Development costs



**(i) Production or Manufacturing Costs:** *Production cost is the cost of all items involved in the production of a product or service.* These refer to the costs of operating the manufacturing division of an undertaking and include all costs incurred by the factory from the receipt of raw materials and supply of labour and services until production is completed and the finished product is packed with the primary packing.

The followings are considered as Production or Manufacturing Costs :-

- (1) Direct Material
- (2) Direct Labour
- (3) Direct Expenses and
- (4) Factory overhead, i.e., aggregate of factory indirect material, indirect labour and indirect expenses.

Manufacturing cost can also be referred to as the aggregate of prime cost and factory overhead.

**(ii) Administration Costs:** *Administration costs are expenses incurred for general management of an organization. These are in the nature of indirect costs and are also termed as administrative overheads.* For understanding administration cost, it is necessary to know the scope of administrative function. Administrative function in any organization primarily concerned with following activities:-

- (1) Formulation of policy
- (2) Directing the organization and
- (3) Controlling the operations of an organization. But administrative function will not include control activities concerned with production, selling and distribution and research and development.

Therefore, administration cost is the cost of administrative function, i.e., the cost of formulating policy, directing, organizing and controlling the operations of an undertaking (Administrative cost will include the cost of only those control operations which are not related to production, selling and distribution and research and development). In most of the cases, administration cost includes indirect expenses of following types:

- (1) Salaries of office staff, accountants, directors
- (2) Rent, rates and depreciation of office building
- (3) Postage, stationery and telephone
- (4) Office supplies and expenses
- (5) General administration expenses.

**(iii) Selling & Distribution Costs:** *Selling costs are indirect costs related to selling of products or services and include all indirect costs in sales management for the organization. Distribution costs are the costs incurred in handling a product from the time it is completed in the works until it reaches the ultimate consumer.*

Selling function includes activities directed to create and stimulate demand of company's product and secure orders. Distribution costs are incurred to make the saleable goods available in the hands of the customer.

Following are the examples of selling and distribution costs:

- (1) Salaries and commission of salesmen and sales managers.
- (2) Expenses of advertisement, insurance.
- (3) Rent, rates, depreciation and insurance of sales office and warehouses.
- (4) Cost of insurance, freight, export, duty, packing, shipping, etc.,
- (5) Maintenance of Delivery vans.

**(iv) Research & Development Costs:** Research & development costs are the cost for undertaking research to improve quality of a present product or improve process of manufacture, develop a new product, market research...etc. and commercialization thereof.

R&D Costs comprises of the following :-

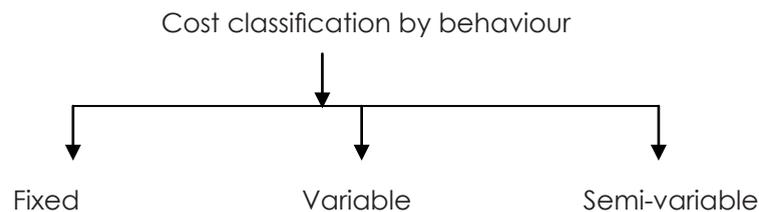
- (1) Development of new product.
- (2) Improvement of existing products.
- (3) Finding new uses for known products.
- (4) Solving technical problem arising in manufacture and application of products.
- (5) Development cost includes the costs incurred for commercialization / implementation of research findings.

**Pre-Production Costs:**

These are costs incurred when a new factory is in the process of establishment, a new project is undertaken, or a new product line or product is taken up but there is no established or formal production to which such costs may be charged. Preproduction costs are normally treated as deferred revenue expenditure and charged to the costs of future production.

**(d) Classification based on Behaviour – Fixed, Semi-variable or Variable**

Costs are classified based on behaviour as fixed cost, variable cost and semi-variable cost depending upon response to the changes in the activity levels.



**Fixed Cost:** Fixed cost is the cost which does not vary with the change in the volume of activity in the short run. These costs are not affected by temporary fluctuation in activity of an enterprise. These are also known as period costs. Example: Rent, Depreciation...etc

**Variable Cost:** Variable cost is the cost of elements which tends to directly vary with the volume of activity. Variable cost has two parts (i) Variable direct cost (ii) Variable indirect costs. Variable indirect costs are termed as variable overheads. Example: Direct labour, Outward Freight...etc



**Semi-Variable Costs:** Semi variable costs contain both fixed and variable elements. They are partly affected by fluctuation in the level of activity. These are partly fixed and partly variable costs and vice versa. Example: Factory supervision, Maintenance...etc.

### **(e) Classification based on Costs for Management Decision Making**

Ascertainment of cost is essential for making managerial decisions. On this basis costing may be classified into the following types

**Marginal Costing:** Marginal Cost is the aggregate of variable costs, i.e. prime cost plus variable overhead. Marginal cost per unit is the change in the amount at any given volume of output by which the aggregate cost changes if the volume of output is increased or decreased by one unit. Marginal Costing system is based on the system of classification of costs into fixed and variable. The fixed costs are excluded and only the marginal costs, i.e the variable costs are taken into consideration for determining the cost of products and the inventory of work-in-progress and completed products.

**Differential Cost:** Differential cost is the change in the cost due to change in activity from one level to another.

**Opportunity Cost:** Opportunity cost is the value of alternatives foregone by adopting a particular strategy or employing resources in specific manner. It is the return expected from an investment other than the present one. These refer to costs which result from the use or application of material, labour or other facilities in a particular manner which has been foregone due to not using the facilities in the manner originally planned. Resources (or input) like men, materials, plant and machinery, finance etc., when utilized in one particular way, yield a particular return (or output). If the same input is utilized in another way, yielding the same or a different return, the original return on the forsaken alternative that is no longer obtainable is the opportunity cost. For example, if fixed deposits in the bank are proposed to be withdrawn for financing project, the opportunity cost would be the loss of interest on the deposits. Similarly when a building leased out on rent to a party is got vacated for own purpose or a vacant space is not leased out but used internally, say, for expansion of the production programme, the rent so forgone is the opportunity cost.

**Replacement Cost:** Replacement cost is the cost of an asset in the current market for the purpose of replacement. Replacement cost is used for determining the optimum time of replacement of an equipment or machine in consideration of maintenance cost of the existing one and its productive capacity. This is the cost in the current market of replacing an asset. For example, when replacement cost of material or an asset is being considered, it means that the cost that would be incurred if the material or the asset was to be purchased at the current market price and not the cost at which it was actually purchased earlier, should be taken into account.

**Relevant Costs:** Relevant costs are costs which are relevant for a specific purpose or situation. In the context of decision making, only those costs are relevant which are pertinent to the decision at hand. Since we are concerned with future costs only while making a decision, historical costs, unless they remain unchanged in the future period are irrelevant to the decision making process.

**Imputed Costs:** Imputed costs are hypothetical or notional costs, not involving cash outlay computed only for the purpose of decision making. In this respect, imputed costs are similar to opportunity costs. Interest on funds generated internally, payment for which is not actually made is an example of imputed cost. When alternative capital investment projects are being considered out of which one or more are to be financed from internal funds, it is necessary to take into account the imputed interest on own funds before a decision is arrived at.

**Sunk Costs:** Sunk costs are historical costs which are incurred i.e sunk in the past and are not relevant to the particular decision making problem being considered. Sunk costs are those that have been incurred for a project and which will not be recovered if the project is terminated. While considering

the replacement of a plant, the depreciated book value of the old asset is irrelevant as the amount is sunk cost which is to be written-off at the time of replacement.

**Normal Cost & Abnormal Cost:** Normal Cost is a cost that is normally incurred at a given level of output in the conditions in which that level of output is achieved. Abnormal Cost is an unusual and typical cost whose occurrence is usually irregular and unexpected and due to some abnormal situation of the production.

**Avoidable Costs & Unavoidable Costs:** Avoidable Costs are those which under given conditions of performance efficiency should not have been incurred. Unavoidable Costs which are inescapable costs, which are essentially to be incurred, within the limits or norms provided for. It is the cost that must be incurred under a programme of business restriction. It is fixed in nature and inescapable.

**Uniform Costing:** This is not a distinct system of costing. The term applies to the costing principles and procedures which are adopted in common by a number of undertakings which desire to have the benefits of a uniform system. The methods of Uniform Costing may be extended so as to be useful in inter-firm comparison.

**Engineered Cost:** Engineered Cost relates to an item where the input has an explicit physical relationship with the output. For instance in the manufacture of a product, there is a definite relationship between the units of raw material and labour time consumed and the amount of variable manufacturing overhead on the one hand and units of the products produced on the other. The input-output relationship can be established the form of standards by engineering analysis or by an analysis of the historical data. It should be noted that the variable costs are not engineered cost but some administration and selling expenses may be categorized as engineered cost.

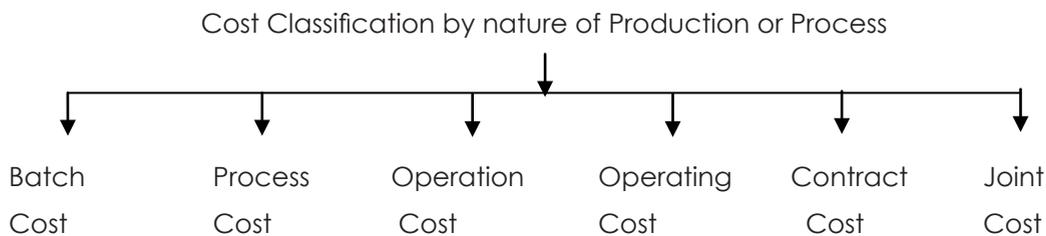
**Out-of-Pocket Cost:** This is the portion of the cost associated with an activity that involve cash payment to other parties, as opposed to costs which do not require any cash outlay, such as depreciation and certain allocated costs. Out-of-Pocket Costs are very much relevant in the consideration of price fixation during trade recession or when a make-or-buy decision is to be made.

**Managed Cost:** Managed (Programmed or Discretionary) Costs all opposed to engineering costs, relate to such items where no accurate relationship between the amount spent on input and the output can be established and sometimes it is difficult to measure the output. Examples are advertisement cost, research and development costs, etc.,

**Common Costs:** These are costs which are incurred collectively for a number of cost centres and are required to be suitably apportioned for determining the cost of individual cost centres. Examples are: Combined purchase cost of several materials in one consignment, and overhead expenses incurred for the factory as a whole.

**Controllable and Non-Controllable Costs:** Controllable Cost is that cost which is subject to direct control at some level of managerial supervision. Non-controllable Cost is the cost which is not subject to control at any level of managerial supervision.

**(f) Classification by nature of Production or Process:**





**Batch Costing:** Batch Costing is the aggregate cost related to a cost unit which consists of a group of similar articles which maintains its identity throughout one or more stages of production. In this method, the cost of a group of products is ascertained. The unit cost is a batch or group of identical products instead of a single job, order, or contract. This method is applicable to general engineering factories which produces components in convenient economical batches.

**Process Costing:** When the production process is such that goods are produced from a sequence of continuous or repetitive operations or processes, the cost incurred during a period is considered as Process Cost. The process cost per unit is derived by dividing the process cost by number of units produced in the process during the period. Process Costing is employed in industries where a continuous process of manufacturing is carried out. Costs are ascertained for a specified period of time by departments or process. Chemical industries, refineries, gas and electricity generating concerns may be quoted as examples of undertakings that employ process costing.

**Operation Cost:** Operation Cost is the cost of a specific operation involved in a production process or business activity. The cost unit in this method is the operation, instead of process. When the manufacturing method consists of a number of distinct operations, operation costing is suitable.

**Operating Cost:** Operating cost is the cost incurred in conducting a business activity. Operating cost refer to the cost of undertakings which do not manufacture any product but which provide services. Industries and establishments like power house, transport and travel agencies, hospitals, and schools, which undertake services rather than the manufacture of products, ascertain operating costs. The cost units used are Kilo Watt Hour (KWH), Passenger Kilometre and Bed in the hospital....etc. Operation costing method constitutes a distinct type of costing but it may also be classed as a variant of Process Cost since costs in this method are usually compiled for a specified period.

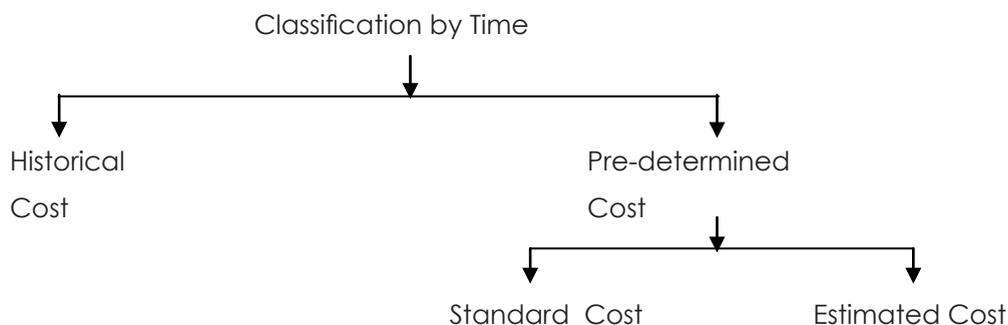
**Contract Costing:** Contract cost is the cost of contract with some terms and conditions between contractee and contractor. This method is used in undertakings, carrying out, building or constructional contracts like constructional engineering concerns, civil engineering contractors. The cost unit here is a contract, which may continue over more than one financial year.

**Joint Costs:** Joint costs are the common cost of facilities or services employed in the output of two or more simultaneously produced or otherwise closely related operations, commodities or services. When a production process is such that from a set of same input two or more distinguishably different products are produced together, products of greater importance are termed as Joint Products and products of minor importance are termed as By-products and the costs incurred prior to the point of separation are called Joint Costs. For example in petroleum industry petrol, diesel, kerosene, naphtha, tar is produced jointly in the refinery process.

**By-product Cost:** By-product Cost is the cost assigned to by-products till the split-off point.

### (g) Classification by Time:

A cost item is related to a specific period of time and cost can be classified according to the system of assessment and specific purpose as indicated in the following ways:-



**Historical Costs:** Historical Costs are the actual costs of acquiring assets or producing goods or services. They are post-mortem costs ascertained after they have been incurred and they represent the cost of actual operational performance. Historical Costing follows a system of accounting to which all values are based on costs actually incurred as relevant from time to time.

**Predetermined Costs:** Pre-determined Costs for a product are computed in advance of production process, on the basis of a specification of all the factors affecting cost and cost data. Predetermined Costs may be either standard or estimated.

**Standard Costs:** A predetermined norm applies as a scale of reference for assessing actual cost, whether these are more or less. The Standard Cost serves as a basis of cost control and as a measure of productive efficiency, when ultimately posed with an actual cost. It provides management with a medium by which the effectiveness of current results is measured and responsibility of deviation placed. Standard Costs are used to compare the actual costs with the standard cost with a view to determine the variances, if any, and analyse the causes of variances and take proper measure to control them.

**Estimated Costs:** Estimated Costs of a product are prepared in advance prior to the performance of operations or even before the acceptance of sale orders. Estimated Cost is found with specific reference to product in question, and the activity levels of the plant. It has no link with actual and hence it is assumed to be less accurate than the Standard Cost.

**Techniques of Costing:**

- A. Marginal Costing
- B. Standard Costing
- C. Budgetary Control
- D. Uniform Costing

**A. Marginal costing**

Marginal Costing is the ascertainment of marginal costs and of the effect on profit of changes in volume or type of output by differentiating between fixed costs and variable costs. Several other terms in use like Direct Costing, Contributory Costing, Variable Costing, Comparative Costing, Differential Costing and Incremental Costing are used more or less synonymously with Marginal Costing.

The term direct cost should not be confused with direct costing. In absorption Costing, direct cost refers to the cost which is attributable to a cost centre of cost unit (e.g., direct labour, direct material and direct expenses including traceable fixed expenses, i.e., the fixed expense which are directly chargeable). In Direct Costing (or Marginal Costing), factory variable overhead is taken as a direct cost while in the Absorption Cost Method, it is Indirect Cost.

**B. Standard Costing**

Standard Costing is defined as the preparation and use of standard cost, their comparison with actual costs and the measurement and analysis of variances to their causes and points of incidence. Standard Cost is a predetermined cost unit that is calculated from the management's standards of efficient operation and the relevant necessary expenditure. Standard Costs are useful for the cost estimation and price quotation and for indicating the suitable cost allowances for products, process and operations but they are effective tools for cost control only when compared with the actual costs of operation. The techniques of standard costing may be summarised as follows :-

- (i) Predetermination of technical data related to production. i.e., details of materials and labour operations required for each product, the quantum of inevitable losses, efficiencies expected, level of activity, etc.
- (ii) Predetermination of standard costs in full details under each element of cost, viz., labour, material and overhead.



- (iii) Comparison of the actual performance and costs with the standards and working out the variances, i.e., the differences between the actual and the standards.
- (iv) Analysis of the variances in order to determine the reasons for deviations of actuals from the standards.
- (v) Presentation of information to the appropriate level of management to enable suitable action (remedial measures or revision of the standard) being taken.

### **C. Budgetary Control**

Budgetary Control may be defined as the process of continuous comparison of actual costs and performance with the pre-established budgets in relation to the responsibilities of the executives to the specific budgets for the achievement of a target in accordance with the policy of the organisation and to provide a basis for revision of budget. Therefore, Budgetary Control involves mainly establishment of budgets, continuous comparison of actual with budgets for achievement of targets, revision of budgets in the light of changed circumstances.

The classification of budgets into various categories certainly helps to make the budgetary control more effective because the maximum use is made of the functional budgets. Functional Budgets over the goals to be attained by the functional executives and thus assume the greatest significance.

### **D. Uniform Costing**

Uniform Costing may be defined as the application and use of the same costing principles and procedures by different Organizations under the same management or on a common understanding between members of an association. It is thus not a separate technique or method. It simply denotes a situation in which a number of organizations may use the same costing principles in such a way as to produce costs which are of the maximum comparability. From such comparable costs valuable conclusions can be drawn. When the Uniform Costing is made use of by the different concerns the same management it helps to indicate the strengths and/or weaknesses of those concerns. By studying the findings, appropriate corrective steps may be taken to improve the overall efficiency of the organizations. When used by the member concerns of a trade association Uniform Costing helps to reduce expenditure on a comparative marketing, to determine and follow a uniform pricing policy, to exchange information between the members for comparison and improvement and so on.

Inter-firm Comparison as the name denotes means the techniques of evaluating the performances, efficiencies, deficiencies, costs and profits of similar nature of firms engaged in the same industry or business. It consists of exchange of information, voluntarily of course, concerning production, sales cost with various types of break-up, prices, profits, etc., among the firms who are interested or willing to make the device a success. The basic purposes of such comparison are to find out the work points in an organization and to improve the efficiency by taking appropriate measures to wipe out the weakness gradually over a period of time.

## **1.3 GENERALLY ACCEPTED COST ACCOUNTING PRINCIPLES & COST ACCOUNTING STANDARDS**

Like Generally Accepted Accounting Principles (GAAP) for Financial Accounting, the Cost Accounting has the Generally Accepted Cost Accounting Principle (GACAP) which are followed by the Indian industry are summarized as below.

Before proceeding with element wise Cost Accounting Principles, let us see the principles applicable to all the elements.

- (a) When an element of cost is accounted at standard cost, variances due to normal reasons are treated as a part of the element wise cost. Variances due to abnormal reasons will not form part of the cost.
- (b) Any subsidy / grant / incentive and any such payment received / receivable with respect to the

input cost is reduced from cost for ascertainment of the cost of the cost object to which such amount pertains.

- (c) Any abnormal cost where it is material and quantifiable will not form part of the cost.
- (d) Penalties, damages paid to statutory authorities or other third parties will not form part of the Total Cost.
- (e) Cost reported under various elements of cost will not include Imputed Costs.
- (f) Finance costs incurred in connection with the acquisition of resources such as material, utilities and the like will not form part of the cost of such resources.
- (g) Any credits or recoveries from employees or suppliers or other parties towards the costs incurred by the entity for a resource will be netted against such cost.
- (h) Except otherwise stated, the measurement of costs for Cost Accounting purposes will follow the same principles as set out in Generally Accepted Accounting Principles applicable to the concerned entity.

### **Generally Accepted Cost Accounting principles – Element wise**

#### **Material Cost**

- (a) Material cost usually includes all costs required to bring the materials to the present condition and location.
- (b) Material receipt is valued at purchase price including duties and taxes, freight inwards, insurance and other expenditure directly attributable to procurement (net of trade discounts, rebates, taxes and duties refundable or to be credited by taxing authorities) that can be quantified with reasonable accuracy at the time of acquisition.
- (c) Normal loss due to shrinkage or evaporation and gain due to elongation or absorption or moisture ...etc before the material is received is absorbed in material cost to the extent they are normal, with corresponding adjustment in quantity.
- (d) Normal loss or spoilage of material prior to reaching the factory or at places where the services are provided is absorbed in the cost of balance of materials net of amounts recoverable from suppliers, insurers, transporters or recoveries from disposal.
- (e) The foreign exchange component of imported material cost is converted at the rate on the date of transaction. Any subsequent change in the exchange rate till payment or otherwise will not form part of the material cost.
- (f) Self manufactured materials are valued at cost including direct material cost, direct employee cost, direct expenses, factory overheads and share of administrative overheads relating to production. Share of other administrative overheads, finance cost and marketing overheads are excluded.
- (g) Material cost of abnormal scrap/defectives should not be included in the material cost, but treated as loss after giving credit to the realizable value of such scrap/defectives.
- (h) When material is processed or part is manufactured by a third party according to the specifications provided by the buyer, the processing / manufacturing charges payable to third party is treated as part of the material cost.
- (i) Material costs are assigned to cost objects on the basis of material quantity consumed where traceable and technical norms or estimates may be taken as basis where the quantity consumed cannot be traced.

#### **Employee Cost**

- (a) Employee Cost or labour cost is ascertained taking into account the gross pay including all allowances payable along with the cost to the employer of all benefits.



- (b) Bonus whether payable as a statutory minimum or on a sharing of surplus and ex gratia payable in lieu of or in addition to bonus is treated as part of the employee cost.
- (c) Remuneration payable to managerial personnel including executive directors on the board and other officers of a corporate body under a statute is considered as part of the employee cost of the year under reference, whether whole or part is computed as a percentage of profits.
- (d) Gratuity, Superannuation, and other benefits measured using actuarial valuation method or any other methods are part of employee cost.
- (e) Separation costs related to voluntary retirement, retrenchment, termination etc. should be amortized over the period benefiting from such costs.
- (f) Recruitment costs, training costs and other such costs is treated as overheads and dealt with accordingly.

### **Direct Expenses**

- (a) The identification of direct expenses is based on the traceability in an economically feasible manner and if an item of expense does not meet the test of materiality, it can be treated as part of overheads.
- (b) Expenses paid or incurred in lump sum or which is in the nature of 'one-time' payment is amortized on the basis of the estimated output or benefit to be derived from such expenses.
- (c) Direct expenses are by definition directly traceable to cost objects and hence no special principles are involved for them to be assigned to cost object.

### **Utilities**

- (a) The cost of utilities purchased is measured at cost of purchase including duties and taxes, transportation cost, insurance and other expenditure directly attributable to procurement.
- (b) The cost of generated utilities includes direct materials, direct labour, direct expenses and factory overheads.
- (c) Cost of utilities generated for the purpose of inter unit transfers is arrived as cost of self generated utilities with distribution cost added.
- (d) Cost of utilities generated for the purpose of intercompany transfers is arrived as cost of self generated utilities with distribution costs plus share of administrative overheads.
- (e) Cost of utilities generated for sale to outside parties is arrived as cost of self generated utilities with distribution cost plus share of administrative and marketing overheads.
- (f) Cost of standby utilities includes the committed cost of maintaining such utility.
- (g) The most appropriate basis for distribution of cost of a utility to the departments consuming services is to be derived from usage parameters.

### **Repairs & Maintenance Cost**

- (a) The Cost of repairs and maintenance is the aggregate of direct and indirect cost relating to repairs and maintenance activity.
- (b) Cost of in-house repairs and maintenance activity will include cost of materials, consumable stores, spares manpower, equipment usage, utilities and other resources used in the activity.
- (c) Cost of repairs and maintenance activity carried out by outside contractors within the factory / entity, then repair charges will include the charges payable to the contractor in addition to the in-house materials / spares cost issued.

- (d) When a high value spare is replaced and the replaced spare is reconditioned and such spare is expected to result in future economic benefit & it is taken into stock, then such spare is valued at an amount that measures its service potential in relation to the new spare, the amount of which will not exceed the cost of reconditioning the spare. The difference between the total of the cost of new spare and the reconditioning cost and the value of reconditioned spare should be treated as Repairs and Maintenance.
- (e) Cost of major overhaul is to be amortized on a rational basis.

### **Production Overheads**

Production overheads are indirect costs involved in the production process or in rendering services. Production overheads include administration cost relating to production, factory, works or manufacturing; Production related expenses incurred at administrative office, for example Design office expenses, industrial relations dept, materials management dept...etc

- (a) While assigning the overheads, traceability to a cost object in an economically feasible manner shall be the guiding principle. The costs which can be traced directly to a cost object shall be directly assigned.
- (b) Assignment of overheads to cost objects shall be based on either of the following principles
  - (i) *Cause & Effect*: Cause is the process or operation or activity and effect is the incurrence of cost.
  - (ii) *Benefits Received*: Overheads are to be apportioned to the various cost objects in proportion to the benefits received by them.
- (c) It is not good practice to allocate overheads to Cost centres / Cost objects on the basis of what the traffic will bear – That is by size of the user.

Production overheads of production cost centres have to be segregated between fixed overheads and variable overheads. The fixed overheads are to be absorbed by products based on the normal capacity or actual capacity utilization whichever is higher. Variable overheads are absorbed by products based on actual capacity utilized. Under absorbed fixed overheads are charged off to Costing Profit and Loss Account.

### **Administrative Overheads**

Administrative Overheads are the aggregate cost of resources consumed in activities relating to general management and administration of an organization.

Since most of the administrative overheads are fixed in nature, it is preferable to charge them to users on 'readiness to serve' basis such as installed capacity, budgeted sales...etc rather than actual production or actual sales.

In case of leased assets, if it is on operating lease then entire rental will be treated as a part of administrative overheads, while in case of financial lease, the finance cost portion will be segregated and treated as a part of finance cost. The assignment of administrative overheads to cost objects is based on either of the principles of Cause & Effect or Benefits received, if it is not traceable.

### **Selling and Distribution Overheads**

The acceptable basis for apportionment of selling costs to customers/ products are:-

- (a) Weight
- (b) Units/ Equivalent Units
- (c) Value of goods
- (d) Any other appropriate and equitable basis

The acceptable bases for assigning common transport cost to products are:

- (a) Weight
- (b) Volume of Goods
- (c) Tonne Kilometre
- (d) Value of goods
- (e) Units / Equivalent units

### **Interest and Finance Charges**

Many entities started including the financing charges in computing the Cost of Sales. Normally these costs are assigned to products before arriving at margin by product/ product line.

Normally interest charges are grouped under two categories i.e interest on long-term borrowings and interest on working capital. The interest on long-term funds is assigned to products based on the fixed capital investment in such products. Interest on working capital may be assigned based on the net working capital of the product lines.

## **1.4 COST ACCOUNTING STANDARDS:**

### **Preface to Cost Accounting Standards:**

The council of the Institute of Cost Accountants of India, has constituted 'Cost Accounting Standards Board' (CASB) with the objective of formulating Cost Accounting Standards, after recognizing the need for structured approach to the measurement of cost so as to provide guidance to the user organizations, government bodies, regulators, research agencies, academic institutions and others to achieve uniformity and consistency in classification, measurement and assignment of costs.

The composition of the CASB will be broad based and ensure participation of all interest groups in the standard setting process. The chairman of the CASB will be nominated by the council of the Institute. Apart from six members of the council nominated on the CASB the following will be represented on the CASB:-

- (a) A nominee of the Central Government representing Ministry of Corporate Affairs.
- (b) Adviser (Cost), Cost Audit Branch, Ministry of Corporate Affairs, Government of India.
- (c) A nominee of the Central Government representing the Central Board of Excise and Customs, Government of India.
- (d) A nominee of the Central Government representing the Central Board of Direct Taxes.
- (e) Two members of the institute representing leading companies.
- (f) Four nominees from regulators i.e. CAG, RBI, SEBI, IRDA, TRAI...etc.
- (g) Two nominees from professional institutions i.e. ICAI and ICSI.
- (h) Three nominees of industry associations viz ASSOCHAM, CII, FICCI....etc.
- (i) Two nominees from academic institutions like IIM, MDI, Universities...etc.
- (j) Four eminent practicing members of the institute.
- (k) President is authorized to include a maximum of two eminent persons having knowledge and expertise in the Cost and Management Accounting / Accounting Standards not falling under the categories as defined in the constitution.

### **Objectives and Functions of the Cost Accounting Standards Board:**

The objectives of the CASB are to develop high quality Cost Accounting Standards to enable the management to take informed decisions and to enable regulators to function more effectively by integrating, harmonizing and standardizing Cost Accounting Principles and Practices.

The following will be the functions of the CASB:-

- (a) To issue the framework for the Cost Accounting Standards.

- (b) To equip the Cost & Management Accounting professionals with better guide lines on cost Accounting Principles.
- (c) To assists the members in preparation of uniform cost statements under various statutes.
- (d) To provide from time to time interpretations on Cost Accounting Standards.
- (e) To issue application guidance relating to particular standard.
- (f) To propagate the Cost Accounting Standards and to persuade the users to adopt them in the preparation and presentation of general purpose Cost Statement.
- (g) To persuade the government and appropriate authorities to enforce Cost Accounting Standards, to facilitate the adoption thereof, by industry and corporate entities in order to achieve the desired objectives of standardization of Cost Accounting Practices.
- (h) To educate the users about the utility and the need for compliance of Cost Accounting Standards.

Overview of Cost Accounting Standards issued till date are as follows:

CAS No	Title	Objective
CAS 1	Classification of Cost	For preparation of Cost Statements.
CAS 2	Capacity Determination	To bring uniformity and consistency in the principles and methods of determination of capacity with reasonable accuracy.
CAS 3	Overheads	To bring uniformity and consistency in the principles and methods of determining overheads with reasonable accuracy.
CAS 4	Cost of Production for Captive consumption	To determine the assessable value of excisable goods used for captive consumption.
CAS 5	Average (Equalized) Cost of Transportation	To determine averaged / equalized transportation cost.
CAS 6	Material Cost	To bring uniformity and consistency in the principles and methods of determining the Material Cost with reasonable accuracy in an economically feasible manner.
CAS 7	Employee Cost	To bring uniformity and consistency in the principles and methods of determining the Employee Cost with reasonable accuracy.
CAS 8	Cost of Utilities	To bring uniformity and consistency in the principles and methods of determining the Cost of Utilities with reasonable accuracy.
CAS 9	Packing Material Cost	To bring uniformity and consistency in the principles and methods of determining the Packing Material Cost with reasonable accuracy.
CAS 10	Direct Expenses	To bring uniformity and consistency in the principles and methods of determining the Direct Expenses with reasonable accuracy.
CAS 11	Administrative Over-heads	To bring uniformity and consistency in the principles and methods of determining the Administrative Overheads with reasonable accuracy.
CAS 12	Repairs and Maintenance Cost	To bring uniformity and consistency in the principles and methods of determining the Repairs and Maintenance Cost with reasonable accuracy.

CAS 13	Cost of Service Cost Centre	To bring uniformity and consistency in the principles and methods of determining the Cost of Service Cost Centre with reasonable accuracy.
CAS 14	Pollution Control Cost	To bring uniformity and consistency in the principles and methods of determining the Pollution Control Costs with reasonable accuracy.
CAS 15	Selling and Distribution overheads	To bring uniformity and consistency in the principles and methods of determining the selling and Distribution overheads with reasonable accuracy

CAS No.	Title	Objectives
CAS 16	Depreciation and Amortisation	To bring uniformity and consistency in the principles and methods of determining the Depreciation and Amortisation with reasonable accuracy.
CAS 17	Interest and Financing Charges.	To bring uniformity and consistency in the principles ,methods of determining and assigning the Interest and Financing Charges with reasonable accuracy.
CAS 18	Research and Development Costs	To bring uniformity and consistency in the principles and methods of determining the Research, and Development Costs with reasonable accuracy and presentation of the same.
CAS 19	Joint Costs	To bring uniformity and consistency in the principles and methods of determining the Joint Costs.
CAS 20	Cost Accounting Standard on Royalty and Technical Know-How Fee	To bring uniformity and consistency in the principles and methods of determining the amount of Royalty and Technical Know-how Fee with reasonable accuracy.
CAS 21	Cost Accounting Standard on Quality Control	To bring uniformity, consistency in the principles, methods of determining and assigning Quality Control cost with reasonable accuracy.
CAS 22	Cost Accounting Standard on Manufacturing Cost	To bring uniformity and consistency in the principles and methods of determining the Manufacturing Cost of excisable goods

Each of the Cost Accounting standard has been explained in brief as follows

### **CAS -1: Classification of Costs**

#### **Objective**

- The objective of this standard is to prescribe the classification of costs for ascertainment of cost of a product or service and preparation of cost statements on a consistent and uniform basis with a view to effect the comparability of the same of an enterprise with that of previous periods and of other enterprises.
- The classification and its disclosure are aimed at providing better transparency in the cost statement.
- The standard is also for better adoption of Uniform Costing and Inter-Firm Comparison.

#### **Scope**

The standard on classification of cost should be applied in assessment of cost of a product or service, application of costing technique and in case of management decision making by the manufacturing industries in India.

The standard is to be followed by an enterprise, whether covered under [section 128](#) of the [Companies Act, 2013](#) or not, to classify cost in order to prepare Cost Statement on uniform basis to make it relevant and understandable for effective cost management.

The standard has also to be followed for the purpose of assessment of cost of production or valuation of product or the valuation of stock to be certified for calculation of duties and taxes, tariffs and other purposes as the case may be. The Cost Statement prepared based on standard will be used for assessment of excise duty and other taxes, anti-dumping measures, transfer pricing etc.

### **Basic Rules for Classification of Costs**

- (a) Classification of cost is the arrangement of items of costs in logical groups having regard to their nature (subjective classification) or purpose (objective classification).
- (b) Items should be classified by one characteristic for a specific purpose without ambiguity.
- (c) Scheme of classification should be such that every item of cost can be classified.

### **Basis of classification**

- (a) Nature of expense
- (b) Relation to object – traceability
- (c) Functions / activities
- (d) Behaviour - Fixed, Semi-variable or Variable
- (e) Management decision making
- (f) Production Process
- (g) Time period

### **CAS -2: Capacity Determination**

This standard deals with the principles and methods of determining the capacity of a manufacturing facility of an entity. Capacity is determined for assignment of overheads to cost objects. Principles of assignment of overheads have been stipulated in Cost Accounting Standard – 3 (Revised 2011) on Overheads. This standard deals with the principles and methods of classification and determination of capacity of a plant of an entity for ascertainment of the cost of product, and the presentation and disclosure in cost statements.

### **Objective**

The objective of this standard is to bring uniformity and consistency in the principles and methods of determination of capacity with reasonable accuracy.

### **Scope**

This standard shall be applied to the Cost Statements, including those requiring attestation, which require determination of capacity for assignment of overheads.

**Determinants of Capacity:** Installed capacity is determined based on the following factors:-

- (a) Manufacturers' Technical specifications.
- (b) Capacities of individual or interrelated production centres.
- (c) Operational constraints / capacity of critical machines.
- (d) Number of shifts.

Normal capacity shall be determined vis-a-vis installed capacity after carrying out following adjustments:

- (i) Holidays, normal shut down days and normal idle time,
- (ii) Normal time lost in batch change over,



- (iii) Time lost due to preventive maintenance and normal break downs of equipments,
- (iv) Loss in efficiency due to ageing of the equipment,
- (v) Number of shifts.

### **CAS-3: Cost Accounting Standard on Overheads**

This standard deals with the principles and methods of determining the Overheads. This standard deals with the principles and methods of classification, measurement and assignment of Overheads, for determination of the cost of product or service, and for the presentation and disclosure in Cost Statements.

#### **Objectives**

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Overheads with reasonable accuracy.

#### **Scope**

This standard shall be applied to Cost Statements, which require classification, measurement, assignment, presentation and disclosure of Overheads including those requiring attestation.

#### **Disclosures**

The cost statements shall disclose the following:-

1. The basis of assignment of overheads to the cost objects.
2. Overheads incurred in foreign exchange.
3. Overheads relating to resources received from or supplied to related parties.
4. Any Subsidy / Grant / Incentive or any amount of similar nature received / receivable reduced from overheads.
5. Credits / recoveries relating to overheads.
6. Any abnormal cost not forming part of the overheads.
7. Any unabsorbed overheads.

### **CAS-4: Cost Accounting Standard on Cost of Production for Captive Consumption**

The Cost Accounting Principle for determination of cost of production is well established. Similarly, rules for levy of excise duty on goods used for captive consumption are also well defined. Captive Consumption means the consumption of goods manufactured by one division and consumed by another division(s) of the same organization or related undertaking for manufacturing another product(s). Liability of excise duty arises as soon as the goods covered under excise duty are manufactured but excise duty is collected at the time of removal or clearance from the place of manufacture even if such removal does not amount to sale. Assessable value of goods used for captive consumption is based on cost of production. According to the Central Excise Valuation (Determination of Price of Excisable Goods) Rules 2000, the assessable value of goods used for captive consumption is 115% **(110% w.e.f. 05-08-2003)** of cost of production of such goods, and as may be prescribed by the Government from time to time.

#### **Objective**

- (a) The purpose of this standard is to bring uniformity in the principles and methods used for determining the cost of production of excisable goods used for captive consumption.
- (b) The cost statement prepared based on standard will be used for determination of assessable value of excisable goods used for captive consumption.
- (c) The standard and its disclosure requirement will provide better transparency in the valuation of excisable goods used for captive consumption.

### **Scope**

The standard is to be followed for determining the cost of production to arrive at an assessable value of excisable goods used for captive consumption.

Cost of production will include various cost components. They are already defined in Cost Accounting Standard-1 ('Classification of Cost' – CAS-1). Thus, this standard has to be read in conjunction with standard 1.

### **CAS-5: Cost Accounting Standard on Determination of Average Cost of Transportation**

The Cost Accounting Principles for tracing/identifying an element of cost, its allocation/apportionment to a product or service are well established. Transportation Cost is an important element of cost for procurement of materials for production and for distribution of product for sale. Therefore, Cost Accounting Records should present transportation cost separately from the other cost of inward materials or cost of sales of finished goods. The Finance Act 2003 also specifies the certification requirement of Transportation Cost for claiming deduction while arriving at the assessable value of excisable goods cleared for home consumption/ export. There is a need to standardize the record keeping of expenses relating to transportation and computation of Transportation Cost.

### **Objective**

- (a) To bring uniformity in the application of principles and methods used in the determination of averaged/equalized Transportation Cost.
- (b) To prescribe the system to be followed for maintenance of records for collection of cost of transportation, its allocation/apportionment to cost centres locations or products.
- (c) To provide transparency in the determination of cost of transportation.

### **Scope**

This standard should be applied for calculation of cost of transportation required under any statute or regulations or for any other purpose. For example, this standard can be used for :

- (a) Determination of average transportation cost for claiming the deduction for arriving at the assessable value of excisable goods.
- (b) Insurance claim valuation.
- (c) Working out claim for freight subsidy under Fertilizer Industry Coordination Committee.
- (d) Administered price mechanism of freight cost element.
- (e) Determination of inward freight costs included or to be included in the cost of purchases attributable to the acquisition.
- (f) Computation of freight included in the value of inventory for accounting on inventory or valuation of stock hypothecated with Banks / Financial Institution ...etc.

### **CAS-6: Cost Accounting Standard on Material Cost**

This standard deals with principles and methods of determining the Material Cost. Material for the purpose of this standard includes raw materials, process materials, additives, manufactured / bought out components, sub-assemblies, accessories, semi finished goods, consumable stores, spares and other indirect materials. This standard does not deal with Packing Materials as a separate standard is being issued on the subject.

This standard deals with the principles and methods of classification, measurement and assignment of Material Cost, for determination of the Cost of product or service, and the presentation and disclosure in cost statements.



### **Objective**

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Material Cost with reasonable accuracy.

### **Scope:**

This standard should be applied to Cost Statements which require classification, measurement, assignment, presentation and disclosure of Material Costs including those requiring attestation.

### **CAS-7: Cost Accounting Standard on Employee Cost**

This standard deals with the principles and methods of determining the Employee Cost. This standard deals with the principles and methods of classification, measurement and assignment of Employee Cost, for determination of the cost of product or service and the presentation and disclosure in Cost Statements.

### **Objective**

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Employee Cost with reasonable accuracy.

### **Scope**

This standard should be applied to cost statements which require classification, measurement, assignment, presentation and disclosure of Employee Cost including those requiring attestation.

### **CAS-8: Cost Accounting Standard on Cost of Utilities**

This standard deals with the principles and methods of determining the Cost of Utilities. This standard deals with the principles and methods of classification, measurement and assignment of Cost of Utilities, for determination of the cost of product or service and the presentation and disclosure in Cost Statements.

### **Objective**

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Cost of Utilities with reasonable accuracy.

### **Scope**

This standard shall be applied to cost statements which require classification, measurement, assignment, presentation and disclosure of Cost of Utilities including those requiring attestation.

For determining the cost of production to arrive at an assessable value of excisable utilities used for captive consumption, Cost Accounting Standard 4 on Cost of Production for Captive Consumption (CAS 4) shall apply. This standard shall not be applicable to the organizations primarily engaged in generation and sale of utilities. This standard does not cover issues related to the ascertainment and treatment of carbon credits, which shall be dealt with in a separate standard.

### **CAS-9: Cost Accounting Standard on Packing Material Cost**

This standard deals with the principles and methods of determining the Packing Material Cost. This standard deals with the principles and methods of classification, measurement and assignment of Packing Material Cost, for determination of the cost of product, and the presentation and disclosure in Cost Statements. Packing Materials for the purpose of this standard are classified into primary and secondary packing materials.

### **Objective**

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the packing material cost with reasonable accuracy.

### **Scope**

This standard should be applied to cost statements, which require classification, measurement, assignment, presentation and disclosure of Packing Material Cost including those requiring attestation.

### **CAS-10: Cost Accounting Standard on Direct Expenses**

This standard deals with the principles and methods of determining the Direct Expenses. This standard deals with the principles and methods of classification, measurement and assignment of Direct Expenses, for determination of the cost of product or service, and the presentation and disclosure in Cost Statements.

#### **Objectives**

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Direct Expenses with reasonable accuracy.

#### **Scope**

This standard should be applied to Cost Statements, which require classification, measurement, assignment, presentation and disclosure of Direct Expenses including those requiring attestation.

### **CAS-11: Cost Accounting Standard on Administrative overheads**

This standard deals with the principles and methods of determining the Administrative Overheads

This standard deals with the principles and methods of classification, measurement and assignment of Administrative Overheads, for determination of the cost of product or service, and the presentation and disclosure in Cost Statements.

#### **Objective**

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Administrative Overheads with reasonable accuracy.

#### **Scope**

The standard should be applied to Cost Statements, which require classification, measurement, assignment, presentation and disclosure of Administrative Overheads including those requiring attestation.

### **CAS-12: Cost Accounting Standard on Repairs and Maintenance**

This standard deals with the principles and methods of determining the Repairs and Maintenance Cost.

This standard deals with the principles and methods of classification, measurement and assignment of Repairs and Maintenance Cost, for determination of the cost of product or service, and the presentation and disclosure in Cost Statements.

#### **Objective**

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Repairs and Maintenance Cost with reasonable accuracy.

#### **Scope**

The standard should be applied to Cost Statements, which require classification, measurement, assignment, presentation and disclosure of Repairs and Maintenance Cost including those requiring attestation.

### **CAS-13: Cost Accounting Standard on Cost of Service Cost Centre**

This standard deals with the principles and methods of determining Cost of Service Cost Centres. This standard deals with the principles and methods of classification, measurement and assignment of Cost of Service Cost Centre, for determination of the cost of product or service, and the presentation and disclosure in Cost Statements.

#### **Objective**

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Cost of Service Cost Centre with reasonable accuracy.



## Scope

The standard should be applied to [the preparation & presentation](#) Cost Statements, which require classification, measurement [and](#) assignment, of Cost of Service Cost Centres including those requiring attestation. It excludes Utilities and Repairs & Maintenance Services dealt with in CAS-8 and CAS-12 respectively.

### **CAS-14: Cost Accounting Standard on Pollution Control Cost**

This standard deals with the principles and methods of determining Pollution Control Cost. This standard deals with the principles and methods of classification, measurement and assignment of Pollution Control Costs, for determination of the cost of product or service, and the presentation and disclosure in Cost Statements.

#### **Objective**

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Pollution Control Costs with reasonable accuracy.

#### **Scope**

The standard should be applied to Cost Statements, which require classification, measurement, assignment, presentation and disclosure of Pollution Control Costs including those requiring attestation.

### **CAS-15: Cost Accounting Standard on Selling and Distribution Overheads**

This standard deals with the principles and methods of determining the Selling and Distribution Overheads.

This standard deals with the principles and methods of classification, measurement and assignment of Selling and Distribution Overheads, for determination of the cost of sales of product or service, and the presentation and disclosure in cost statements.

#### **Objective:**

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Selling and Distribution Overheads with reasonable accuracy.

#### **Scope:**

This standard should be applied to cost statements, which require classification, measurement, assignment, presentation and disclosure of Selling and Distribution Overheads including those requiring attestation.

### **CAS -16 : Cost Accounting Standard on Depreciation and Amortisation**

This standard deals with the principles and methods of determining Depreciation and Amortisation Cost.

This standard deals with the principles and methods of measurement and assignment of Depreciation and Amortisation for determination of the cost of product or service, and the presentation and disclosure in cost statements.

#### **Objective :**

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Depreciation and Amortisation with reasonable accuracy.

#### **Scope :**

This standard shall be applied to cost statements which require measurement, assignment, presentation and disclosure of Depreciation and Amortisation, including those requiring attestation.

### **CAS-17 : Cost Accounting Standard on Interest and Financing Charges**

This standard deals with the principles and methods of determining Interest and Financing Charges.

This standard deals with the principles and methods of classification, measurement and assignment of Interest and Financing Charges.

#### **Objective**

The objective of this standard is to bring uniformity and consistency in the principles ,methods of determining and assigning the Interest and Financing Charges with reasonable accuracy.

#### **Scope**

This standard should be applied to cost statements which require classification, measurement, assignment, presentation and disclosure of Interest and Financing Charges including those requiring attestation. This standard does not deal with costs relating to risk management through derivatives.

### **CAS -18 : Cost Accounting Standard on Research and Development Costs**

This standard deals with the principles and methods of determining Research and Development Cost.

This standard deals with the principles and methods of determining the Research, and Development Costs and their classification, measurement and assignment for determination of the cost of product or service, and the presentation and disclosure in cost statements.

#### **Objective**

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Research, and Development Costs with reasonable accuracy and presentation of the same.

#### **Scope**

This standard should be applied to cost statements that require classification, measurement, assignment, presentation and disclosure of Research, and Development Costs including those requiring attestation.

### **CAS-19 : Cost Accounting Standard on Joint Costs**

This standard deals with the principles and methods of determining Joint Cost.

The standard deals with the principles and methods of measurement and assignment of Joint Costs and the presentation and disclosure in cost statement.

#### **Objective**

The objective of this standard is to bring uniformity, consistency in the principles, methods of determining and assigning Joint Costs with reasonable accuracy.

#### **Scope**

The standard shall be applied to cost statements which require classification, measurement, assignment, presentation and disclosure of Joint Costs including those requiring attestation.

### **CAS-20 : Cost Accounting Standard on Royalty And Technical Know-How Fee**

This standard deals with the principles and methods of determining the amount of Royalty and Technical Know-how Fee.

This standard deals with the principles and methods of classification, measurement and assignment of the amount of Royalty and Technical Know-how Fee, for determination of the cost of product or service, and their presentation and disclosure in cost statements.



### **Objective**

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the amount of Royalty and Technical Know-how Fee with reasonable accuracy.

### **Scope**

This standard should be applied to cost statements, which require classification, measurement, assignment, presentation and disclosure of the amount of Royalty and Technical Know-how Fee including those requiring attestation.

### **CAS-21 : Cost Accounting Standard on Quality Control**

The standard deals with the principles and methods of measurement and assignment of Quality Control cost and the presentation and disclosure in cost statement.

### **Objective**

The objective of this standard is to bring uniformity, consistency in the principles, methods of determining and assigning Quality Control cost with reasonable accuracy.

### **Scope**

The standards shall be applied to cost statements which require classification, measurement, assignment, presentation and disclosure of Quality Control cost including those requiring attestation.

### **CAS – 22 : Cost Accounting Standard on Manufacturing Cost**

This standard deals with the principles and methods of determining the Manufacturing Cost of excisable goods.

This standard deals with the principles and methods of classification, measurement and assignment for determination of the Manufacturing Cost of excisable goods and the presentation and disclosure in cost statements.

### **Objective**

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Manufacturing Cost of excisable goods.

### **Scope**

This standard should be applied to cost statements which require classification, measurement, assignment, presentation and disclosure of Manufacturing Cost of excisable goods.



# Study Note - 2

## BUSINESS PROCESS ANALYSIS



### This Study Note includes

- 2.1 Materials (CAS-6)
- 2.2 Employee Costs (CAS-7)
- 2.3 Direct Expenses (CAS-10)
- 2.4 Overheads (CAS-3)
- 2.5 Treatment of Special Items
- 2.6 Cost Sheet

### 2.1 MATERIALS (CAS – 6)

Material is any substance (Physics term) that forms part of or composed of a finished product. i.e material refers to the commodities supplied to an undertaking for the purpose of consumption in the process of manufacturing or of rendering service or for transformation into products. The term 'Stores' is often used synonymously with materials, however, stores has a wider meaning and it covers not only raw materials consumed or utilized in production but also such other items as sundry supplies, maintenance stores, fabricated parts, components, tools, jigs, other items, consumables, lubricants.....etc. Finished and partly finished products are also often included under the term 'Stores'. Materials are also known as Inventory. The term Materials / Inventory covers not only raw materials but also components, work-in-progress and finished goods and scrap also.

Material cost is the significant constituent of the total cost of any product. It constitutes 40% to 80% of the total cost. The percentages may differ from industry to industry. But for manufacturing sector the material costs are of greatest significance. Inventory also constitutes a vital element in the Working Capital. So it is treated as equivalent to cash. Therefore the analysis and control on Material Cost is very important.

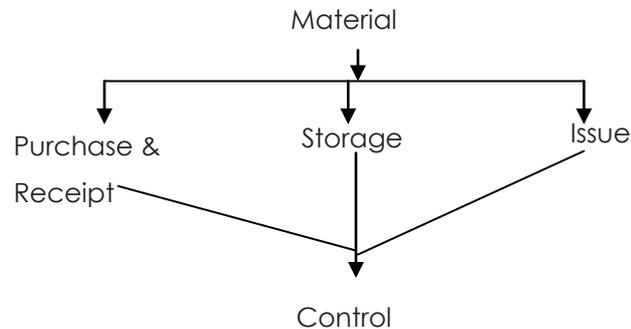
#### **Objectives of Material Control System:**

*Material Control: The function of ensuring that sufficient goods are retained in stock to meet all requirements without carrying unnecessarily large stocks.*

The objectives of a system of material control are as following :-

- (a) To make continuous availability of materials so that there may be uninterrupted flow of materials for production. Production may not be held up for want of materials.
- (b) To purchase requisite quantity of materials to avoid locking up of working capital and to minimise risk of surplus and obsolete stores.
- (c) To make purchase competitively and wisely at the most economical prices so that there may be reduction of material costs.
- (d) To purchase proper quality of materials to have minimum possible wastage of materials.
- (e) To serve as an information centre on the materials knowledge for prices, sources of supply, lead time, quality and specification.

Study of Material can be better explained as follows:



**Requisites of Material Control System:**

- (a) Coordination and cooperation between the various departments concerned viz purchase, receiving, inspection, storage, issues and Accounts and Cost departments.
- (b) Use of standard forms and documents in all the stages of control.
- (c) Classification, coordination, standardization and simplification of materials.
- (d) Planning of requirement of material.
- (e) Efficient purchase organization.
- (f) Budgetary control of purchases.
- (g) Planned storage of materials, physical control as well as efficient book control through satisfactory storage control procedures, forms and documents.
- (h) Appropriate records to control issues and utilization of stores in production.
- (i) Efficient system of Internal Audit and Internal Checks.
- (j) System of reporting to management regarding material purchase, storage and utilization.

**Purchase Flow:**

The main functions of a purchase department are as follows:-

- (a) What to purchase? – Right Material with good quality
- (b) When to purchase? – Right Time
- (c) Where to purchase? – Right Source
- (d) How much to purchase? – Right Quantity
- (e) At what price to purchase? – Right Price

To perform these functions effectively, the purchasing department follows the following procedure:-

- (a) Receiving purchase requisitions.
- (b) Exploring the sources of supply and choosing the supplier.
- (c) Preparation and execution of purchase orders.
- (d) Receiving materials.
- (e) Inspecting and testing materials.
- (f) Checking and passing of bills for payment.



### **Purchase Organization:**

Purchasing involves procurement of materials of requisite quantity and quality at economic price. It is of extreme importance particularly to a manufacturing concern because it has bearing on all vital factors of manufacture such as quantity, quality, cost, efficiency, economy, prompt delivery, volume of production and so on. Purchase department in a business concern can be organized into two types i.e Centralized Purchasing System and De-centralized Purchasing System. Purchasing process in most of the organisation is a centralised function because the advantages of a centralised purchasing out weight its disadvantages. Lets us see the merits and demerits of both the systems.

### **Merits of a centralised & De-merits of decentralized purchase organization:-**

- (a) When materials are purchased favourable terms (Trade discount, Economies of transport...etc) can be obtained because the quantity involved will be large. In case of decentralized system these benefits cannot be realized.
- (b) Specialised purchasing officer can be appointed with the specific purpose of highly efficient purchases functions of the concern. In case of decentralized purchase system, the business entity cannot afford a specialized purchasing officer in every location.
- (c) Effective control can be exercised over the stock of materials because duplication of purchase of the same materials may easily be avoided in centralized purchase system, where as in decentralized purchase system, duplication of purchase of same material cannot be avoided.
- (d) Under centralized purchase system effective control can be exercised on the purchases of all the materials as the purchase function is channelized through one track which would make the system of receiving, checking and inspection efficient. Where as in decentralized purchase system it is very difficult to exercise controls.
- (e) Under centralized system of purchase materials, components and capital equipments can be suitably standardised so that the maximum purchasing benefits be availed of, storage facilities can be improved and available production facilities can be greatly utilized to the maximum possible extent. Under decentralized purchase system standardization of materials, storage facilities.....etc is very difficult to achieve.
- (f) Under centralized system of purchase closer cooperation between the financial and purchasing departments can be achieved which may not be easy under decentralized purchase system.

### **De-Merits of a centralized & Merits of decentralized purchase organization :-**

- (a) In may take unnecessarily long time to place a purchase order under centralized purchase system because to collect the relevant data from various departments/ branches/locations may take more time, These delays can be avoided under decentralized purchase system.
- (b) In case of centralized purchasing system, branches at different places cannot take advantage of localized purchasing, whereas under decentralized purchase system localization savings can be realized.
- (c) Due to the Chances of misunderstanding / miscommunication between the branch and the centralized purchasing office may result in wrong purchase of material also. Whereas under decentralized purchase system, the chances of miscommunication/ misunderstanding is very limited.
- (d) Centralized system will lead to high initial costs because a separate purchasing department for purchase of materials is to be setup. No such costs are required to be incurred in the decentralized system.
- (e) Replacement of a defective item may take long time resulting in strain on smooth production flow under centralized system of purchase. No such delay in decentralized system.

Now let us see the various material control documents in detail.

**Purchase Requisition:**

Purchases Requisition is a request made to the Purchase Department to procure materials of given description and of the required quality and quantity within a specified period. It is a formal request and it authorizes the Purchase Department to issue a Purchase Order to secure materials intended for periodic requirements of a given material or materials to provide guidance to the Purchase Department to estimate the future requirements in order to secure maximum purchase benefits in the form of higher discount and better credit terms. The extent and range of materials requirements provide a basis for preparation of a purchase budget. The actual requirements of a given period can be summarised from the purchases requisition and compared with the purchase budget in order to determine the variances and the reasons thereof. This form is prepared by storekeeper for regular items and by the departmental head for special materials not stocked as regular items.

The Purchase Requisition is prepared in three copies. Original will be sent to Purchase department, Duplicate copy will be retained by the indenting (request initiating) department and the triplicate will be sent to approver for approving the purchase requisition.

Purchase Requisition provides the three basic things:-

- a) What type of material is to be purchased?
- b) When to be purchased?
- c) How much is to be purchased?

The specimen form of Purchase Requisition is as shown below :

<b>Modern Ltd</b>						
<b>Purchase Requisition or Indent</b>						
Purchase Req Type: Special / Regular :						
Purchase Req No :			Purchase Requisition Date :			
Department :						
S.No	Material Code	Description of the Goods	Quantity Required	Material Required by date	Remarks	
Requested by			Approved by			
<b>For use in Purchase Dept.</b>						
Quotations from						
1)				PO Placed : Yes /No		
2)				PO No:		
3)						



**Purchase Order:**

Purchase Order (PO) is a request made in writing to selected supplier to deliver goods of requisite quality, quantity, (as per the purchase requisition) at the prices, terms and conditions agreed upon. It is a commitment on the part of the purchaser to accept the delivery of goods contained in the Purchase Order if the terms included therein, are fulfilled. Purchase Order contains the following details:-

(a) Purchase Order No; (b) PO Date; (c) Supplier Name and Address; (d) Material Code; (e) Material description; (f) Grade & Other particulars of the material; (g) Quantity to be supplied; h) Price; i) Place of delivery; j) Taxes; k) Terms of Payment (Credit period) .....etc

Usually a purchase order is made in five copies, one each for suppliers, Receiving/Stores Department, Originating Department, Accounts Department and filing. Thus we see that all the departments concerned with the materials are informed fully about all the details of every purchases and it becomes easier for everyone to follow up on any relevant matter.

<b>Modern Ltd</b>							
<b>Purchase Order</b>							
To						PO No:	
Supplier XXXXXX						PO date:	
Address						Quotation	
						Reference:	
						PR No:	
Please supply the following items in accordance with the instructions mentioned there in on the following terms and conditions.							
S.No	Material Code	Material Description	Quantity	Rate per Unit	Amount	Delivery Date	Remarks
Packing & Freight							
Taxes							
Total Amount							
Delivery: Goods to be delivered at Delivery date: Payment Terms:							
							Authorized signatory

**Receipt & Inspection of Materials:**

*Goods Received cum Inspection Note:*

The stores department will receive the material after the gate entry. It will compare the quantities received with the PO Quantity. It is a valuable document as it forms the basis of accounting entry in the stores ledger and stock records. It is the document basis for quality control department to carry inspection of the material in warded.

It also forms the basis of payments to be made to the supplier in respect of the materials supplied by him. Suppliers invoices are checked with goods received notes which such for actual receipt of the goods supplied by the supplier. One copy of such note is also sent to Inspection Department who after inspection of materials approves the note for Stores Department to receive the materials. Outstanding Goods Received Notes which are not linked with supplier's bills enable the Accounts Department to estimate at the year end the liability for goods purchased for which supplier's bills not received.

The specimen copy of the Goods Received cum Inspection Note as below:

<b>New India Ltd</b>							
<b>Goods Received cum Inspection Note</b>							
Received from:				GRN No:			
Received at:				GR Date:			
				PO Ref No:			
				Gate Entry No:			
S.No	Material code	Material Description	Quantity Received	Quantity Accepted	Qty Rejected	Reason for Rejection	Remarks
Prepared by				Inspected by			
Received by				Storekeeper			

**Purchase Quantity:**

Important requirement for an efficient system of purchase control is to ensure that only the correct quantity of materials is purchased. The basic factors to be considered while fixing the ordering quantity are as follows :-

- (a) There should be no overstocking.
- (b) Materials should always be available in sufficient quantity to meet the requirements of production and to avoid plant shut down.
- (c) Purchases should be made in economic lots.

Other factors to be considered are quantity already ordered, availability of funds, business cycle... etc.

Purchase department in manufacturing concerns is usually faced with the problem of deciding the quantity of various items, which they should purchase basing on the above factors. If purchases of material are made in bulk then inventory cost will be high. On the other hand if the order size is small each time then the ordering cost will be very high. In order to minimise ordering and carrying costs it is necessary to determine the order quantity which minimises these two costs.

### **Economic Order Quantity: (EOQ)**

The total costs of a material usually consist of Buying Cost + Total Ordering Cost + Total Carrying Cost.

Economic Order Quantity is 'The size of the order for which both ordering and carrying cost are minimum'.

**Ordering Cost:** The costs which are associated with the ordering of material. It includes cost of staff posted for ordering of goods, expenses incurred on transportation, inspection expenses of incoming material....etc

**Carrying Cost:** The costs for holding the inventories. It includes the cost of capital invested in inventories. Cost of storage, Insurance.....etc

**Buying cost:** Amount paid / payable to the supplier for the goods. It includes the purchasing price plus all non-deductible taxes.

The assumption underlying the Economic Ordering Quantity: The calculation of economic order of material to be purchased is subject to the following assumptions:-

- (a) Ordering cost per order and carrying cost per unit per annum are known and they are fixed.
- (b) Anticipated usage of material in units is known.
- (c) Cost per unit of the material is constant and is known as well.
- (d) The quantity of material ordered is received immediately i.e lead time is Zero.

The famous mathematician 'WILSON' derived the formula used for determining the size of order for each purchases at minimum ordering and carrying costs, which is as below :-

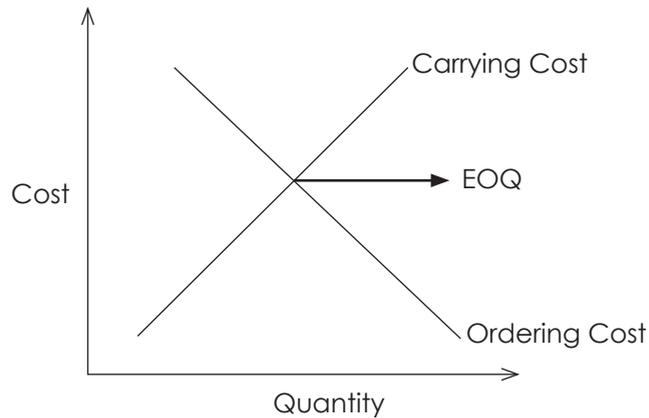
$$\text{Economic Ordering Quantity} = \sqrt{\frac{2AO}{C}}$$

Where,

A= Annual demand

O= Ordering Cost

C = Carrying Cost

**Graphical representation of EOQ:****Illustration 1**

Calculate the Economic Order Quantity from the following information. Also state the number of orders to be placed in a year.

Consumption of materials per annum	:	10,000 kg
Order placing cost per order	:	₹ 50
Cost per kg. of raw materials	:	₹ 2
Storage costs	:	8% on average inventory

**Solution:**

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}}$$

A = Units consumed during year

O = Order cost per order

C = Inventory carrying cost per unit per annum.

$$EOQ = \sqrt{\frac{2 \times 10,000 \times 50}{\frac{2 \times 8}{100}}}$$

$$EOQ = \sqrt{\frac{2 \times 10,000 \times 50 \times 25}{4}}$$

= 2,500 kg.

$$\begin{aligned} \text{No. of orders to be placed in a year} &= \frac{\text{Total consumption of materials per annum}}{EOQ} \\ &= \frac{10,000 \text{ kg}}{2,500 \text{ kg}} \\ &= 4 \text{ Orders per year} \end{aligned}$$

### Illustration 2

The average annual consumption of a material is 18,250 units at a price of ₹ 36.50 per unit. The storage cost is 20% on an average inventory and the cost of placing an order is ₹ 50. How much quantity is to be purchased at a time?

#### Solution:

$$\begin{aligned} \text{EOQ} &= \sqrt{\frac{2 \times 18,250 \text{ units} \times ₹ 50}{₹ 36.50 \times 20/100}} \\ &= \sqrt{\frac{18,25,000}{7.2}} \\ &= 500 \text{ Units} \end{aligned}$$

#### Material Storage & Control:

Once the material is received, it is the responsibility of the stores-in-charge, to ensure that material movements in and out of stores are done only against the authorized documents. Stores-in-charge is responsible for proper utilization of storage space & exercise better control over the material in the stores to ensure that the material is well protected against all losses such as theft, pilferage, fire, misappropriation ...etc.

#### Duties of store keeper:

The duties of store-keeper are as follows:-

- (a) To exercise general control over all activities in stores department.
- (b) To ensure safe storage of the materials.
- (c) To maintain proper records.
- (d) To initiate purchase requisitions for the replacement of stock of all regular materials, whenever the stock level of any item in the store reaches the Minimum Level.
- (e) To initiate the action for stoppage of further purchasing when the stock level approaches the Maximum Level.
- (f) To issue materials only in required quantities against authorized requisition documents.
- (g) To check and receive purchased materials forwarded by the receiving department and to arrange for storage in appropriate places.

#### Different classes of stores:-

Broadly speaking, there are three classes of stores

- (a) Central Stores
- (b) Decentralized stores
- (c) Sub-Store (Imprest Store)

#### Centralized stores:

The usual practice in most of the concerns is to have a central store. Separate store to meet the requirements of each production department are not popular because of the heavy expenditure involved. In case of centralized stores materials are received by and issued from one stores department. All materials are kept at one central store. The advantages and disadvantages of this type of store are set out as follows:

**Advantages of centralized stores:**

- (a) Better control can be exercised over stores because all stores are housed in one department. The risk of obsolescence of stores can be minimised.
- (b) The economy of staff-experts, or clerical, floor space, records and stationery are available.
- (c) Better supervision is certainly possible.
- (d) Obsolescence of the stores items can be kept under strict vigil and control.
- (e) Centralized material handling system can be put into operation thus further economising on space, personnel and equipments.
- (f) Investment in stocks can be minimized.

**Disadvantages of centralized stores:**

- (a) The transportation costs of the materials may increase because the movements of the stores may be for a greater distance since the storing is centralized.
- (b) If the user departments are far away from the stores there may be delay in receipt of the stores by those departments.
- (c) Breakdown of inter-departmental transport system may hold up the entire process, and similarly labour problem in the centralized stores may bring the entire concern to standstill.
- (d) There is greater chance of losses through fire, burglary or some other unhappy incidents.
- (e) It may not be safe to have some hazardous elements bunched together in the centralized stores.

**Decentralized stores:**

Under this type of stores, independent stores are situated in various departments. Handling of stores is undertaken by the store keeper in each department. The departments requiring stores can draw them from their respective stores situated in their departments. The disadvantages of centralized stores can be eliminated, if there are decentralized stores. But these types of stores are uncommon because of heavy expenditure involved.

**Central stores with sub-stores:**

In large organizations, factories / workshops may be located at different places which are far from the central stores. So in order to keep the transportation costs and handling charges to the minimum level, sub-stores should be situated near to the factory. For each item of materials a quantity is determined and this should be kept in the stock at the beginning of any period. At the end of a period, the store keepers of each sub-store will requisition from the central stores the quantity of the materials consumed to bring the stock up to the predetermined quantity. In short this type of stores operates in a similar way to a petty cash system, so this system of stores is also known as the imprest system of stores control.

**Advantages:**

- (a) It ensures the prompt issue of stores.
- (b) It confines the advantages of centralized stores with sub-stores and at the same time it does not sacrifice the centralized control.
- (c) It reduces handling cost of materials.
- (d) It avoids the maintenance of elaborate inventory records.

**Control of the Stores:**

**Classification and Codification of Material:**

In case of large organizations the number and types of materials used is considerable and unless each



item is distinguished and stored separately it would be impossible to find them out when they are required for production or any other operation. It may happen that either one type of material is in excess or another type may be altogether non-existent. It is therefore, essential that a proper system of classification and codification.

Classified into different categories according to their nature or type, viz., mild steel, tool steel, brass, bronze, copper, glass, timber, etc., and then again within such broad classification into rounds; bars, strips; angles, etc. There are two steps in the classification and codification of materials - determination of the number of items, their nature, other characteristics and classification of the items of comparable nature or type into suitable groups or classes.

**Various classes of coding are in practice and the common types are stated below:**

- (a) Alphabetical Scheme: Alphabets are only used for codification. Like Mild Steel Sheets are coded as MSS.
- (b) Numeric Scheme : In this scheme numerals are used instead of alphabets, For example If steel is given main code of 300 mild steel may be coded as 310 and mild steel sheet may be coded as 311, mild steel bar may be coded as 3112.
- (c) Decimal Scheme: It is similar to the numeric scheme in which the groups are represented by number and digits after the decimal indicate sub-groups of items. For example, where the steel is coded as 3.00 mild steel may be coded as 3.10 and mild steel sheet can be coded as 3.11 and mild sheet bar as 3.12 and so on.
- (d) Block Scheme: In this case block of number are allotted for classification of specific groups such as for material classification the block of number 1 to 999 may be reserved, for raw materials; 1000 to 1999 for stores and spares; 2000 to 2999 for finished goods.
- (e) Combination Scheme : Here the code structure takes in account both alphabetic and numeric schemes and strikes a balance between the two. Mild steel by coded as MS and the sheets, bars, strips, rounds of mild steel may be coded as MS01, MS02, MS04 and so on. This code is most commonly used because this system has got the advantage of both the alphabetic and numeric systems and is quite flexible in nature.

**Advantages of Classification & Codification of materials:**

- (a) The procedure assists in the easy identification and location of the materials because of their classification.
- (b) It minimises the recording of the nature/ type of the materials with detailed description on every document relating to the transaction of materials.
- (c) Codification is a must in the case of mechanisation of the stores accounting.
- (d) The method is simple to operate and definitely saves time and money in respect of both physical location/ identification of materials as well as recording of the materials.

After the material classification and codification is done for all the materials, for each material code we have to fix the Minimum Level, Maximum Level, Re-order Level and Re-order Quantity. It is the storekeeper's responsibility to ensure inventory of any material is maintained between the Minimum Level and Maximum Level.

**Maximum Level:**

The Maximum Level indicates the maximum quantity of an item of material that can be held in stock at any time. The stock in hand is regulated in such a manner that normally it does not exceed this level. While fixing the level, the following factors are to be taken into consideration:

- (a) Maximum requirement of the store for production purpose, at any point of time.
- (b) Rate of consumption and lead time.

- (c) Nature and properties of the Store: For instance, the maximum level is necessarily kept low for materials that are liable to quick deterioration or obsolescence during storage.
- (d) Storage facilities that can be conveniently spared for the item without determinant to the requirements of other items of stores.
- (e) Cost of storage and insurance.
- (f) Economy in prices: For seasonal supplies purchased in bulk during the season, the maximum level is generally high.
- (g) Financial considerations: Availability of funds and the price of the stores are to be kept in view. For costly items, the maximum level should be as low as possible. Another point to be considered is the future market trend. If prices are likely to rise, the concern may like to stock-piling for keeping large stock in reserve for long-term future uses and in such a case, the level is pushed up.
- (h) Rules framed by the government for import or procurement. If due to these and other causes materials are difficult to obtain and supplies are irregular the maximum level should be high.
- (i) The maximum level is also dependent on the economic ordering quantity.

**Maximum Level = Re-Order Level + Re-Order Qty – (Minimum Rate of Consumption X Minimum Re-Order Period)**

**Minimum Level:**

The Minimum Level indicates the lowest quantitative balance of an item of material which must be maintained at all times so that there is no stoppage of production due to the material being not available. In fixing the minimum level, the following factors are to be considered:-

- (a) Nature of the item: For special material purchased against customer's specific orders, no minimum level is necessary. This applies to other levels also.
- (b) The minimum time (normal re-order period) required replenishing supply: This is known as the Lead Time and are defined as the anticipated time lag between the dates of issuing orders and the receipt of materials. Longer the lead time, lower is minimum level, the re-order point remaining constant.
- (c) Rate of consumption (normal, minimum or maximum) of the material.

**Minimum Level = Re-Order level – (Normal Rate of Consumption X Normal Re-Order Period)**

**Re-Order Level:**

When the stock in hand reach the ordering or re-ordering level, store keeper has to initiate the action for replenish the material. This level is fixed somewhere between the maximum and minimum levels in such a manner that the difference of quantity of the material between the Re-ordering Level and Minimum Level will be sufficient to meet the requirements of production up to the time the fresh supply of material is received.

The basic factors which are taken into consideration in fixing a Re-ordering Level for a store item include minimum quantity of item to be kept, rate of consumption and lead time which are applied for computing of this level.

**Re-Ordering level = Minimum Level + Consumption during lead time**

**= Minimum Level + (Normal Rate of Consumption × Normal Re-order Period)**

**Another formula for computing the Re-Order level is as below**

**Re-Order level = Maximum Rate of Consumption X Maximum Re-Order period (lead time)**

### Danger Level:

It is the level at which normal issue of raw materials are stopped and only emergency issues are only made. This is a level fixed usually below the Minimum Level. When the stock reaches this level very urgent action for purchases is indicated. This presupposed that the minimum level contains a cushion to cover such contingencies. The normal lead time cannot be afforded at this stage. It is necessary to resort to unorthodox hasty purchase procedure resulting in higher purchase cost.

The practice in some firms is to fix danger level below the Re-Ordering Level but above the Minimum Level. In such case, if action for purchase of an item was taken when the stock reached the Re-Ordering Level, the Danger Level is of no significance except that a check with the purchases department may be made as soon as the Danger Level is reached to ensure that everything is all right and that delivery will be made on the scheduled date.

**Danger Level = Normal Rate of Consumption × Maximum Re-OrPeriod for emergency purchases**

### Illustration 3

The components A and B are used as follows:

Normal usage .... 300 units per week each

Maximum usage .... 450 units per week each

Minimum usage .... 150 units per week each

Reorder Quantity .... A 2,400 units; B 3,600 units.

Reorder period .... A 4 to 6 weeks, B 2 to 4 weeks.

Calculate for each component:

a) Re-order Level b) Minimum Level c) Maximum Level d) Average Stock Level.

### Solution:

	Particulars	A	B
a)	Reorder Level [Max. Consumption × Max. Re-order Period]	2700 units (450 × 6)	1800 units (450 × 4)
b)	Minimum Level [ROL – (Normal Consumption × Normal Re-order period)]	1200 units [2700 – (300×5)]	900 units [1800 – (300×3)]
c)	Maximum Level [ROL + ROQ – (Min. Consumption × Min. Re-order Period)]	4500 units [2700 + 2400 – (150×4)]	5100 units [1800 + 3600 – (150 × 2)]
d)	Average Stock Level [Min. Level + Max. Level] / 2 OR [Min. Level + ½ Re-order Quantity]	2850 units [4500 + 1200 / 2] (or) 2400 units 1200 + ½ (2400)	3000 units [5100 + 900 / 2] (or) 2700 units 900 + ½ (3600)

### Stores Records

The bin cards and the stores ledger are the two important stores records that are generally kept for making a record of various items.

### Bin Card:

Bin Card is a quantitative record of receipts, issues and closing balance of items of stores. Separate bin cards are maintained for each item and are placed in shelves or bins. This card is debited with the

quantity of stores received, credited with the quantity of stores issued and the balance of quantity of store is taken after every receipt or issue. The balance quantity of the item may be easily known at any time. To have an up to date balance of stores, the principle of '*before touching the item, bin card should be touched*'. For each item of stores, Material Code, Minimum Quantity, Maximum Quantity, Ordering Quantity, Balance Quantities are stated on the bin card. Bin card is also known as 'Bintag' or 'Stock card'

<b>BIN CARD OF APHME LTD</b>							
Material Code:				Maximum Level:			
Mat. Description:				Minimum Level:			
Location:				Re-ordering level:			
Unit of Measurement:							
Date	Doc No.	Received from / Issued to	Receipts	Issue	Balance	Verification with Stores ledger Date & Verified By	

**Stores Ledger:**

Stores Ledger is maintained by the costing department to make record of all receipts, issues of materials with quantities, values (Sometimes unit rates also). Ledger resembles with bin cards except that receipts, issues and balances are shown along with their money value. The ledger contains an account for every item of stores in which receipts, issues and balances are recorded both in quantity and value.

<b>Stores Ledger of Krishna Engineering Ltd.</b>											
Material code:						Minimum Qty:					
Bin No:						Maximum Qty:					
Material Description:						Ordering Qty:					
Location:											
Date	Receipts				Issues				Balance		
	GR No	Qty	Rate	Amount	SR No	Qty	Rate	Amount	Qty	Rate	Amount



### Difference between Bin Card and Stores Ledger:-

Bin Card	Stores Ledger
a) It is maintained by the store keeper.	a) It is maintained in the Costing department.
b) It contains only quantitative details of materials received, issued and returned to stores.	b) It contains information both in quantity and value.
c) Entries are made when transactions take place.	c) It is always posted after the transaction.
d) Each transaction is individually posted.	d) Transactions may be summarized and then posted.
e) Inter-department transfers do not appear in Bin-card.	e) Material transfers from one job to another job are recorded for costing purpose.

### Reconciliation of Stores ledger and Bin Card:

Normally there should not be any difference between the quantities shown in the Bin Card and the Stores Ledger. However, in practice differences arise mainly due to the following reasons:-

- Arithmetical error in working out the balances.
- Non-posting of a document either in a bin card or in the stores ledger may be due to non receipt of a document.
- Posting in the wrong bin card or in the wrong sheet (code) of the stores ledger.
- Posting of receipts under issue and vice-versa.
- Materials issued or received on loan or for approval are sometimes entered in bin card, but not in stores ledger.

Any difference between the stores ledger and bin card defeats the purpose for which the two separate sets are maintained and renders physical stocking ineffective as the correct book balance for the purpose of comparison with physical balance is not available. So to control or reduce the mismatch between the stores ledger and bin card and maintain the correct balance in the books of accounts various methods are followed.

### Perpetual Inventory System:

Perpetual Inventory System may be defined as 'a system of records maintained by the controlling department, which reflects the physical movements of stocks and their current balance'. Thus it is a system of ascertaining balance after every receipt and issue of materials through stock records to facilitate regular checking and to avoid closing down the firm for stock taking. To ensure the accuracy of the perpetual inventory records (bin card and Stores ledger), physical verification of stores is made by a programme of continuous stock taking.

The operation of the perpetual inventory system may be as follows:-

- The stock records are maintained and up to date posting of transactions are made there in so that current balance may be known at any time.
- Different sections of the stores are taken up by rotation for physical checking. Every day some items are checked so that every item may be checked for a number of times during the year.
- Stores received but awaiting quality inspection are not mixed up with the regular stores at the time of physical verification, because entries relating to such stores have not yet been made in the stock records.
- The physical stock available in the store, after counting, weighing, measuring or listing as the case may be, is properly recorded in the bin cards / Inventory tags and stock verification sheets.

Perpetual inventory system should not be confused with continuous stock taking; Continuous stock taking is an essential feature of perpetual inventory system. *Perpetual inventory means the system of stock records and continuous stock taking, where as continuous stock taking means only the physical verification of the stock records with actual stocks.*

In continuous stock taking, physical verification is spread throughout the year. Everyday 10 to 15 items are taken at random by rotation and checked so that the surprise element in stock verification may be maintained and each item may be checked for a number of times each year. On the other hand the surprise element is missing in case of periodical checking, because checking is usually done at the end of year.

**Advantages of perpetual inventory system:**

- (a) The system obviates the need for the physical checking of all items of stock and stores at the end of the year.
- (b) It avoids the dislocation of the routine activities of the organisation including production and despatch.
- (c) A reliable and detailed check on the stores is maintained.
- (d) Errors, irregularities and loss of stock through other methods are quickly detected and through necessary action recurrence of such things in future is minimised.
- (e) As the work is carried out systematically and without undue haste the figures are readily available.
- (f) Actual stock can be compared with the authorised maximum and minimum levels, thus keeping the stocks within the prescribed limits. The disadvantages of excess stocks are avoided and capitalised up in stores materials cannot exceed the budget.
- (g) The recorder level of various items of stores are readily available thus facilitating the work of procurement of stores.
- (h) For monthly or quarterly financial statements like Profit and Loss Account and Balance Sheet the stock figures are readily available and it is not necessary to have physical verification of the balances.

**Periodical Stock Verification:**

This system envisages physical stock verification at a fixed date/period during the year. Generally under this system the activity takes place at the end of the accounting period or a date close to such date. Usually the system is opened in the following manner:-

- (a) A period of 5/7 days, depending on the magnitude of the work is chosen during which all the items under stock are verified physically and such period is known as 'cut-off' period. During this period there are no movements of stock items and neither 'receipts' nor are 'issues permitted.
- (b) The items are physically counted/measured depending on their nature and are noted down in records which are signed by the auditors if they are present in stock verification.
- (c) The bin cards balances are also checked and initiated. Generally the physical balances and bin card balances of various items should be same unless shortage/excesses are there or the recording/balancing in the cards are incorrect.
- (d) After the physical verification is completed work sheets are countersigned by the godown supervisors and the stock verified.
- (e) Thereafter reconciliation statement is prepared item wise where the physical balances and bin card balances are different.
- (f) Then the balance as per bin cards and as per stores ledger is also compared and necessary adjustments are made to show the correct position of stock at the year end.



- (g) Finally the shortages/excess statement is prepared by the concerned departments and are placed before the higher management for their approval for adjustments.

### ABC Analysis:

The "ABC Analysis" is an analytical method of stock control which aims at concentrating efforts on those items where attention is needed most. It is based on the concept that a small number of the items in inventory may typically represent the bulk money value of the total materials used in production process, while a relatively large number of items may present a small portion of the money value of stores used resulting in a small number of items be subjected to greater degree of continuous control.

Under this system, the materials stocked may be classified into a number of categories according to their importance, i.e., their value and frequency of replenishment during a period. The first category (we may call it group 'A' items) may consist of only a small percentage of total items handled but combined value may be a large portion of the total stock value. The second category, naming it as group 'B' items, may be relatively less important. In the third category, consisting of group 'C' items, all the remaining items of stock may be included which are quite large in number but their value is not high.

This concept may be clear by the following example:

Category	No. of Items	% of the Total No. of Items	Value ₹	% of the Total Value Item	Average Value ₹
A	75	6	70,000	70	933
B	375	30	20,000	20	53
C	800	64	10,000	10	12
	1250	100	1,00,000	100	998

Category 'A' items represent 70% of the total investment but as little as only 6% of the number of items. Maximum control must be exercised on these items. Category 'B' is of secondary importance and normal control procedures may be followed. Category 'C' comprising of 64% in quantity but only 10% in value, needs a simpler, less elaborate and economic system of control.

### The advantages of ABC analysis are:

- Closer and stricter control of those items which represent a major portion of total stock value is maintained.
- Investment in inventory can be regulated and funds can be utilized in the best possible manner. 'A' class items are ordered as and when need arises, so that the working capital can be utilized in a best possible way.
- With greater control over the inventories, savings in material cost will be realized.
- It helps in maintaining enough safety stock for 'C' category of items.
- Scientific and selective control helps in the maintenance of high stock turnover ratio.

### VED Analysis:

VED stands for Vital, Essential and Desirable- analysis is used primarily for control of spare parts. The spare parts can be classified in to three categories i.e Vital, Essential and Desirable- keeping in view the criticality to production.

**Vital:** The spares, stock-out of which even for a short time will stop the production for quite some time, and where in the stock-out cost is very high are known as Vital spares. For a car Assembly Company, Engine is a vital part, without the engine the assembly activity will not be started.

**Essential:** The spares or material absence of which cannot be tolerated for more than few hours or a day and the cost of lost production is high and which is essential for production to continue are known

as Essential items. For a car assembly company 'Tyres' is an essential item, without fixing the tyres the assembly of car will not be completed.

**Desirable:** The Desirable spares are those parts which are needed, but their absence for even a week or more also will not lead to stoppage of production. For example, CD player, for a car assembly company.

Some spares though small in value, may be vital for production, requires constant attention. Such spares may not pay attention if the organization adopts ABC analysis.

**FSN Analysis:**

FSN analysis is the process of classifying the materials based on their movement from inventory for a specified period. All the items are classified in to F-Fast moving, S- Slow moving and N-Non-moving Items based on consumption and average stay in the inventory. Higher the stay of item in the inventory, the slower would be the movement of the material. This analysis helps the store keeper / purchase department to keep the fast moving items always available & take necessary steps to dispose off the non-moving inventory.

**Just-in-Time:**

Just in time (JIT) is a production strategy that strives to improve a business return on investment by reducing in-process inventory and associated carrying costs. Inventory is seen as incurring costs, or waste, instead of adding and storing value, contrary to traditional accounting. In short, the Just-in-Time inventory system focuses on "the right material, at the right time, at the right place, and in the exact amount" without the safety net of inventory.

The advantages of Just-in-Time system are as follows :-

- (a) Increased emphasis on supplier relationships. A company without inventory does not want a supply system problem that creates a part shortage. This makes supplier relationships extremely important.
- (b) Supplies come in at regular intervals throughout the production day. Supply is synchronized with production demand and the optimal amount of inventory is on hand at any time. When parts move directly from the truck to the point of assembly, the need for storage facilities is reduced.
- (c) Reduces the working capital requirements, as very little inventory is maintained.
- (d) Minimizes storage space.
- (e) Reduces the chance of inventory obsolescence or damage.

**Inventory Turnover Ratio:**

Inventory Turnover:

Inventory Turnover signifies a ratio of the value of materials consumed during a given period to the average level of inventory held during that period. The ratio is worked out on the basis of the following formula:

$$\text{Inventory Turnover Ratio} = \frac{\text{Value of material consumed during the period}}{\text{Value of average stock held during the period}}$$

The purpose of the above ratio is to ascertain the speed of movement of a particular item. A high ratio indicates that the item is moving fast with a minimum investment involved at any point of time. On the other hand a low ratio indicates the slow moving item. Thus Inventory Turnover Ratio may indicate slow moving dormant and obsolet stock highlighting the need for appropriate managerial actions.



#### Illustration 4

Compute the Inventory turnover ratio from the following:

Opening Stock - ₹10,000

Closing Stock - ₹16,000

Material Consumed - ₹78,000

#### Solution:

$$\text{Inventory Turnover Ratio} = \frac{\text{Value of material consumed during the period}}{\text{Value of average stock held during the period}}$$

$$\text{Average Stock} = \frac{\text{Opening Stock} + \text{Closing Stock}}{2}$$

$$= \frac{10,000 + 16,000}{2} = 13,000$$

$$\therefore \text{Inventory Turnover Ratio} = \frac{78,000}{13,000} \\ = 6.$$

#### Valuation of Material Receipts:

Principles of valuation of receipt of materials as per CAS-6 are as follows:-

- (a) The material receipt should be valued at purchase price including duties and taxes, freight inwards, insurance and other expenditure directly attributable to procurement (net of trade discounts, rebates, taxes and duties refundable) that can be quantified with reasonable accuracy at the time of acquisition.
- (b) Finance costs incurred in connection with the acquisition of materials shall not form part of the material cost.
- (c) Self manufactured item shall be valued including the direct material, direct labour, direct expenses, factory overheads, share of administrative overheads relating to the production but excluding share of other administrative overheads, finance cost and marketing overheads. In case of captive consumption, valuation shall be in accordance with Cost Accounting Standard-4.
- (d) Spares which are specific to an item of equipment shall not be taken into inventory, but shall be capitalized with cost of specific equipment. Cost of Capital spares and / or insurance spares, whether procured with the equipment or subsequently, shall be amortized over a period, not exceeding the useful life of the equipment.
- (e) Normal loss or spoilage of material prior to reaching the factory or at places where the services are provided shall be absorbed in the cost of balance materials net of amounts recoverable from suppliers, insurers, carriers or recoveries from disposal.
- (f) Losses due to shrinkage or evaporation and gain due to elongation or absorption or moisture ...etc before the material is received is absorbed in material cost to the extent they are normal, with corresponding adjustment in quantity.
- (g) The foreign exchange component of imported material cost is converted at the rate on the date of transaction (material / service recording in books of accounts). Any subsequent change in the exchange rate till payment or otherwise shall not form part of the material cost.
- (h) Any demurrage or detention charges, or penalty levied by transport or other authorities shall not form part of the cost of materials.
- (i) Subsidy/grant/incentive and any such payment received / receivable with respect to any material shall be reduced from cost for ascertainment of the cost of the cost object to which such amounts are related.

### **Valuation of Material Issues:**

*Principles of valuation of issue of materials as per CAS-6 are as follows:-*

- (a) Issues shall be valued using appropriate assumptions on cost flow such as FIFO, LIFO, and Weighted average rate. The method of valuation shall be followed on a consistent basis.
- (b) Where materials are accounted at standard cost, the price variances related to materials shall be treated as part of material cost.
- (c) Any abnormal cost shall be excluded from the material cost.
- (d) Wherever the material cost includes the transportation costs, determination of transportation cost shall be based on CAS-5, i.e Equalized Transportation Costs.
- (e) Material cost may include imputed costs not considered in Financial Accounts.
- (f) Self manufactured **components and sub-assemblies** item shall be valued including the direct material, direct labour, direct expenses, factory overheads, share of administrative overheads relating to the production but excluding share of other administrative overheads, finance cost and marketing overheads. In case of captive consumption, the valuation shall be in accordance with Cost Accounting Standard-4.
- (g) The material cost of normal scrap / defectives which are rejects shall be included in the material cost of goods manufactured. The material cost of actual scrap / defectives, not exceeding the normal shall be adjusted in the material cost of good production. Material cost of abnormal scrap/ defectives should not be included in material cost **but treated as loss after giving credit to the realisable value of such scrap / defectives.**

Materials issued from stores should be priced at the price at which they are carried in inventory. Material may be purchased from different suppliers at different prices in different situations, where as consumption may happen the entire inventory at a time or at different lots....etc. So issue of materials should be valued after considering the following factors:-

- (a) Nature of business and production process.
- (b) Management policy relating to the closing stock valuation.
- (c) Frequency of purchases and price fluctuations.

Several methods of pricing of material issues have been evolved; these may be classified into the following:-

#### **Cost Price Method**

- (a) First in First out
- (b) Last-in-first out
- (c) Base Stock Method

#### **Specific price method**

- (a) Average Price Method
- (b) Simple Average Price Method
- (c) Weighted Average Price Method
- (d) Moving Simple Average Method
- (e) Moving Weighted Average Method

#### **Market Price Methods**

- (a) Replacement Method
- (b) Realisable Price Method



### **Notional Price Methods:**

- (a) Standard Price Method
- (b) Inflated Price Method

We may now briefly discuss all the above methods

#### **1) First in – First Out Method:**

It is a method of pricing the issue of materials in the order in which they are purchased. In other words the materials are issued in the order in which they arrive in the store. This method is considered suitable in times of falling price because the material cost charged to production will be high while the replacement cost of materials will be low. In case of rising prices this method is not suitable.

#### **Advantages of FIFO:-**

- (a) It is simple and easy to operate.
- (b) In case of falling prices, this method gives better results.
- (c) Closing stocks represents the market prices.

#### **Disadvantages:-**

- (a) If the prices fluctuate frequently, this method may lead to clerical errors.
- (b) In case of rising prices this method is not advisable.
- (c) The material costs charged to same job are likely to show different rates.

#### **2) Last-in-First Out Method:**

Under this method the prices of last received batch (lot) are used for pricing the issues, until it is exhausted and so on. During the inflationary period or period of rising prices, the use of LIFO would help to ensure the cost of production determined approximately on the above basis is approximately the current one. Under LIFO stocks would be valued at old prices, but not represent the current prices.

#### **Advantages:-**

- (a) The cost of materials issued will be either nearer to and/or will reflect the current market price.
- (b) In case of falling prices profit tends to rise due to lower material cost

#### **Disadvantages:**

- (a) The computations become complicated if too many receipts are there.
- (b) Companies having JIT system will face this problem more.

#### **3) Base Stock Method:**

A minimum quantity of stock under this method is always held at a fixed price as reserve in the stock, to meet a state of emergency, if arises. This minimum stock is known as Base Stock and is valued at a price at which the first lot of materials is received and remains unaffected by subsequent price fluctuations. The quantity in excess of the base stock may be valued either on the LIFO basis or FIFO basis. This method is not an independent method as it uses FIFO or LIFO. Its advantages and disadvantages therefore will depend upon the use of the other method.

#### **4) Specific Price Method:**

This method is useful, especially when the materials are purchased for a specific job or work order, and as such these materials are issued subsequently to that specific job or work order at the price at which they were purchased. The cost of materials issued for production purposes to specific jobs represent actual and correct costs. This method is specific for non-standard products. This method is difficult to operate, especially when purchases and issues are numerous.

**5) Simple Average Price Method:**

Under this method materials issued are valued at average price, which is computed by dividing the total of all units rate by the number of units.

Material Issue Price = Total of unit prices of each purchase / Total No of Units

This method is useful, when the materials are received in uniform lots of similar quantity and prices do not fluctuate considerably.

**6) Weighted Average Price Method:**

This method removes the limitation of Simple Average Method in that it also takes into account the quantities which are used as weights in order to find the issue price. This method uses total cost of material available for issue divided by the quantity available for issue.

Issue Price = Total Cost of Materials in stock / Total Quantity of Materials in stock

**7) Moving Simple Average Price Method:**

Under this method the rate for material issue is determined by dividing the total of the periodic simple average prices of a given number of periods by the number of periods. For determining the moving simple average price, it is necessary to fix up first period to be taken for determining the average. Suppose a three monthly period is decided upon and moving average rate for the month of April is to be computed. Under such situation, we have to make a simple list of the simple average price from January to March, add them up, and divide the total by three. To compute the moving average for May, we have to omit simple average rate pertains to January and add the rate relating to the April and divide the total by three.

**8) Moving Weighted Average Price Method:**

Under this method, the issue, rate is computed by dividing the total of the periodic weighted average price of a given number of periods by the number of periods.

**9) Replacement Method:**

Replacement price is defined as the price at which it is possible to purchase an item, identical to that which is being replaced or revalued. Under this method, materials issued are valued at replacement cost of the items. Advantage of this method is issue cost reflects the current market price. But the difficult involved under this method is determination of market price of material before each issue.

**10) Realisable Price method:**

Realisable price means a price at which the material to be issued can be sold in the market. This price may be more or less than the cost price, at which it was originally purchased.

**11) Standard Price Method:**

Under this method, materials are priced at some predetermined rate of standard price irrespective of the actual purchase cost of the materials. Standard cost is usually fixed after taking into consideration the current price, anticipated market trends. This method facilitates the control of material cost and task of judging the efficiency of purchase department. But it is very difficult to fix the standard price when the prices fluctuates frequently.

**12) Inflated Price Method:**

In case of materials that suffers loss in weight due to natural or climatic factors ex: evaporation...etc the issue price of the materials is inflated to cover up the losses.

### Illustration 5

Prepare a statement showing the pricing of issues, on the basis of

- Simple Average and
- Weighted Average methods from the following information pertaining to Material-D

2012 March	1	Purchased 100 units @ ₹10 each
	2	Purchased 200 units @ ₹ 10.2 each.
	5	Issued 250 units to Job X vide M.R.No.12
	7	Purchased 200 units @ ₹10.50 each
	10	Purchased 300 units @ ₹10.80 each
	13	Issued 200 units to Job Y vide M.R.No.15
	18	Issued 200 units to Job Z vide M.R.No.17
	20	Purchased 100 units @ ₹11 each
	25	Issued 150 units to Job K vide M.R.No.25

**Solution:**

**(a) Simple Average Method:**

#### Stores Ledger Account

Date	Receipts			Issue			Balance	
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Value ₹
2012								
March 1	100	10	1000	--	--	--	100	1000
March 2	200	10.2	2040	--	--	--	300	3040
March 5	--	--	--	250	10.10 <sup>(1)</sup>	2525	50	515
March 7	200	10.5	2100	--	--	--	250	2615
March 10	300	10.8	3240	--	--	--	550	5855
March 13	--	--	--	200	10.50 <sup>(2)</sup>	2100	350	3755
March 18	--	--	--	200	10.65 <sup>(3)</sup>	2130	150	1625
March 20	100	11	1100	--	--	--	250	2725
March 25	--	--	--	150	10.90 <sup>(4)</sup>	1635	100	1090

**Working Notes:**

- Calculation of Price for Issue on March 5<sup>th</sup>  
 $= 10 + 10.2 / 2 = ₹10.10$
- Calculation of Price for Issue on March 13<sup>th</sup>  
 $= 10.2 + 10.5 + 10.8 / 3 = ₹10.5$
- Calculation of Price for Issue on March 18<sup>th</sup>  
 $= 10.5 + 10.8 / 2 = ₹10.65$
- Calculation of Price for Issue on March 25<sup>th</sup>  
 $= 10.8 + 11 / 2 = ₹10.90$

**(b) Weighted Average Method:****Stores Ledger Account**

Date	Receipts			Issue			Balance	
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Value ₹
2012								
March 1	100	10	1000	--	--	--	100	1000
March 2	200	10.2	2040	--	--	--	300	3040
March 5	--	--	--	250	10.13 <sup>(1)</sup>	2533	50	507
March 7	200	10.5	2100	--	--	--	250	2607
March 10	300	10.8	3240	--	--	--	550	5847
March 13	--	--	--	200	10.63 <sup>(2)</sup>	2126	350	3721
March 18	--	--	--	200	10.63 <sup>(3)</sup>	2126	150	1595
March 20	100	11	1100	--	--	--	250	2695
March 25	--	--	--	150	10.78 <sup>(4)</sup>	1617	100	1078

**Working Notes:**

1. Calculation of price for Issue on March 5<sup>th</sup>  
=  $3040/300 = ₹10.13$
2. Calculation of price for Issue on March 13<sup>th</sup>  
=  $5847/550 = ₹10.63$
3. Calculation of price for Issue on March 18<sup>th</sup>  
=  $3721/350 = ₹10.63$
4. Calculation of price for Issue on March 25<sup>th</sup>  
=  $2695/250 = ₹10.78$

**Illustration 6**

The stock of material held on 1-4-2012 was 400 units @ 50 per unit. The following receipts and issues were recorded. You are required to prepare the Stores Ledger Account, showing how the values of issues would be calculated under Base Stock Method, both through FIFO AND LIFO base being 100 units.

2-4-2012	Purchased 100 units @ ₹55 per unit
6-4-2012	Issued 400 units
10-4-2012	Purchased 600 units @ ₹55 per unit
13-4-2012	Issued 400 units
20-4-2012	Purchased 500 units @ ₹65 per unit.
25-4-2012	Issued 600 units



10-5-2012	Purchased 800 units @ ₹70 per unit
12-5-2012	Issued 500 units
13-5-2012	Issued 200 units
15-5-2012	Purchased 500 units @ ₹75 per unit
12-6-2012	Issued 400 units
15-6-2012	Purchased 300 units @ ₹ 80 per unit

**Solution:**

**Stores Ledger Account [under Base Stock through FIFO Method]**

Date	Receipts			Issue			Balance		
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹
1-4-2012	--	--	--	--	--	--	100	50	5,000
							300	50	15,000
2-4-2012	100	55	5,500	--	--	--	100	50	5,000
							300	50	15,000
							100	55	5,500
6-4-2012	--	--	--	300	50	15,000			
				100	55	5,500	100	50	5,000
10-4-2012	600	55	33,000	--	--	--	100	50	5,000
							600	55	33,000
13-4-2012	--	--	--	400	55	22,000	100	50	5,000
							200	55	11,000
20-4-2012	500	65	32,500	--	--	--	100	50	5,000
							200	55	11,000
							500	65	32,500
25-4-2012	--	--	--	200	55	11,000	100	50	5,000
				400	65	26,000	100	65	6,500
10-5-2012	800	70	56,000	--	--	--	100	50	5,000
							100	65	6,500
							800	70	56,000
12-5-2012	--	--	--	100	65	6,500	100	50	5,000
				400	70	28,000	400	70	28,000
13-5-2012	--	--	--	200	70	14,000	100	50	5,000
							200	70	14,000
15-5-2012	500	75	37,500	--	--	--	100	50	5,000
							200	70	14,000
							500	75	37,500
12-6-2012	--	--	--	200	70	14,000	100	50	5,000
				200	75	15,000	300	75	22,500
15-6-2012	300	80	24,000	--	--	--	100	50	5,000
							300	75	22,500
							300	80	24,000

**Stores Ledger Account [under Base Stock through LIFO Method]**

Date	Receipts			Issue			Balance		
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹
1-4-2012	--	--	--	--	--	--	100	50	5,000
							300	50	15,000
2-4-2012	100	55	5,500	--	--	--	100	50	5,000
							300	50	15,000
							100	55	5,500
6-4-2012	--	--	--	100	55	5,500			
				300	50	15,000	100	50	5,000
10-4-2012	600	55	33,000	--	--	--	100	50	5,000
							600	55	33,000
13-4-2012	--	--	--	400	55	22,000	100	50	5,000
							200	55	11,000
20-4-2012	500	65	32,500	--	--	--	100	50	5,000
							200	55	11,000
							500	65	32,500
25-4-2012	--	--	--	500	65	32,500	100	50	5,000
				100	55	5,500	100	55	5,500
10-5-2012	800	70	56,000	--	--	--	100	50	5,000
							100	55	5,500
							800	70	56,000
12-5-2012	--	--	--	500	70	35,000	100	50	5,000
							100	55	5,500
							300	70	21,000
13-5-2012	--	--	--	200	70	14,000	100	50	5,000
							100	55	5,500
							100	70	7,000
15-5-2012	500	75	37,500	--	--	--	100	50	5,000
							100	55	5,500
							100	70	7,000
							500	75	37,500
12-6-2012	--	--	--	400	75	30,000	100	50	5,000
							100	55	5,500
							100	70	7,000
							100	75	7,500
15-6-2012	300	80	24,000	--	--	--	100	50	5,000
							100	55	5,500
							100	70	7,000
							100	75	7,500
							300	80	24,000

**Other Important concepts under Materials****1. Valuation of Work-in-Progress:**

Unlike closing stock of finished goods, which is valued at cost or market price, whichever is lower, work-in-progress is always valued on the basis of cost. The problem arises whether overheads should be included in the costs of work-in-progress.



There are three ways of valuing work-in-progress.

**(a) At Prime Cost :**

This is a conservative method of valuation. Overheads are not added to prime cost for valuing work-in-progress. As a result of the exclusion of overheads, the cost of the subsequent period is understated and the cost of production for the current period is inflated to that extent.

**(b) Prime Cost plus Variable Overheads:**

Under Marginal Costing method, work-in-progress is valued at prime cost plus variable overheads. Fixed overheads are excluded on the basis that these are period costs and should be recovered from revenue, i.e., sales, only.

**(c) At Total Cost :**

The valuation is done at full costs inclusive of both variable and fixed overheads. The logic behind this method is that work-in-progress should carry the proportionate cost of the overheads and cost of production of completed items should not be burdened. This method is most commonly used.

**2. Abnormal and Normal Wastage of Materials**

Wastage may be classified as normal or abnormal according to the circumstances.

Normal wastage denotes that part of the wastage which is generally bound to arise in a manufacturing processing on account of evaporation, shrinkage of basic raw materials or on account of typical manufacturing process being involved. Usually such wastage remains within certain normal ratio or percentage of the input.

On the other hand, abnormal wastage is that loss which does not arise in the ordinary course of manufacturing process but is the result of certain adverse circumstances such as power failure, major breakdown of machinery non-availability of the basic raw materials, etc. It is generally not possible to estimate the extent of such wastage before as they are much more than the normal ratio/percentage of loss compared to the input of basic materials.

Since the normal wastage of the materials is an unavoidable and uncontrollable issue, it should be recovered through good production. The cost of such normal wastages will be recovered as production overhead and apportioned on the number of units produced. Necessary allowance should however be made for any amount which the wastage should realize when it is disposed of. On the contrary, the cost of abnormal wastage should be separately collected and charged off to the Costing Profit and Loss Account so as not to vitiate the Production Cost of good units produced.

**3. Material Requisition Note:**

Material Requisition is a document issued by a department in charge requesting the Storekeeper to issue certain materials to a job or standing order number. It is an important document as it authorises issue of materials from stores and thereby should be authenticated by appropriate authority. It forms the basis of crediting the Marginal Account in the stores ledger as the materials are taken out on the strength of such documents. The corresponding debit to work-in-progress account or Job Account for standing order number is also made on the basis of such documents. This document enables the Accounts Department to value the issue of the materials to find out the cost of materials issued. The storekeeper uses this department to check total item wise issues made by him during a certain period by adding up the details of issue from this document.

**4. Material Transfer Note:**

Material Transfer Note is a document used for transferring the material from one department to other department or one site to other site or one job to other job. The need for Material Transfer Note arises under the following conditions:

- (a) Great urgency for such materials as normal procedure for requisitioning the materials may result in delay in completion of the job.

- (b) Where two jobs are being executed side by side or very near to each other and stores department is situated at a great distance, adoption of normal procedure for requisitioning the materials may mean unnecessary expenditure in handling and transportation, especially in cases of heavy materials (e.g. iron rails).
- (c) Frequent shifting of materials (for returning to stores and for re-issue) may result in wastage or breakage.
- (d) If the goods are of perishable nature (e.g. Vegetable or Fruits) and refrigeration may not keep them fresh for a long time.

**Procedure to be followed to transfer the material is as follows:**

- (a) Transferring supervisor will prepare a Material Transfer Note giving all the details of the materials transferred and will send this note to the supervisor of the job to which materials being transferred.
- (b) Transferee supervisor will sign the note in token of receipt of the materials and send it back to the transferring supervisor.
- (c) This note will then be send to Cost Office where necessary entries will be passed and respective job accounts debited and credited.

**5. Bill of Material:**

Bill of Material is a complete schedule of parts and materials required for a particular order prepared by the Drawing Office and issued by it together with necessary blue prints of drawings. For standard products, printed copies of Bill of Material are kept with blank spaces for any special details of modification to be filled in for a particular job/order. The schedule details everything, even to bolts and nuts, sizes and weights. The document solves a number of useful purposes, such as:

- (a) It provides a quantitative estimate of budget of material required for a given job, process or operation which might be used for control purposes.
- (b) It substitutes material requisitions and expedite issue of materials.
- (c) The store-keeper can draw up a programme of material purchases and issue for a given period.
- (d) It provides the basis for charging material cost to the respective job/process.

**6. Waste:**

*Definition* : This is the residue such a smoke, dust, gases, slag, etc., which arises in course of manufacturing process and practically no measurable sale or utility value. In certain types of processes and operations, some material physically disappears on account of shrinkage, evaporation etc., with the result that the quantity of the output is less than the input. Such wastage is termed invisible waste where the residual instead of fetching any value, creates a problem for its dispose which entails further costs. Special arrangements have to be made for disposal and refuse, effluent, obnoxious gases, etc.

**Accounting:** As waste has practically no value, its accounting is relatively simple. The effect of the waste is to reduce the quantity of output; In order to arrive at the unit cost of the process, operation, or job, the total cost of the process, etc., is distributed over the reduced output, i.e., the units of good production only. The cost of abnormal waste, should, however, be excluded from the total cost and charged to the Profit and Loss Account.

The actual waste is observed against standards and periodically reported to the management.

**7. Scrap:**

This is also in the form of incidental material residue coming out of certain types of manufacturing processes but it is usually in small amounts and has low measurable utility or market value, recoverable without further processing. Numerous examples of scrap may be given; scrap may arise in the form of



turnings, borings, trimmings, fillings, shavings etc., from metals on which machine operations are carried out; saw dust and trimmings in the timber industry; dead heads and bottom ends in foundries; and cuttings, pieces, and split in leather industries. Scrap should always be physically available unlike waste which may or may not be present in the form of a residue.

**Accounting treatment of scrap is as follows:**

**(a) Sales Credited to Revenue:**

In this method, the scrap is not cost and its value does not, therefore, appear separately in the Cost Accounts. Only a quantitative record of the scrap returned to storeroom from the shops is maintained and the sale value realised from time to time is credited to the Profit and Loss Account as miscellaneous revenue.

**(b) Credit to Overhead:**

In this method and in the following method the scrap is assigned a cost. The cost is usually the sale value of the scrap less selling and distribution costs. If the scrap has no ready market but has only utility or use value, and is taken as a credit to manufacturing overhead. The effect of this credit is to reduce the overhead recovery rate. When predetermined overhead rates are in use, it is more expedient to credit an estimated allowance for the scrap instead of the amount of actual scrap.

**(c) Credit to Jobs:**

The scrap is assigned a cost and is traced to the job which yielded the scrap. This affords a reasonable amount of credit to the jobs and widely different.

**(d) Transfer to Other Jobs:**

Scrap arising in one job may be issued for utilization in another job. Such transfers of scrap from one job to another should be affected through Material Transfer Notes. Alternatively, scrap may be returned to store room and subsequently issued to another job for utilization. The latter method is more appropriate when some further processing is required on the scrap before it can be utilized for other jobs.

**Control of Scrap:**

Scrap is also an unavoidable residue material arising in the process of manufacture. The basic difference between scrap and waste is that while waste may not have any value, scrap must necessarily have a value, though a comparatively small one. Scrap may be sold or re-used in some process. In some industries, arising of scraps of various types in significant quantities is a regular feature and in such cases, it would be worth while having a proper administrative set-up for control of scrap. A Scrap Survey Committee may be constituted which would be responsible for such matters as (1) classifying the various types of scrap; (2) Assessing the quantum of each; and (3) Deciding upon the manner of their use or disposal.

Control of scrap should start from the designing stage of the products. At the designing stage, the type, shape and form of materials which all result in the minimum of waste or the least quantity of scrap in manufacturing process are decided. The quantity of scrap resulting from a process also depends upon the manufacturing equipment used and the efficiency of the operative who performs the work. In order to minimise scrap, production should be planned so that the best possible equipment is used and properly trained personnel are employed on the job

**8. Spoilage :**

**Definition:**

When production does not come up to the standard specifications or quality it has to be rejected outright. The components or materials are so damaged in the manufacturing process that they cannot be brought back to the normal specifications by repairs or reconditioning. Some spoiled work may be sold as seconds but in most cases, the entire production is sold for small value in the form of scrap or

treated as waste if it has no market value. Spoilage involves not only loss of materials but also of labour and manufacturing overhead incurred up to the stage when the spoilage incurred.

### **Accounting and Control of Spoilage:**

Spoilage arises when the production output is damaged in such a manner and to such an extent that it cannot be used for the original purpose for which it was designed but is to be disposed off in some suitable manner without further processing. The distinction between scrap and spoiled work is that while normal scrap arises mostly as a result of the processing of materials, spoilage occurs due to some defect in operations or materials which may or may not be inherent in the manufacturing process or operation. Further, scrap has always a relatively low but some definite value, but the value of spoilage may range from low, if it is a waste, to comparatively high values if the spoilage is to be sold as seconds.

Spoilage involves not only the loss of material but also labour and manufacturing overheads.

### **9. Treatment of Packing Cost:**

Packing materials is of two types - primary and secondary. Primary containers are essential to put the goods in a saleable condition like ink in a bottle, jam in a jar, etc. Secondary containers are required for delivery/transportation like crates, etc., they are returnable and reusable.

The cost of primary containers should be charged off as a production overhead and included in production cost. On the other hand, the cost of secondary containers should charge as a selling and distribution overhead. The cost of reusable container should be charged when they could not be used any more due to damage, wear and tear, etc.

In some cases, the primary packing materials may be made decorative with a view to promote sales, and in such a case a part of the primary packing materials should be apportioned as a selling cost.

### **10. Carriage and Cartage Expenses:**

Carriage and Cartage Expenses are incurred in the course of movement of materials or goods. Materials may mean direct materials or indirect materials. The treatment of the Carriage and Cartage Expenses differ with the kind of materials/goods transported. The carriage and cartage expenses relating to raw materials are treated as a part of direct materials cost and those relating to distribution of materials or finished goods are treated as distribution overhead. In case where the carriage and cartage are abnormal due to any reason the same is charged off to be costing Profit and Loss Account.

### **11. Treatment of Tools Cost:**

Tools may be classified as (i) large tools and (ii) small tools, large tools are normally capitalised and depreciation charged to Factory Overheads. For small tools the following treatment may apply:

- (a) Capitalization Method: In line with large tools.
- (b) Revaluation Method: At the end of the year revaluation for unused life of the tools is made and the difference between original cost and revalued cost is charged as factory overheads.
- (c) Write-off-Method: Whenever such small tools are issued the department is debited with the cost. Alternatively cost of tools issued during a period is accumulated and distributed to various departments on some suitable basis, e.g., hours worked.

### **12. Treatment of Discount Allowed by Suppliers for Bulk Purchases:**

Discounts Allowed on purchases are of two types, viz., Cash Discount and Quantity and Trade Discount. Cash Discount is usually allowed for prompt payment and the Quantity and Trade Discount for heavy purchases. The amount of the latter discount is already credited in the invoice and the net landed cost of the material exclusive of the discount is considered as the material cost.

### 13. Treatment of Variance Detected at Stock Taking:

If the variances are due to normal causes, i.e., due to normal dry age, shrinkage, evaporation, etc., these are valued at the ruling ledger rates of the items of material concerned and the amount is taken as an item of stores overhead and recovered from production as a percentage of direct material cost consumed. If the variances are due to abnormal causes, viz., theft, fraud, misappropriation etc., these are valued by writing off to Costing Profit and Loss Account.

#### Illustration 7

Prepare a Stores Ledger Account from the following information adopting FIFO method of pricing of issues of materials.

- 2012 March
1. Opening Balance 500 tonnes @ ₹200
  3. Issue 70 tonnes
  4. Issue 100 tonnes
  5. Issue 80 tonnes
  13. Received from suppliers 200 tonnes @ ₹190
  14. Returned from Department A 15 tonnes.
  16. Issued 180 tonnes
  20. Received from supplier 240 tonnes @ ₹195
  24. Issue 300 tonnes
  25. Received from supplier 320 tonnes @ ₹200
  26. Issue 115 tonnes
  27. Returned from Department B 35 tonnes
  28. Received from supplier 100 tonnes @ ₹200

**Solution:**

#### Stores Ledger Account [FIFO Method]

Date	Receipts			Issue			Balance		
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹
2012									
March 1	--	--	--	--	--	--	500	200	1,00,000
March 3	--	--	--	70	200	14,000	430	200	86,000
March 4	--	--	--	100	200	20,000	330	200	66,000
March 5	--	--	--	80	200	16,000	250	200	50,000
March 13	200	190	38,000	--	--	--	250	200	50,000
							200	190	38,000
March 14	15	200	3,000	--	--	--	250	200	50,000
							200	190	38,000
							15	200	3,000
March 16	--	--	--	180	200	36,000	70	200	14,000
							200	190	38,000
							15	200	3,000
March 20	240	195	46,800	--	--	--	70	200	14,000
							200	190	38,000
							15	200	3,000

							240	195	46,800
March 24	--	--	--	70	200	14,000	--	--	--
				200	190	38,000	--	--	--
				15	200	3,000	--	--	--
				15	195	2,925	225	195	43,875
March 25	320	200	64,000	--	--	--	225	195	43,875
							320	200	64,000
March 26	--	--	--	115	195	22,425	110	195	21,450
							320	200	64,000
March 27	35	195	6,825	--	--	--	110	195	21,450
							320	200	64,000
							35	195	6,825
March 28	100	200	20,000	--	--	--	110	195	21,450
							320	200	64,000
							35	195	6,825
							100	200	20,000

**Illustration 8**

From this information provided as under, you are required to prepare a statement showing how the issues would be priced if LIFO method is followed.

- 2012 Feb:
1. Opening Balance 100 units at ₹10 each.
  2. Received 200 units at ₹10.50 each.
  3. Received 300 units at ₹10.60 each.
  4. Issued 400 units to Job A vide M.R.No.015.
  6. Issued 120 to Job B vide M.R.No.020.
  7. Received 400 units at ₹11 each.
  8. Issued 200 units to Job B vide M.R.No.031
  12. Received 300 units at ₹11.40 each.
  13. Received 200 units at ₹11.50 each.
  17. Issued 400 units to Job D vide M.R.No.040.

**Solution:****Stores Ledger Account [LIFO Method]**

Date	Receipts			Issue			Balance		
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹
2012									
Feb 1	--	--	--	--	--	--	100	10.00	1,000
Feb 2	200	10.50	2,100	--	--	--	100	10.00	1,000
							200	10.50	2,100
Feb 3	300	10.60	3,180	--	--	--	100	10.00	1,000
							200	10.50	2,100
							300	10.60	3,180
Feb 4	--	--	--	300	10.6	3,180	100	10.00	1,000
				100	10.50	1,050	100	10.5	1,050



Feb 6	--	--	--	100	10.50	1050	--	--	--
				20	10.00	200	80	10.00	800
Feb 7	400	11.00	4,400	--	--	--	80	10.00	800
							400	11.00	4,400
Feb 8	--	--	--	200	11.00	2200	80	10.00	800
							200	11.00	2,200
Feb 12	300	11.40	3,420	--	--	--	80	10.00	800
							200	11.00	2,200
							300	11.40	3,420
Feb 13	200	11.50	2,300	--	--	--	80	10.00	800
							200	11.00	2,200
							300	11.40	3,420
							200	11.50	2,300
Feb 17	--	--	--	200	11.50	2300	80	10.00	800
				200	11.40	2280	200	11.00	2,200
							100	11.40	1,140

### Illustration 9

Prepare Stores Ledger Account showing pricing of material issues on Replacement Price basis from the following particulars.

Opening balance 400 units at ₹4 each

10-3-2012 Received 100 units at ₹4.10 each

15-3-2012 Issued 300 units to Job XY vide M.R.No.14

17-3-2012 Received 200 units at ₹4.30 each

20-3-2012 Issued 250 units to Job AB vide M.R.No.20

25-3-2012 Received 400 units @ ₹4.50 each

26-3-2012 Issued 200 units to Job JK vide M.R.No.27

27-3-2012 Received 100 units @ ₹4.60 each.

30-3-2012 Issued 300 units to Job PQ vide M.R.No.32.

Replacement Price on various dates : 15-3-2012 ₹4.20

20-3-2012 ₹4.40

26-3-2012 ₹4.60 &

30-3-2012 ₹4.80.

**Solution:**

### Stores Ledger Account [Replacement Price Basis]

Date	Receipts			Issue			Balance		
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹
2012 Mar 1	--	--	--	--	--	--	400	4.00	1,600
10-3-2012	100	4.10	410	--	--	--	500	4.02	2,010
15-3-2012	--	--	--	300	4.20	1260	200	3.75	750

17-3-2012	200	4.30	860	--	--	--	400	4.03	1,610
20-3-2012	--	--	--	250	4.40	1,100	150	3.40	510
25-3-2012	400	4.50	1,800	--	--	--	550	4.20	2,310
26-3-2012	--	--	--	200	4.60	920	350	3.97	1,390
27-3-2012	100	4.60	460	--	--	--	450	4.11	1,850
30-3-2012	--	--	--	300	4.80	1,440	150	2.7310	410

**Illustration 10**

Stocks are issued at a standard price and the following transactions occurred for a specific material:

1st January	Opening Stock	10	tonnes at ₹240 per ton
4th January	Purchased	5	tonnes at ₹260 per ton
5th January	Issued	3	tons
12th January	Issued	4	tons
13th January	Purchased	3	tons at ₹250 per ton
19th January	Issued	4	tons
26th January	Issued	3	tons
30th January	Purchased	4	tons at ₹280 per ton
31st January	Issued	3	tons.

The debit balance of price variation on 1st January was ₹20. Show the stock account for the material for the month of January, indicating how would you deal with the difference in material price variance, when preparing the Profit and Loss Account for the month.

**Solution:**

$$\begin{aligned} \text{Standard Price} &= \frac{(240 \times 10) + 20}{10} \\ &= ₹ 242 \end{aligned}$$

**Stores Ledger Account**

Date	Receipts			Issue			Balance	
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Price ₹
1 <sup>st</sup> January	--	--	--	--	--	--	10	2,400
4 <sup>th</sup> January	5	260	1,300	--	--	--	15	3,700
5 <sup>th</sup> January	--	--	--	3	242	726	12	2,974
12 <sup>th</sup> January	--	--	--	4	242	968	8	2,006
13 <sup>th</sup> January	3	250	750	--	--	--	11	2,756
19 <sup>th</sup> January	--	--	--	4	242	968	7	1,788
26 <sup>th</sup> January	--	--	--	3	242	726	4	1,062
30 <sup>th</sup> January	4	280	1,120	--	--	--	8	2,182
31 <sup>st</sup> January	--	--	--	3	242	726	5	1,456



Material price variance is ₹ 246 which is to be transferred to debit of costing P & L A/c.

**Working:**

Stock at standard price	= 5 x 242	= 1,210
Material Price Variance	= 1,210 – 1,456	= 246 (A)

**Illustration 11**

Receipts and issues of an item of stores are made as follows: There was no balance before 9th January.

	Receipts		Issues
	Quantity	Price	Quantity
January 9th	10	17.0	
19th	25	10.0	
20th			10
29th			20
30th	15	8.0	
February 13th	20	12.0	
27th	10	16.9	
28th			40
March 30th	20	20.0	
31st			20

- (i) What is the simple average of February receipts ?
- (ii) What are the moving monthly simple average price for January -February and February-March?
- (iii) If a weighted average is used for pricing issues how does the value of the balance in stock change during January?
- (iv) If a weighted average price is calculated at the end of each month and is then used for pricing the issued of that month, what will be the value of the month-end balance?

**Solution:**

**(i) Simple Average Price of February Receipts.**

$$\text{Simple Average Price of February Receipts} = 12 + 16.9 / 2 = ₹ 14.45$$

**(ii) Simple Average Price of January Receipts**

$$\text{Simple Average Price of January Receipts} = 17 + 10 + 8 / 3 = ₹ 11.67$$

$$\text{Moving monthly average for Jan-Feb} = 11.67 + 14.45 / 2 = ₹ 13.06$$

$$\text{Moving monthly average for Feb-March} = 14.45 + 20 / 2 = ₹ 17.225$$

**(iii) Stores Ledger Account (under weighted average method for January)**

Date	Receipts			Issue			Balance	
	Qty.	Price ₹	Value ₹	Qty.	Price ₹	Value ₹	Qty.	Value ₹
Jan 9 <sup>th</sup>	10	17	170	--	--	--	10	170
Jan 19 <sup>th</sup>	25	10	250	--	--	--	35	420
Jan 20 <sup>th</sup>	--	--	--	10	12	120	25	300
Jan 29 <sup>th</sup>	--	--	--	20	12	240	5	60
Jan 30 <sup>th</sup>	15	8	120	--	--	--	20	180

**(iv) Calculation of the Value of month-end balance**

Date	Quantity	Value
Jan 9 <sup>th</sup>	10	170
Jan 19 <sup>th</sup>	25	250
Jan 30 <sup>th</sup>	15	120
	50	540
(-) Issues	30 (10.8)	324
Jan-Balance	20	216
Feb 13 <sup>th</sup>	20	240
Feb 27 <sup>th</sup>	10	169
Feb Balance	50	625
(-) Issues	40 (12.5)	500
	10	125
March 30 <sup>th</sup>	20	400
	30	525
(-) Issues	20 (17.5)	350
Balance	10	175

**Illustration 12**

Two components A and B are used as follows:

Normal usage = 50 per week each

Re-order quantity = A- 300; B-500

Maximum usage = 75 per week each

Minimum usage = 25 per week each

Re-order period: A - 4 to 6 weeks; B - 2 to 4 weeks

Calculate for each component

(a) Re-order level; (b) Minimum level; (c) Maximum level; (d) Average stock level.

**Solution:**

	Particulars	A	B
a)	Reorder Level	450 units	300 units
	[Max. Consumption × Max. Re-order Period]	(75 × 6)	(75 × 4)

b)	Minimum Level [ROL – (Normal Consumption x Normal Re-order period)]	200 units [450 – (50x5)]	150 units [300 – (50x3)]
c)	Maximum Level [ROL + ROQ – (Min. Consumption x Min Re-order period)]	650 units [450 + 300 – (25x4)]	750 units [300 + 500 – (25 x 2)]
d)	Average Stock Level [Min. Level + Max. Level] / 2 or [Min. Level + ½ × ROQ]	425 units [200 + 650 / 2] (or) or 350 units 200 + ½ (300)	450 units [150 + 750 / 2] (or) or 400 units 150 + ½ (500)

### Illustration 13

Anil company buys its annual requirement of 36,000 units in six installments. Each unit costs ₹1 and the ordering cost is ₹25. The inventory carrying cost is estimated at 20% of unit value. Find the total annual cost of the existing inventory policy. How much money can be saved by using E.O.Q?

#### Solution:

$$\begin{aligned}
 \text{EOQ} &= \sqrt{\frac{2 \cdot \text{A.O}}{C}} \\
 &= \sqrt{\frac{2 \times 35,000 \times 25}{1 \times 20\%}} \\
 &= \sqrt{\frac{18,00,000}{0.2}} = 3,000 \text{ units}
 \end{aligned}$$

#### Statement Showing computation of comparative inventory cost of existing policy and proposed EOQ policy:

	Particulars	Existing Policy		EOQ	
(i)	Purchase Cost	(36000 x 1)	36000	(36000 x 1)	36000
(ii)	Ordering Cost	[36000/6000 x 25]	150	[36000/3000 x 25]	300
(iii)	Carrying Cost	[1/2 x 6000 x 1 x 20%]	600	[1/2 x 3000 x 1 x 20%]	300
			36,750		36,600

$$\text{Saving by using EOQ} = 36,750 - 36,600 = ₹ 150$$

### Illustration 14

The annual demand for an item is 3,200 units. The units cost is ₹6 and inventory carrying charges is 25% p.a. If the cost of one procurement is ₹150, determine:

- (a) E.O.Q                      (b) No. of orders per year                      (c) Time between two consecutive orders.

#### Solution:

$$\begin{aligned}
 \text{(a) EOQ} &= \sqrt{\frac{2 \cdot \text{A.O}}{C}} \\
 &= \sqrt{\frac{2 \times 150 \times 3200}{6 \times 25\%}} \\
 &= \sqrt{\frac{9,60,000}{1.5}} \\
 &= 800 \text{ units}
 \end{aligned}$$

- (b) No. of orders per year =  $A / EOQ = 3200 / 800 = 4$  orders  
 (c) Time between two consecutive orders = No. of months in years / No. of orders  
 $= 12/4 = 3$  Months

**Illustration 15**

A company manufactures a special product which requires a component 'Alpha'. The following particulars are collected for the year 2012.

- |                             |                 |
|-----------------------------|-----------------|
| 1. Annual demand of Alpha   | 8,000 units     |
| 2. Cost of placing an order | ₹ 200 per order |
| 3. Cost per unit of Alpha   | ₹ 400           |
| 4. Carrying cost % p.a.     | 20%             |

The company has been offered a quantity discount of 4% on the purchase of 'Alpha' provided the order size is 4,000 components at a time.

**Required:**

- (a) Compute the economic order quantity.  
 (b) Advise whether the quantity discount offer can be accepted.

**Solution:****(a) Calculation of Economic Order Quantity**

$$EOQ = \sqrt{\frac{2AO}{C}}$$

$$EOQ = \sqrt{\frac{2 \times 8,000 \text{ units} \times ₹ 200}{₹ 400 \times 20/100}}$$

$$= 200 \text{ units}$$

**(b) Evaluation of Profitability of Different Options of Order Quantity**

- (a) When EOQ is ordered

Purchase Cost	(8,000 units x ₹ 400)	32,00,000
Ordering Cost	[(8,000 units / 200 units) x ₹ 200]	8,000
Carrying Cost	(200 units x ₹ 400 x ½ x 20/100)	8,000
Total Cost		32,16,000

- (b) When quantity discount is accepted

Purchase Cost	(8,000 units x ₹ 384)	30,72,000
Ordering Cost	[(8,000 units / 4000 units) x ₹ 200]	400
Carrying Cost	(4000 units x ₹ 384 x ½ x 20/100)	1,53,600
Total Cost		32,26,000

**Advise:**

The total cost of inventory is lower if EOQ is adopted. Hence, the company is advised not to accept the quantity discount.



### Illustration 16

PQR Limited produces a product which has a monthly demand of 52,000 units. The product requires a Component X which is purchased at ₹ 15 per unit. For every finished product, 2 units of Component X are required. The ordering cost is ₹ 350 per order and the carrying cost is 12% p.a.

#### Required:

- Calculate the economic order quantity for Component X.
- If the minimum lot size to be supplied is 52,000 units, what is the extra cost, the company has to incur?
- What is the minimum carrying cost, the company has to incur?

#### Solution:

$$\begin{aligned}\text{Annual Consumption of Component X} \\ &= 52,000 \text{ units} \times 2 \times 12 \text{ months} = 12,48,000 \text{ units.}\end{aligned}$$

#### (a) Calculation of Economic Order Quantity

$$\begin{aligned}\text{EOQ} &= \sqrt{\frac{2 \times 12,48,000 \times ₹ 350}{₹ 15 \times 12/100}} \\ &= 22,030 \text{ units}\end{aligned}$$

#### (b) Calculation of Extra Cost if Minimum Lot size to be supplied is 52,000 units.

(a)	If Lot size is 52,000 units		
	Ordering cost	= (12,48,000/52,000 x ₹ 350)	8,400
	Carrying cost	= (52,000 units x ½ x ₹ 15 x 12/100)	46,800
			55,200
(b)	If Lot size is 22,030 units (EOQ)		
	Ordering cost	= (12,48,000/22,030 x ₹ 350)	19,827
	Carrying cost	= (22,030 units x ½ x ₹ 15 x 12/100)	19,827
			39,655
	Extra cost (a) – (b)		15,545

(c) Minimum Carrying Cost = 22,030 units x ½ x ₹ 15 x 12/100 = ₹ 19,827.

### Illustration 17

From the following particulars with respect to a particular item of materials of a manufacturing company, calculate the best quantity to order:

Ordering quantities (tonne)	Price per ton ₹
Less than 250	6.00
250 but less than 800	5.90
800 but less than 2,000	5.80
2,000 but less than 4,000	5.70
4,000 and above	5.60

The annual demand for the material is 4,000 tonnes.

Stock holding costs are 20% of material cost p.a.

The delivery cost per order is ₹6.00

**Solution:****Statement showing computation of total inventory cost at different order sizes**

	Particulars	Ordering Quantities				
		200	250	800	2000	4000
(i)	Purchasing cost	24000	23600	23200	22800	22400
(ii)	No. of orders	20	16	5	2	1
(iii)	Ordering Cost	120	96	30	12	6
(iv)	Average size of order	100	125	400	1000	2000
(v)	Inventory Carrying cost per unit	1.2 (6x20%)	1.18 (5.9x20%)	1.16 (5.8x20%)	1.14 (5.7x20%)	1.12 (5.6x20%)
(vi)	Inventory carrying cost (iv x v)	120	147.5	464	1140	2240
(vii)	Total Inventory Cost (iii + i + vi)	24240	23843.5	23694	23952	24646

For the above computations the best quantity to order is 800 units.

**Illustration 18**

Calculate

Value of raw materials consumed;

Total cost of production

Cost of goods sold and

The amount of profit from the following particulars.

<b>Opening Stock:</b>	₹
Raw Materials	5,000
Finished goods	4,000
<b>Closing Stock:</b>	
Raw materials	4,000
Finished goods	5,000
Raw materials purchased	50,000
Wages paid to laborers	20,000
Chargeable expenses	2,000
Rent, rates & taxes	5,000
Power	2,000
Factory heating and lighting	2,000
Factory insurance	1,000
Experimental expenses	500
Wastage of material	200
Office management salaries	4,000
Office printing and stationery	200
Salaries of sales men	2,000
Commission of travelling agents	1,000
Sales	1,00,000



**Solution:**

### Cost Sheet

Particulars	Amount (₹)	Amount (₹)
Opening stock of raw materials	5,000	
(+) Purchase of raw materials	50,000	
(-) Closing stock of raw materials	(4,000)	
<b>Materials Consumed</b>		51,000
Wages	20,000	
Chargeable expenses	2,000	22,000
<b>Prime Cost</b>		73,000
(+) Factory overheads		
Power	2,000	
Factory heating & lighting	2,000	
Factory Insurance	1,000	
Experimental expenses	500	
Wastage of material	200	5,700
<b>Factory Cost (or) Works Cost</b>		78,700
(+) Office overheads		
Rent, rates	5,000	
Office Salaries	4,000	
Printing & Stationary	200	9,200
<b>Cost of Production</b>		87,900
(+) Opening stock of finished goods		4,000
(-) Closing stock of finished goods		(5,000)
<b>Cost of goods sold</b>		86,900
(+) Selling & distribution overheads		
Salary of salesmen	2,000	
Commission of travelling agent	1,000	3,000
<b>Cost of sales (or) Total sales</b>		89,900
(+) Profit		10,100
<b>Sales</b>		1,00,000

#### Illustration 19

The particulars relating to 1,200 kgs. of a certain raw material purchased by a company during June, were as follows:-

Lot prices quoted by supplier and accepted by the Company for placing the purchase order:

Lot upto 1,000 kgs. @ ₹22 per kg.

Between 1,000 - 1,500 kgs, @ ₹20 per kg.

Between 1500 -2000 kgs. @ ₹18 per kg.

Trade discount – 20%.

Additional charge for containers @ ₹10 per drum of 25 kgs.

Credit allowed on return of containers, @ ₹8 per drum.

Sales tax at 10% on raw material and 5% on drums.

Total freight paid by the purchaser ₹240/-

Insurance at 2.5% (on net invoice value) paid by the purchaser.

Stores overhead applied at 5% on total purchase cost of material.

The entire quantity was received and issued to production.

The containers are returned in due course. Draw up a suitable statement to show :-

- Total cost of material purchased and
- Unit cost of material issued to production.

**Solution:**

**Statement showing computation of total cost of material purchased and unit cost of material issued for production.**

Particulars	Unit Cost	Total Cost ₹ (1,200 kgs)
Basic price of material	20.00	24,000.00
(-) Trade discount	4.00	4,800.00
	16.00	19,200.00
(+) Drum charges $(1,200/25 \times 10)$	0.40	480.00
(+) Sales tax $19,200 \times 10\% = 1920$ $480 \times 5\% = 24$ $= 1944$	1.62	1,944.00
Net Invoice Value	18.02	21,624.00
(+) Insurance $(21,624 \times 2.5\%)$	0.4505	540.60
(+) Freight paid	0.2000	240.00
	18.6705	22,404.60
(-) Credit for drums returned $(1,200 / 25 \times 8)$	0.3200	384.00
Total Cost of Material Purchased	18.3505	22,020.60
(+) Stores overhead $(22,020.6 \times 5\%)$	0.9200	1,101.03
Material cost issued to production	19.2705	23,121.63



### Illustration 20

From the following data for the year ended 31st Dec, 2012, calculate the inventory turnover ratio of the two items, and put forward your comments on them.

	Material A ₹	Material B ₹
Opening stock on 1-1-2012	10,000	9,000
Purchase during the year 2012	52,000	27,000
Closing on 31-12-2012	6,000	11,000

#### Solution:

$$\text{Material Inventory Turnover Ratio} = \frac{\text{Cost of Material Used}}{\text{Average Stock}}$$

$$\begin{aligned} \text{For A} &= \frac{10,000 + 52,000 - 6,000}{(10,000 + 6,000)/2} \\ &= 7 \text{ times} \end{aligned}$$

$$\begin{aligned} \text{For B} &= \frac{9,000 + 27,000 - 11,000}{(9,000 + 11,000)/2} \\ &= 25,000 / 10,000 \\ &= 2.5 \text{ times} \end{aligned}$$

Material Inventory turnover ratio indicates the efficiency of the management with which they are able to utilize their inventory. It indicates the existence or non-existence of non moving items, dormant items, slow moving items etc. in inventory. If the ratio is high, the efficiency is said to be high and on the other hand if the ratio is low, the efficiency is said to be low.

In view of above, in the instant case, we may say that Material A used better than Material B.

### Illustration 21

A manufacturing organisation has imported four types of materials. The invoice reveals the following data:

	Quantity Kgs.	Rate US \$ per kg.
Material A	1,000	1.50
B	2,000	1.25
C	1,500	2.00
D	3,000	1.00

Import duty 23% of invoice value

Insurance 2% of invoice value

Freight and Clearing ₹ 30,000

Exchange Rate US \$ 1 = ₹16.00

50% of the materials imported are issued to production centers. While determining the value of closing stock 5% allowance is provided to cover up storage loss. Determine the value of closing stock of each type of materials.

**Solution:****Statement showing computation of total cost of material purchased and value of closing stock:**

	Particulars	A	B	C	D
(a)	Basic cost of material in \$	1,500	2,500	3,000	3,000
(b)	Insurance & import duty @ 25%	375	625	750	750
		1,875	3,125	3,750	3,750
	Cost in Rupees	30,000	50,000	60,000	60,000
(c)	(+) Freight & Clearing (on weight basis) (1 : 2 : 1.5 : 3)	4,000	8,000	6,000	12,000
		34,000	58,000	66,000	72,000
(d)	(-) Issued to production (50%)	17,000	29,000	33,000	36,000
		17,000	29,000	33,000	36,000
(e)	(-) Storage loss @ 5%	850	1,450	1,650	1,800
	Closing Stock	16,150	27,550	31,350	34,200

**Illustration 22**

From the details given below, calculate:

- Re-ordering level
- Maximum level
- Minimum level
- Danger level

Re-ordering quantity is to be calculated on the basis of following information:

- Cost of placing a purchase order is ₹ 20
- Number of units to be purchased during the year is 5,000
- Purchase price per unit inclusive of transportation cost is ₹ 50
- Annual cost of storage per units is ₹ 5
- Details of lead time: Average 10 days, Maximum 15 days, Minimum 6 days.  
For emergency purchases 4 days
- Rate of consumption: Average: 15 units per day,  
Maximum: 20 units per days

**Solution:**

$$\text{EOQ} = \sqrt{\frac{2 \times 5,000 \times 20}{5}}$$

$$= 200 \text{ units}$$

$$\text{Min. Rate of Consumption} = (15 \times 2) - 20$$

$$= 10 \text{ units per day}$$

i) Re-order Level (ROL)	= Maximum usage per period x Maximum Re-order Period = 20 units per day x 15 days = 300 units
ii) Maximum level	= ROL + ROQ – (Min. Rate of Consumption x Min. Re-order Period) = 300 units + 200 units – (10 units per day x 6 days) = 440 units
iii) Minimum level	= ROL – (Average Rate of Consumption x Average Re-order Period) = 300 units – (15 units per day x 10 days)

	= 150 units
iv) Danger level	= Average Consumption x Lead time for Emergency Purchases
	= 15 units per day x 4 days = 60 units

### Illustration 23

M/s Tubes Ltd. are the manufacturers of picture tubes for T.V. The following are the details of their operation during the year 2012:

Average monthly market demand	2,000 Tubes
Ordering Cost	₹100 per order
Inventory carrying cost	20% per annum
Cost of tubes	₹ 500 per tube
Normal usage	100 tubes per week
Minimum usage	50 tubes per week
Maximum usage	200 tubes per week
Lead time to supply	6 – 8 weeks

#### Compute from the above:

- Economic order quantity. If the supplier is willing to supply quarterly 1,500 units at a discount of 5% is it worth accepting?
- Maximum level of stock
- Minimum level of stock
- Re-order level

#### Solution:

A = Annual usage of tubes = Normal usage per week x 52 weeks  
 = 100 tubes x 52 weeks = 5,200 tubes

O = Ordering cost per order = ₹ 100 per order

C = Inventory carrying cost per unit per annum  
 = 20% x ₹ 500 = ₹ 100 per unit, per annum

#### Economic Order Quantity:

$$E.O.Q = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 5,200 \text{ units} \times ₹100}{₹100}} = 102 \text{ tubes (approx.)}$$

#### If the supplier is willing to supply 1,500 units at a discount of 5% is it worth accepting?

Total cost (when order size is 1,500 units) = Cost of 5,200 units + Ordering cost + Carrying cost.

$$5,200 \text{ units} \times ₹ 475 + \left( \frac{5,200 \text{ units}}{1,500 \text{ units}} \times ₹ 100 \right) + (1,500 \text{ units} \times 20\% \times ₹ 475) \div 2$$

$$= ₹ 24,70,000 + ₹ 346.67 + ₹ 71,250$$

$$= ₹ 25,41,596.67$$

#### Total cost (when order size is 102 units)

$$= 5,200 \text{ units} \times ₹ 500 + \left( \frac{5,200 \text{ units}}{102 \text{ units}} \times ₹ 100 \right) + (102 \text{ units} \times 20\% \times ₹ 500) \div 2$$

$$= ₹ 26,00,000 + ₹ 5,098.03 + ₹ 5,100$$

$$= ₹ 26,10,198.03$$

Since the total cost under quarterly supply of 1,500 units with 5% discount is lower than that when order size is 102 units, the offer should be accepted. While accepting this offer capital blocked on order size of 1,500 unit per quarter has been ignored.

**Maximum level of Stock:**

$$= \text{Re-order Level} + \text{Re-order Quantity} - \text{Min. Usage} \times \text{Min.-Re-order Period}$$

$$= 1,600 \text{ units} + 102 \text{ units} - 50 \text{ units} \times 6 \text{ weeks}$$

$$= 1,402 \text{ units.}$$

**Minimum level of Stock:**

$$= \text{Re-order Level} - \text{Normal Usage} \times \text{Average Re-order Period}$$

$$= 1,600 \text{ units} - 100 \text{ units} \times 7 \text{ weeks} = 900 \text{ units.}$$

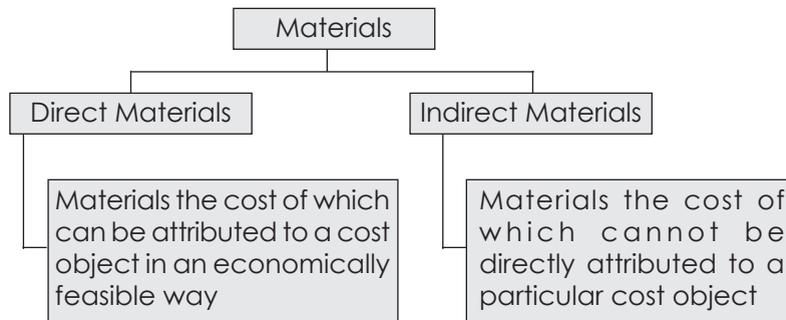
**Re-order Level:**

$$= \text{Maximum Consumption} \times \text{Maximum Re-order Period}$$

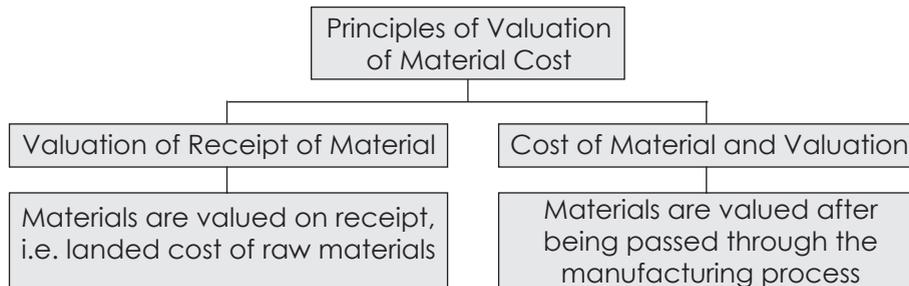
$$= 200 \text{ units} \times 8 \text{ weeks} = 1,600 \text{ units.}$$

**COST ACCOUNTING STANDARD-6 MATERIAL COST:**

**“Material cost is defined as cost of material of any nature used for the purpose of production of a product or a service”.**



**Principles of Valuation of Material Cost:** The principles to be followed for valuation of materials are:



**Valuation of Receipts of Materials: Inclusions and Exclusions:**

The following items are to be **‘included’** for the purpose of determining valuation of receipt of materials:

- (i) Purchase price;
- (ii) Duties and Taxes ;
- (iii) Freight Inwards ;



- (iv) Insurance ;
- (v) Other expenditure directly attributable to procurement that can be quantified with reasonable accuracy at the time of procurement ;
- (vi) Self-manufactured packing materials shall be valued including direct material cost, direct employee cost, direct expenses, job charges, factory overheads and other directly related overheads.

The following items are to be '**excluded**' for the purpose of determining valuation of receipt of materials:

- (i) Trade Discounts (Cash Discount being a financial income is not to be netted off against cost of materials)
- (ii) Rebates
- (iii) Taxes and duties refundable or credited by tax authorities  
(CENVAT Credits, Credit for countervailing customs duty, sales tax set off, VAT Credits and other similar items)

**Note:**

- (1) The items specified as 'include' should be considered only if it is not included earlier in the material cost. If those items are already included earlier, then those may be ignored for the purpose of computation of material cost.
- (2) The items specified as 'exclude' should be excluded only if it is already included in material cost. If those items are not included earlier, then those may be ignored for the purpose of computation of material cost.

**Illustration 24: Valuation of Receipt of Material**

**Purchase of Materials ₹ 2,00,000 (inclusive of Trade Discount ₹ 3,000); Fee on Board ₹ 10,000; Import Duty paid ₹ 15,000; Freight inward ₹ 20,000 ; Insurance paid for import by sea ₹ 12,000; Rebates allowed ₹ 4,000; Cash discount ₹ 3,000; CENVAT Credit refundable ₹ 7,000; Subsidy received from the Government for importation of these materials ₹ 18,000. Compute the landed cost of material (i.e. value of receipt of material).**

**Computation of Material Cost Sheet**

	<b>Particulars</b>	<b>Amount (₹)</b>
	Purchase price of Material	2,00,000
<b>Add</b>	Fee on Board	10,000
<b>Add</b>	Import Duties on purchasing the material	15,000
<b>Add</b>	Freight Inward during the procurement of material	20,000
<b>Add</b>	Insurance paid	12,000
	<b>Total</b>	<b>2,57,000</b>
<b>Less</b>	Trade Discount	3,000
<b>Less</b>	Rebates	4,000
<b>Less</b>	CENVAT Credit refundable	7,000
<b>Less</b>	Subsidy received from the Government for importation of materials	18,000
	<b>Value of Receipt of Material</b>	<b>2,25,000</b>

**Note:**

- (i) Cash discount is not allowed, as it is a financial item.
- (ii) Subsidy received, rebates and CENVAT Credit refundable are to be deducted for the purpose of computing the material cost.

**Illustration 25: Valuation of Receipt of Material (special treatment related of losses)**

**Purchase of Materials ₹5,00,000 (inclusive of Trade Discount ₹8,000); Import Duty paid ₹45,000; Freight inward ₹62,000 ; Insurance paid for import by air ₹ 28,000; Rebates allowed ₹10,000; Cash discount ₹3,000; CENVAT Credit refundable ₹7,000; Abnormal Loss of Materials ₹14,000; Price variation due to computation of cost under standard rates ₹1,500. Compute the landed cost of material.**

**Solution:**

Computation of Landed Cost of Material

	Particulars	Amount (₹)
	Purchase price of Material	5,00,000
<b>Add</b>	Import Duties of purchasing the material	45,000
<b>Add</b>	Freight Inward during the procurement of material	62,000
<b>Add</b>	Insurance paid on import by air	28,000
<b>Add</b>	Price Variation due to computation of cost under standard rates	1,500
	<b>Total</b>	<b>6,36,500</b>
<b>Less</b>	Trade Discount	8,000
<b>Less</b>	Abnormal Loss of materials	14,000
<b>Less</b>	Rebates	10,000
<b>Less</b>	CENVAT Credit Refundable	7,000
	<b>Value of Receipt of Material</b>	<b>5,97,500</b>

**Note:**

- (i) Normal loss is not deducted
- (ii) Price variation is allowable inclusion as the cost was maintained on standard cost.

**Valuation and Cost of Materials: Inclusions and Exclusions:**

The following items are to be '**included**' for the purpose of determining valuation of materials:

- (i) Normal loss or spoilage prior to receipt at factory gate net of amounts recoverable from suppliers, insurers, carriers or recoveries from disposal
- (ii) Normal losses due to shrinkage or evaporation or gain due to elongation or absorption of moisture before receipt of material
- (iii) Foreign exchange component of material cost converted at the rate on the date of transaction
- (iv) Subsidy/Grant/Incentive and any similar payments received or receivable which can be ascertained with certainty shall be reduced.
- (v) Price Variances when materials are accounted for at standard cost
- (vi) Self-manufactured components and sub-assemblies to be valued inclusive of direct material cost, direct employee cost, direct expenses, factory overheads and share of administrative overheads relating to production
- (vii) Material cost of normal scrap/defectives to be included in the material cost of manufactured goods

The following items are to be '**excluded**' for the purpose of determining valuation of receipt of materials:

- (i) Finance costs
- (ii) Abnormal losses due to shrinkage or evaporation or gain due to elongation or absorption of moisture before receipt of material
- (iii) Changes in foreign exchange rate from the rate on date of transaction till date of payment
- (iv) Demurrage or detention charges or penalty levied by transport or other authorities



- (v) Imputed costs
- (vi) Cost of self-manufactured components and sub-assemblies shall not include share of other administrative overheads, finance cost and marketing overheads
- (vii) Material cost of abnormal scrap/defectives not to be included

**Illustration 26: Valuation of Receipt of Material (special treatment related to exchange rate difference)**

**Purchase of Materials \$ 50,000 [ Forward contract rate \$ = 54.40 but \$ = 54.60 on the date of importation]; Import Duty paid ₹5,65,000; Freight inward ₹1,62,000 ; Insurance paid for import by road ₹48,000; Cash discount ₹33,000; CENVAT Credit refundable ₹37,000; Payment made to the foreign vendor after a month, on that date the rate of exchange was \$ = 55.20. Compute the landed cost of material.**

**Solution:**

Computation of Landed Cost of Material

	Particulars	Amount (₹)
	Purchase price of Material [ 50,000 x 54.60]	27,30,000
<b>Add</b>	Import Duties of purchasing the material	5,65,000
<b>Add</b>	Freight Inward during the procurement of material	1,62,000
<b>Add</b>	Insurance of the material (In case of import of material by Road / Sea)	48,000
	<b>Total</b>	<b>35,05,000</b>
<b>Less</b>	CENVAT Credit refundable	37,000
	<b>Value of Receipt of Material</b>	<b>34,68,000</b>

**Note:**

- (i) Excess payment made to the vendor due to exchange fluctuation is not an includible cost, hence not considered.
- (ii) Though the forward contract rate was \$ = 54.40, but the exchange rate on the date of importation is considered. Hence, included in the cost of materials. Accordingly, the purchase cost is computed considering the \$ = 54.60.

**Illustration 27: Valuation of closing stock of raw materials:**

**Opening stock of raw materials (10,000 units) ₹1,80,000; Purchase of Raw Materials (35,000 units) ₹7,00,000; Closing Stock of Raw Materials 7,000 units; Freight Inward ₹85,000; Self-manufactured packing material for purchased raw materials only ₹60,000 (including share of administrative overheads related to marketing sales ₹8,000); Demurrage charges levied by transporter for delay in collection ₹11,000; Normal Loss due to shrinkage 1% of materials ; Abnormal Loss due to absorption of moisture before receipt of materials 100 units.**

**Solution:**

Computation of value of closing stock of raw materials [Average Cost Method]

	Particulars	Quantity (Units)	Amount (₹)
	Opening Stock of Raw Materials	10,000	1,80,000
<b>Add</b>	Purchase of raw materials	35,000	7,00,000
<b>Add</b>	Freight inwards		85,000
<b>Add</b>	Demurrage Charges levied by transporter for delay in collection		11,000
			9,76,000

	Particulars	Quantity (Units)	Amount (₹)
<b>Less</b>	Abnormal Loss of raw materials ( due to absorption of moisture before receipt of materials) = $[(7,00,000 + 85,000 + 11000) \times 100]/35,000$	(100)	(2,274)
<b>Less</b>	Normal loss of materials due to shrinkage during transit [ 1% of 35,000 units]	(350)	-----
<b>Add</b>	Cost of self-manufactured packing materials for purchased raw materials only (60,000 – 8,000)		52,000
	<b>Cost of raw materials</b>	<b>44,550</b>	<b>10,25,726</b>
<b>Less:</b>	Value of Closing Stock = Total Cost / (Total units – Units of Normal Loss) [ 10,25,726/(10,000+35,000 – 100 – 350) ]x 7,000	(7,000)	(1,61,169)
	<b>Cost of Raw Materials Consumed</b>	<b>37,550</b>	<b>8,64,557</b>

**Note:**

- (i) Units of normal loss adjusted in quantity only and not in cost, as it is an includible item
- (ii) Cost of self-manufactured packing materials does not include any share of administrative overheads or finance cost or marketing overheads. Hence, marketing overheads excluded.
- (iii) Abnormal loss of materials arised before the receipt of the raw materials, hence, valuation done on the basis of costs related to purchases only. Value of opening stock is not considered for arriving at the valuation of abnormal loss.
- (iv) Demurrage charges paid to transporter is an includible item. Since this was paid to the transporter, hence considered before estimating the value of abnormal loss

**Alternatively, Solving the Above Illustration Based on FIFO Method**

Computation of value of closing stock of raw materials [FIFO Method]

	Particulars	Quantity (Units)	Amount (₹)
	Opening Stock of Raw Materials	10,000	1,80,000
<b>Add</b>	Purchase of raw materials	35,000	7,00,000
<b>Add</b>	Freight inwards		85,000
<b>Add</b>	Demurrage Charges levied by transporter for delay in collection		11,000
			9,76,000
<b>Less</b>	Abnormal Loss of raw materials ( due to absorption of moisture before receipt of materials) = $[(7,00,000 + 85,000 + 11000) \times 100]/35,000$	(100)	(2,274)
<b>Less</b>	Normal loss of materials due to shrinkage during transit = [ 1% of 35,000 units]	(350)	-----
<b>Add</b>	Cost of self-manufactured packing materials for purchased raw materials only (60,000 – 8,000)		52,000
	<b>Cost of Raw Materials</b>	<b>44,550</b>	<b>10,25,726</b>

	Particulars	Quantity (Units)	Amount (₹)
<b>Less:</b>	Value of Closing Stock = Total Cost / (Total units – Units of Normal Loss) Where Total Cost = = [ 7,00,000 + 85,000 + 11,000 -2,274 + 52,000] = 8,45,726 And Total Units = [35,000 – 1% of 35,000] = 34,650 units Value of Closing Stock = [8,45,726 x 7,000]/ 34,650	(7,000)	(1,70,854)
	<b>Cost of Raw Materials Consumed</b>	<b>37,550</b>	<b>8,54,872</b>

**Note:**

- (i) Since FIFO method is followed, hence for the purpose of estimating the units sold/used/consumed, it is presumed that there is no units left out of units in opening stock.
- (ii) Since normal loss is in transit, hence it is calculated on units purchased only.

**SELF EXAMINATION QUESTIONS:**

1. What is the prime objective of material control? It is said that in any system of material control there are always two counteracting or opposing factors. What are these and why do these factors arise?
2. What are the principal forms generally required to be used in connection with purchasing and receiving of stores? Briefly describe them and design any one of the forms that are used.
3. Explain the meaning and importance of material control and mention the main requisites of an adequate system of material control.
4. What is a purchase order? To whom should the copies of a purchase order be sent and why? Give a specimen form of purchase order, assuming the particulars to be filled in.
5. Enumerate the advantages and disadvantages of a centralized stores system.
6. What is Re-ordering Level? Explain its relationships with Maximum and Minimum Stock Levels. What are the factors to be considered in fixing Re-ordering Level and Quantity? Under what circumstances would you recommend revision of levels?
7. What is Bin Card? Give a specimen form of the Bin Card and discuss its utility.
8. "The Perpetual Inventory System is an Integral part of material control". Discuss this statement by bringing out briefly the salient features and the advantages of this system.
9. What is Economic Order Quantity? How is it calculated?
10. What are the main factors which you would consider before selecting a method of pricing material issues?
11. What is meant by Bill of Materials? When will you recommend drawal of stores under Bill of Materials as opposed to individual requisition?
12. What are the stores that normally come under "Packing Materials"? What are the major classifications of packing expenses and how they are treated in cost?
13. How would you deal with the following in Cost Accounts?
  - (a) Packing cost
  - (b) Cost of Tools
14. Write short notes on the following:
  - (a) ABC analysis.

- (b) VED analysis.
- (c) Treatment of Scrap in costing.
- (d) Valuation of work in progress.
- (e) Moving Average Price Method of material issue valuation.
- (f) Just in time
- (g) Bin Card vs. Stores Ledger
- (h) Principles of valuation of receipt of material as per CAS – 6.

15. Which of the following statements are true?

- (a) Perpetual inventory system enables management to ascertain stock at any time without physical inventory being taken.
- (b) Continuous stock taking is not an essential feature to the perpetual inventory system.
- (c) Bin card is a record of both quantities and value.
- (d) VED analysis is used primarily for control of spare parts.
- (e) ABC analysis is not based on the concept of selection inventory management.
- (f) Stores ledger is maintained in the stores department.
- (g) Purchase requisition is usually prepared by the storekeeper.
- (h) In centralized purchasing all purchases are made by the purchasing department.
- (i) Weighted average method of pricing issue of materials involves adding all the different prices and dividing by the number of such prices.
- (j) Material returned note is prepared to keep a record of return of surplus materials to stores.
- (k) Under the average price method of valuing material issues, a new issue price is determined after each purchase.

(Ans: [True: a, d, g, h, j and k]; [False : b, c, e, f, i])

**PRACTICE PROBLEMS:**

16. Your factory buys and used a component for production at ₹ 10 per piece. Annual requirement is 2,000 numbers. Carrying cost of inventory is 10% p.a. and ordering cost is ₹ 40 per order. The purchase manager argues that as the ordering cost is very high, it is advantageous to place a single order for the entire annual requirement. He also says that if we order 2,000 pieces at a time we can get a 3% discount from the supplier. Evaluate this proposal and makes your recommendations.

**Ans:** Proposal of the purchase manager not acceptable because it increases cost by ₹ 10; buy 400 units (i.e., EOQ) at a time is not economical.

17. P Ltd. uses three types of materials A, B and C for production of 'X', the final product. The relevant monthly date for the components are as given below:

	A	B	C
Normal usage (in units)	200	150	180
Minimum usage (in units)	100	100	90
Maximum usage (in units)	300	250	270
Re-order Quantity (in units)	750	900	720
Re-order period (in months)	2 to 3	3 to 4	2 to 3

**Calculate for each component:**

- Re-order Level
- Minimum Level
- Maximum Level
- Average Stock Level

**Ans:**

A	900 units	1,000 units	810 units
B	400 units	475 units	360 units
C	1,450 units	1,600 units	1,350 units
D	775 units	925 units	its

18. The purchases and issues of material X in the month of January 2012, is as follows:

Jan.	3 Purchase	800 units @ ₹ 20 per unit
Jan.	8 Purchase	700 units @ ₹ 18 per unit
Jan.	9 Issue	600 units
Jan.	11 Issue	800 units
Jan.	17 Purchase	800 units @ ₹ 20 per unit
Jan.	25 Purchase	500 units @ ₹ 25 per unit
Jan.	31 Issue	1000 units

The standard price per unit of material is ₹ 20 fixed for the year 2012. Show the Stores Ledger entries and determine the price variance for the month of January.

**Ans:** Value of Stock on January 31, 2012 ₹ 9,100; Price Variance ₹ 1,100 Un-favourable

19. XYZ company buys in lots of 500 boxes which is a 3 month supply. The cost per box is ₹125 and the ordering cost is ₹150. The inventory carrying cost is estimated at 20% of unit value.

What is the total annual cost of the existing inventory policy?

How much money could be saved by employing the economic order quantity?

(Ans: Saving by adopting EOQ = ₹ 2,977)

20. Following information in an inventory problem is available:

Annual demand	8,400 units
Unit price (₹)	2.4
Ordering cost (₹)	4.0
Storage cost (₹)	2%
Interest rate	10% p.a.
Lead time	1/2 month

Calculate EOQ, Reorder level and total annual inventory cost. How much does the total inventory cost vary if the unit price is changed to ₹5 ?

**(Ans:** Variation in Inventory Cost = 42,201)

21. The following data relate to the manufacture of a standard product during the month of March, 2012.

Raw materials consumed	80,000
Direct wages	48,000
Machine hours worked	8,000
Office overhead	10% on works cost
Machine hour rate	₹4
Selling overhead	₹1.50 p unit
Units produced 4,000 and sold	3,600 @ ₹50 each.

Prepare Cost sheet.

(Ans: Profit : ₹ 16,200)

22. A cast iron foundry is importing forged steel moulds for making its castings. The moulds are of four different sizes A,B,C and D and their CIF values are US \$4,140; 4,160; 6,340, and 7,875 respectively. Customs duty may be assumed at 45% and clearing charges 5% of CIF value. The number of castings that can be made out of each mould is:

A - 1,000 B - 2,000, C - 1,800 and D - 1,500.

The weight of each casting out of A is 300 kg. B - 400 kg. C - 500 kg and D - 700 Kg. The casting suffer a normal rejection of 10%. You are required to calculate the average cost of mould per tonne of saleable casting.

(For conversion assume US \$ 1=₹ 8)

(Ans: Cost per tonne of saleable castings = A = ₹ 184; B = ₹ 69.33; C = ₹ 93.93; D = ₹ 100)

23. G Ltd. produces a product which has a monthly demand of 4,000 units. The product required a component X which is purchased at ₹ 20. For every finished product, one unit of component is required. The ordering cost is ₹ 120 per order and the holding cost is 10% p.a.

You are required to calculate:

Economic order quantity.

If the minimum lot size to be supplied is 4,000 units. What is the extra cost, the company has to incur?

What is the minimum carrying cost, the company has to incur?

(Ans: Minimum carrying cost = ₹ 2,400)

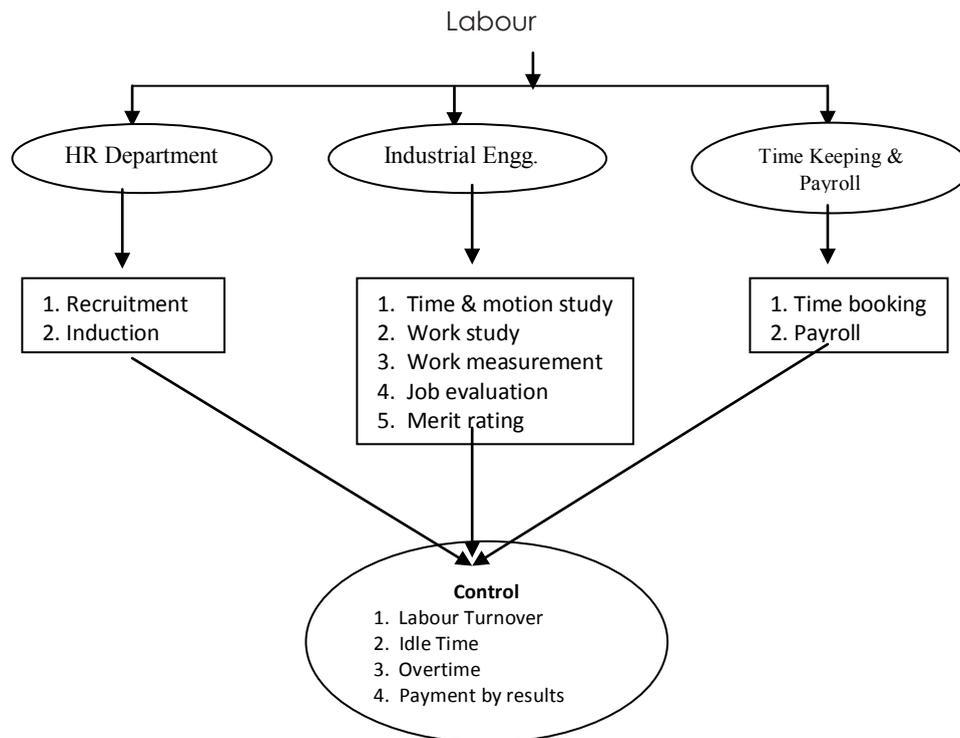
24. From the following data for the year ended 31<sup>st</sup> December, 2012, calculate the inventory turnover ratio of the two items and put forward your comments on them.

	Material A	Material B
	₹	₹
Opening stock 1.1.2012	10,000	9,000
Purchase during the year	52,000	27,000
Closing stock 31.12.2012	6,000	11,000

(Ans: Material A : 7 times; Material B : 2.5 times)

## 2.2 EMPLOYEE COSTS (CAS – 7)

Labour is an important element of cost and for overall cost control and cost reduction, Labour Cost is of paramount importance. Labour Cost is also called as Employee Cost. However, for control and reduction of Labour Cost, it is essential to compute the Labour Cost in a scientific manner and hence there should be proper systems and processes and documentation, which will help computation of Labour Cost in a scientific manner. It should be remembered that Labour is not like material as there is a human aspect involved in it. Therefore, there should be a comprehensive study of all related aspects of Labour Cost and then only computation and control over the same will be possible. Attention should also be paid to the productivity aspect. Low productivity results in higher Labour Cost per unit while higher productivity will reduce the Labour Cost per unit. All these aspects of Labour Cost are discussed in detail in this chapter. Study of Labour or Employee Cost can better be explained as follows:



As per CAS-7, Employee Cost is 'The aggregate of all kinds of consideration paid, payable and provisions made for future payments for the services rendered by employees of an enterprise (including temporary, part time and contract employees). Consideration includes wages, salary, contractual payments and benefits, as applicable or any payment made on behalf of employee. This is also known as Labour Cost.'

### Various aspects of Labour Cost Control

In the modern competitive environment, it is essential to make efforts for controlling and reducing the Labour Cost. Systematic efforts are required in order to achieve this target. The following steps will be useful in controlling and reducing the Labour Cost.

#### A. Classification of Labour cost:

The first step in the direction of controlling and reducing the Labour Cost is proper classification of the same. The Labour Cost is classified into Direct Cost and Indirect Cost. Direct Labour Cost is the cost that can be identified with a product unit. It can also be described as cost of all Labour incurred for altering the construction, composition or condition of the product. Indirect Labour Cost is the cost, which cannot

be identified with a product unit. It represents the amount of wages which is paid to the workers who are not directly engaged on the production but it includes wages paid to the workers and assistants working in departments like purchasing, store keeping, time office, maintenance, and other service and production departments. In other words, indirect wages are the wages paid to the workers who facilitate the production rather than actually engaged in production. The Direct Labour Cost can be charged directly to the job or product units and is included in the prime cost. Indirect Labour Cost is included in the overhead cost. Direct Labour Cost is variable in nature and can be controlled by strictly adhering to the norms and standards set by the management. Indirect Labour Cost can be controlled by establishing Labour budgets and comparing the actual Indirect Labour Cost with the budgeted Labour Cost. Any difference between the two is analysed carefully and suitable corrective action is taken.

**B. Production Planning:**

Effective control over the Labour Cost Can be achieved through proper production planning. Production planning includes activities like planning, scheduling, routing, machine loading, product and process engineering, work study etc. With the help of work study, time and motion study can be conducted which will help in fixation of standard time for a particular job. A comparison between the standard time and actual time is constantly made to find out the difference between the two. Suitable corrective action can be taken if it is noted that the actual time taken is constantly more than the standard time allowed for the job.

**C. Labour Budget:**

Budget and budgetary control are effective tools for cost control and cost reduction. A Labour budget can be prepared which will set the target for the Labour Cost which will again facilitate comparison between the Budgeted Labour Cost and the Actual Labour Cost.

**D. Labour Standards:**

Standards can be set for Labour Cost against which the Actual Labour Cost can be compared. Standard Labour Cost is the cost, which should have been incurred for producing a particular quantity of production. While fixing the Standard Labour Cost, use of time and motion study is made to fix up the standard time that should be taken for the actual production.

**E. Labour Performance Report:**

There should be a system of periodic Labour efficiency and utilisation reports. These reports will give an idea about the efficiency and productivity of the Labour.

**F. Incentive Schemes:**

Improving the Labour productivity is one of the important ways to reduce the Labour Cost per unit. Productivity can be improved by motivating the workers. Offering monetary and non monetary incentives can help to improve the productivity substantially. However, there should be a periodic review of the incentive schemes and therefore incentive schemes report should be prepared at periodic intervals.

**G. Labour Cost Accounting:**

There should be a proper cost accounting system, which will identify the Direct and Indirect Labour Cost. Similarly the cost accounting department should be able to generate and maintain records for time keeping, time booking, idle and overtime, impact of incentive schemes, per unit of Labour, cost due to Labour Turnover and other relevant records.

Thus from the above mentioned points, it will be clear that there is a need to control the Labour Cost and it can be done by the combined efforts of various departments.

**Principles of measurement of Labour Cost (CAS-7):**

The guide lines for ascertaining the Labour Cost / Employee Cost are as follows:-

- (a) Employee Cost shall be ascertained taking into account the gross pay including all allowances payable along with the cost to the employer of all the benefits

- (b) Bonus whether payable as a statutory minimum or on a sharing of surplus shall be treated as part of Employee Cost. Ex-gratia payable in lieu of or in addition to bonus shall also be treated as part of the Employee Cost.
- (c) Remuneration payable to managerial personnel including executive directors on board and other officers of a corporate body under a statute will be considered as part of the Employee Cost of the year under reference, whether the whole or part of the remuneration is considered as a percentage of profits.
- (d) Separation costs related to voluntary retirement, retrenchment, termination...etc shall be amortized over the period of benefitting from such costs.
- (e) Employee Cost shall not be included any Imputed Costs.
- (f) Any subsidy, grant, incentive or any such received or receivable with respect to any employee cost shall be reduced from ascertainment of Cost of the cost project to which such amounts are related.
- (g) Any abnormal cost where it is material and quantifiable shall not form part of the Employee Cost.
- (h) Penalties, damages paid to statutory authorities or other third parties shall not form part of the Employee Cost.
- (i) The cost of free housing, free conveyance and any other similar benefits provided to an employee shall be determined at the total cost of all resources consumed in providing such benefits. Any recovery from employees towards the facilities provided shall be reduced from the Employee Cost.
- (j) Cost of idle time is ascertained by the idle hours multiplied by the hourly rate applicable to idle employee or employee group.
- (k) Where Employee Cost is accounted at standard cost, variances due to normal reasons related to employee cost shall be treated as part of Employee Cost. Variances due to abnormal reasons shall be treated as part of abnormal cost.
- (l) Any change in the cost accounting principles applied for the determination of the Employee Cost should be made only if it is required by law or for compliance with Cost Accounting Standard or change would result in a more appropriate way of presentation of Cost Statement.

### **Control of Labour Cost**

Labour cost consists of the total amount of wages paid to the workers and other expenses related thereto. It includes hourly or piece-rates payable to the workers. It may be excessive due to inefficiency of labour force, high idle time and overtime payments, increase in spoilage, waste and defective production due to lack of supervision and inspection, high labour turnover and other matters. Therefore it is clearly seen that the control of labour cost is essential in every organization to cut down the cost of production and to improve the labour productivity/efficiency. The following departments play a vital role in Labour Cost Control :-

#### **(a) Human Resources Department**

This department is responsible for the execution of policies regarding appointment, discharge, transfer, promotion, classification of labour, wage and incentive systems, etc, which have been formulated by the board of directors or executive committee. It normally maintain detailed records of attendance, leave records, overtime and shift records from which various calculations of wages, allowances, overtime, incentives are made. Reports concerning labour turnover, recruitment, productivity, utilization, absenteeism as well as reports on labour cost, idle time, various cost ratios etc., are prepared here for submission to higher authorities for necessary action.

**(b) Engineering, Industrial Engineering Department**

This department helps to maintain control over working conditions, production methods, job performances by preparing plans and specification for each job scheduled for production, maintaining safety and efficient working conditions, initiating and supervising research and development activities, making method study, motion study, and time study, setting piece-rates, making job evaluation, merit rating and job analysis, measuring labour productivity and in general suggesting ways and means to improve labour efficiency/productivity thereby cutting down the effective labour cost.

**(c) Time Keeping Department**

The function of this department is mainly to keep, maintain the time for which each and every worker has worked including the check-in and check-out time. The records are kept separately for different shift and irregular working periods like overtime period. The records are such kept that the departments wise/product wise/process wise/ batch wise/job wise/operation wise allocation of labour cost is possible. The entire correctness of calculation of payroll, overtime payments, incentive payments, overhead allocation depend on the records maintained by this department and as such the importance of the functions rendered by this department cannot be over emphasised.

**(d) Payroll Department**

This departments is responsible for preparation of payroll and also basically to maintain records of job classification, department wage rates to prepare each man's earnings, to allocate those earnings to various cost centres to summarise various deductions and employers' share of provident fund, state insurance and other items, and also to summarise overtime payments and incentive payments wherever applicable.

**(e) Cost-Accounting Department**

This department is responsible for the accumulation and compilation of all cost data relating to the element Labour. It analyses the payroll cost to effectively render routine and special labour, cost reports thereby disclosing the amount of normal, and abnormal idle time, direct labour, indirect labour, overtime and departmental labour costs and variances between actual and standard labour costs. These reports are used by the top management to effectively control the labour cost and also to improve the labour productivity/efficiency.

**Labour Turnover**

Labour Turnover of an organisation is change in the labour force during a specified period measured against a suitable index. The rate of Labour Turnover in an industry depends upon several factors such as, nature of the industry, its size, location and composition of the labour force. A controlled level of Labour Turnover is considered desirable because it helps the firm to adjust the size of its labour force in response to needs such as for seasonal changes or changes in technology.

**Causes of Labour Turnovers:**

The causes giving rise to high labour turnover may be broadly classified under the following the heads:

- (i) Personnel Causes:** Workers may leave employment purely on personal grounds, e.g.,
  - (a) Dislike for the job, locality or environments.
  - (b) Domestic troubles and family responsibilities.
  - (c) Change of line for betterment.
  - (d) Retirement due to old age and ill health.
  - (e) Death.

In all such cases, personal factors count the most and employer can practically do nothing to help the situation.

- (ii) **Unavoidable Causes** : In certain circumstances it becomes obligatory on the part of the management to ask some of the workers to leave. These circumstances are:
- (a) Retrenchment due to seasonal trade, shortage of any material and other resources, slack market for the product, etc.
  - (b) Discharge on disciplinary grounds.
  - (c) Discharge due to continued or long absence.
- (iii) **Avoidable Causes**: Under this head, may be grouped the causes which need the attention of the management most so that the turnover may be kept low by taking remedial measures. The main reasons for which workers leave are:
- (a) Unsuitability of job.
  - (b) Low pay and allowance.
  - (c) Unsatisfactory working conditions.
  - (d) Unhappy relations with co-workers and unsatisfactory behaviour of superiors.
  - (e) Dispute between rival trade unions.
  - (f) Lack of transport, accommodation, medical and other factors.
  - (g) Lack of amenities like recreational centres, schools, etc.

The above causes may also be classified in a different manner under three heads, viz., Financial Causes, Social and Economic Causes and Psychological Causes relating to human relationship.

#### **Measurement of Labour Turnover:**

It is essential for any organisation to measure the Labour Turnover. This is necessary for having an idea about the turnover in the organisation and also to compare the Labour Turnover of the previous period with the current one. The following methods are available for measurement of the Labour Turnover:-

- (a) **Additions Method**: Under this method, number of employees added during a particular period is taken into consideration for computing the Labour Turnover. The method of computing is as follows.

$$\text{Labour Turnover} = (\text{Number of additions} / \text{Average number of workers during the period}) \times 100$$

- (b) **Separation Method**: In this method, instead of taking the number of employees added, number of employees left during the period is taken into consideration. The method of computation is as follows.

$$\text{Labour Turnover} = (\text{Number of separations} / \text{Average number of workers during the period}) \times 100$$

- (c) **Replacement Method**: In this method neither the additions nor the separations are taken into consideration. The number of employees replaced is taken into consideration for computing the Labour turnover.

$$\text{Labour Turnover} = (\text{Number of replacements} / \text{Average number of workers during the period}) \times 100$$

- (d) **Flux Method**: Under this method Labour Turnover is computed by taking into consideration the additions as well as separations. The turnover can also be computed by taking replacements and separations also. Computation is done as per the following methods.

$$\text{Labour Turnover} = \frac{1}{2} [\text{Number of additions} + \text{Number of separations}] / \text{Average number of workers during the period} \times 100$$

$$\text{Labour Turnover} = \frac{1}{2} [\text{Number of replacements} + \text{Number of separations}] / \text{Average number of workers during the period} \times 100$$

Increasing Labour Turnover is a double edged malady. It reduces the productivity of labour and resulting in high costs. The cost of Labour Turnover may be analyzed under two broad headings, Preventive Cost and Replacement Costs. Preventive Costs refer to all those items of expenditure which are incurred in order to keep the workers satisfied and thus to act as discouragement against leaving employment. Replacement Costs are those costs which are incurred for the recruitment and training of new hands and the resulting losses, wastages and lowering of productivity due to the inexperience and inefficiency of the new labour force.

**Preventive Costs may be further grouped under the following heads:**

**1. Personnel administration**

Most concerns would have a Personnel Department which is entrusted with recruitment, training, and other problems arising out of the employment of the labour force. Obviously, the entire expenditure of the department cannot be treated as labour turnover costs but a portion of the costs which related to the efforts of the Personnel Manager in maintaining good relationship between the management and the staff should be treated as Preventive Labour Turnover Cost. The labour force remains satisfied if properly looked after and if grievances are sympathetically considered.

**2. Medical Service (Preventive and Curative)**

Care for own health and that of family members gets prior consideration with the workers who prefer those concerns where medical services are available. Further, a healthy worker is an asset of the firm as he is able to make substantial contribution towards higher efficiency and productivity.

**3. Welfare activities and Schemes:**

These include facilities like subsidised canteens, co-operative store, laundry and washing services, sports, housing schemes, transport, and educational facilities. These facilities are as good as higher wages offering incentive to the worker to stay with the firm.

**4. Miscellaneous Schemes such as Pension or Provident Fund Schemes, Bonus, High Wage and Other Incentive Schemes**

Greater the advantage these prerequisites offer, the lower will be the rate of Labour Turnover.

**Replacement Costs consist of the following:**

**1. Loss of output due to delay in obtaining new workers**

As suitable workers may not be available readily, there is a time gap before a new worker can replace the old one. During this period, some output may be maintained by retaining surplus labour force to meet such contingencies or by working overtime. All such extra cost should be taken as labour turnover cost.

**2. Employment Department Expenses**

With the increase in the tempo of recruitment, additional work is thrown on the Employment or Personnel Department. Administrative expenditure is incurred for the selection, test and medical examination of the new hands for writing initial document like service records, fund accounts, etc.

**3. Induction Training for new workers**

Unless skilled workers are recruited (more likely on higher rates of pay ) who can be at right way put on jobs, the average worker has to be given some induction training before he is fit to be put on his assigned work. For certain categories of skilled and highly skilled jobs, intensive training for some period may be essential.

**4. Inefficiency of new workers**

The efficiency of new hands be generally low, productivity is reduced and cost increases.



### 5. Cost of tool and machine breakage:

While on training and the initial stages of work after completion of training, the worker is likely to break tools more frequently on account of his inexperience.

### 6. Cost of Scrap and Defective Work:

A new worker is likely to spoil work and although in most cases responsibility can be fixed on him and no wages paid for the scrapped work, the expenditure incurred on material and wages for the earlier operations done on the job becomes waste.

### 7. Cost of Accidents:

On account of his inexperience, the new worker is apt to disregard safety rules and he is thus more prone to accidents. It may be noted that the increases in labour costs due to high Labour Turnover contribute to create an inflationary trend in the industry.

Measures to reduce Labour Turnover:

Labour Turnover may be reduced by removing its avoidable causes and taking preventive remedial measures. The various measures may be summarised as follows:

- (i) Efficient, sympathetic and impartial personal administration.
- (ii) Effective communication system to keep the workers informed on matters that affect them.
- (iii) Improving working conditions and placing the right man on the right jobs.
- (iv) Job enrichment to reduce boredom and monotony and to provide job satisfaction.
- (v) Introducing fair rates of pay and allowance and incentives, pensions, gratuity, etc.
- (vi) Strengthening welfare measures.
- (vii) Augmenting recreational activities and schemes.

### Illustration 28

During October 2012, the following information is obtained from the Personnel Department of a manufacturing company. Labour force at the beginning of the month 1900 and at the end of the month 2100. During the month, 25 people left while 40 persons were discharged. 280 workers were engaged out of which only 30 were appointed in the vacancy created by the number of workers separated and the rest on account of expansion scheme. Calculate the Labour Turnover by different methods.

#### Solution:

Computation of Labour Turnover

Additions Method:

Number of Additions/Number of average workers during the period =  $280 / 2000 \times 100 = 14\%$

Separation Method:

Number of Separations/Number of average workers during the period =  $(25+40)/2000 \times 100 = 3.25\%$

#### Replacement Method:

Number of Replacements / Number of average workers during the period =  $30/2000 \times 100 = 1.5\%$

#### Flux Method:

$\frac{1}{2}$  [Number of Additions + Number of Separations] / Number of average workers during the period =  $[\frac{1}{2}(280 + 65) / 2000] \times 100 = 173/2000 \times 100 = 8.63\%$

**Note:** Average number of workers in all the above methods is computed by taking Opening number of workers + Closing number of workers / 2 =  $1900 + 2100/2 = 2000$

**Illustration 2**

The management of XYZ Ltd. is worried about the increasing Labour Turnover in the factory and before analyzing the causes and taking remedial steps; they want to have an idea of the profit foregone as a result of Labour Turnover during the last year. Last year's sales amounted to ₹83,03,300 and the profit/volume ratio was 20%. The total number of actual hours worked by the direct Labour force was 4.45 lakhs. As a result of the delays by the Personnel department in filling vacancies due to Labour Turnover, 1,00,000 potentially productive hours were lost. The Actual Direct Labour hours included 30,000 hours attributable to training new recruits, out of which, half of the hours were unproductive. The cost incurred consequent on Labour turnover revealed, on analysis the following. Settlement cost due to leaving: ₹43,820 & Recruitment costs: ₹26,740. Selection costs: ₹12,750, & Training costs: ₹30,490

Assuming that the potential production lost as a consequence of Labour Turnover could have been sold at prevailing prices, find the profit foregone last year on account of Labour Turnover.

**Solution:**

We will have to calculate the profit foregone by calculating the amount of contribution lost and the additional cost that was incurred as a result of the Labour Turnover. This is done in the following manner.

I. Actual productive hours: Actual hours worked – Unproductive training hours

$$= 4,45,000 - 15,000 [50\% \text{ of } 30,000]$$

$$= 4,30,000 \text{ actual productive hours.}$$

II. Total hours lost: 1,00,000 hrs

$$\text{Sales lost } [₹83,03,300 \times 1,00,000] / 4,30,000 = ₹19,31,000$$

$$\text{Loss of contribution} - 20\% \text{ of } ₹19,31,000 = ₹3,86,200$$

**Statement Showing Profit Foregone**

	₹
Contribution lost:	3,86,200
Settlement cost due to leaving:	43,820
Recruitment cost:	26,740
Selection cost:	12,750
Training cost:	<u>30,490</u>
Profit foregone:	<u>5,00,000</u>

**Time Keeping:**

Like Personnel Department, this department also plays an important role in labour cost control through maintaining record of each worker's time in and time out during regular working period and reporting the time of each worker for each department, operation or production order. Thus this department is responsible for recording the attendance time of each worker accurately. This will ensure punctuality and discipline in the company and will have a positive impact on the morale of each worker. Time keeping is a statutory requirement also and therefore accurate recording of time should be ensured. The important role of time keeping from the point of view of labour costing and control can be summarized as given below:

- (a) It shows the total number of hours worked by each workman and so the calculation of his wage becomes possible. This is applicable where the workers are paid wages as per the time rate.



- (b) Time keeping promotes punctuality and discipline amongst the workers. In the absence of the time keeping system, there will be not only indiscipline amongst them but the workers who are otherwise punctual and disciplined will be frustrated.
- (c) Certain benefits like pension, gratuity and leave with pay, provident fund, promotion, and salary scale are linked with the continuity of service. Attendance records in this regard, can be helpful in computation of these benefits.
- (d) Computation of Labour hours becomes possible through time keeping records. This will be useful in overhead apportionment and absorption, which may be made on the basis of Labour hours.
- (e) Time keeping is a statutory requirement under Labour laws.
- (f) The time keeping records can be used for further analysis like for fixation of standard time and finding out idle time as well as the efficiency of Labour. It can be used by researchers as well as by Government Authorities for various purposes.

### Methods of Time Keeping

The above-mentioned points highlight the importance of the time keeping. The question that we have to answer now is that what are the methods of time keeping? The answer to this is given in the following paragraphs. The methods of time keeping are explained below.

- (1) Time Recording Clocks or Clock Cards:** This is mechanized method of time recording. Each worker punches the card given to him when he comes in and goes out. The time and date is automatically recorded in the card. Each week a new card is prepared and given to the worker so that weekly calculation of wages will be possible. If wages are paid on monthly basis, a new card may be given in each month. Due to advancement of technology, giving a new card each month is also not required as the same card continued till the worker either leaves the service or retires from the service. The only limitation of this method, [in fact it is the limitation of all the methods of time keeping] is that though the time in and time out are recorded, the records do not show the productive time of the worker, i.e. how he has spent the time in the factory. Thus if a worker comes in at 8 am and leaves at 5 pm, he has spent 9 hours in the company, which can be ascertained from the time keeping records. However, how he has spent time, is not be shown by these records. For showing the productive time, separate records showing time booking are to be prepared. The time booking records can also be combined with time keeping records so that there is no need to keep dual records.
- (2) Disc Method:** This is one of the older methods of recording time. A disc, which bears the identification number of each worker, is given to each one. When the worker comes in, he picks up his disc from the tray kept near the gate of the factory and drops in the box or hooks it on a board against his number. Same procedure is followed at the time of leaving the factory. The box is removed at starting time, and the time keeper becomes aware of late arrivals by requiring the workers concerned to report him before starting. The time keeper will record in an Attendance Register any late arrivals and workers leaving early. He will also enter about the absentees in the register on daily basis. The main limitation of this method is that there is a possibility of marking the attendance of a worker by his friend i.e. by a proxy. Secondly if the number of workers is large, there will be a delay in recording time due to manual operation of this system.
- (3) Attendance Records:** This is the simplest and the oldest method of marking attendance of workers. In this method, every worker signs in an attendance register against his name. Leaves taken by workers as well as late reporting is marked on the attendance register itself. The main limitation of this system is that in case there is large number of workers, there may be large queues for signing the muster. Similarly there is little control over marking the attendance time and hence there may be irregularities in time recording.

### Time Booking:

In time keeping we have seen that the basic objective of time keeping is to mark the attendance time, i.e. time in and time out. Time keeping aims at keeping a check on the number of hours spent by a worker in the factory. However, it does not record the productive time of the workers. It means the time keeping methods do not provide information about how the time is spent by the workers in the factory. For example, the time keeping record will show that the worker has reported for duty at 8 am and left at 6 pm, thus, he has spent 10 hours in the company. But the analysis of these 10 hours is not provided by the time keeping. In view of this there is a need to have a system, which will tell about the productive time spent by the workers in the factory. The method, which supplies this information, is known as 'Time Booking Methods' and the recording the time spent by a worker in each job, process or operation is known as 'Time Booking'. The objects of time booking are as follows:-

- (i) To determine the productive time spent by the worker on the job or operation. This helps in finding out the idle time and controls the same.
- (ii) To determine the quantity and value of work done.
- (iii) To determine earnings like wages and bonus.
- (iv) To determine the efficiency of workers.

### Time Booking Methods

The following methods are used for time booking:-

- 1) **Daily Time Sheet:** In this method, each worker records the time spent by him on the work during the day, for which a sheet is provided to each worker. The time is recorded daily and hence accuracy is maintained. However, the main limitation of this method is lot of paper work is involved as daily sheets are maintained on daily basis by each worker.
- 2) **Weekly Time Sheets:** The only difference between the daily time sheet and weekly time sheet is that these time sheets are maintained on weekly basis. This means that each worker prepares these sheets weekly rather than daily. This helps in reducing the paper work to a great extent.  
  
The only care to be taken is that since the information is filled up on daily basis, there may be inaccuracies and hence filling the information should be done on daily basis only.
- 3) **Job Ticket:** Job tickets are given to all workers where time for commencing the job is recorded as well as the time when the job is completed. The job tickets are given for each job and the recording of the time as mentioned above helps to ascertain the time taken for each job. After completing one job, the worker is given another job.
- 4) **Labour Cost Card:** This card is meant for a job, which involves several operations or stages of completion. Instead of giving one card to each worker, only one card is passed on to all workers and time taken on the job is recorded by each one of them. This card shows the aggregate labour cost of the job or the product.
- 5) **Time and Job Card:** This card is a combined record, which shows both, the time taken for completion of the job as well as the attendance time. Therefore there is no need to keep separate record of both, time taken and attendance time.

Thus we may distinguish time keeping and time booking, that the time keeping is simply maintaining attendance of the workers i.e the time of arrival and the time of departure and there by the time spent by the worker in the organization is measured, where as time booking is not only maintaining the time spent by the workers in the organization, but also the time spent on each & every job including the idle time with reasons are recorded.

## Work Study

In order to motivate workers, it is necessary to design a proper incentive system of payment of wages. Money is the strongest motivating factor and hence monetary incentive system become essential. In any incentive system, the bonus is paid by comparing the standard performance/production with the actual performance, i.e. actual production. Bonus is paid if the actual performance is higher than the standard one. However, for deciding the standard performance, standard time, i.e. time that is allowed doing a particular job should be fixed against which the actual time taken should be compared. The Work Study which includes, the Job Study, and the Method Study ensures the fixation of standard time to do a particular job and thus has become extremely important in the designing of the incentive system. Work Study components are discussed below.

### Method Study

Method Study is done to improve the methods of production and to achieve the most efficient use of the resources like, manpower, machines and materials. Method Study has the following stages:-

- (a) Method Study is generally conducted for the jobs, which involve complex operations as well as costly operations. Hence the first step is to select jobs, which are having complexity of operations.
- (b) There should be a detailed study of related aspect of the selected job. Information about the job like, purpose, location, sequence, relationship with other work, methods of working, operators, requirement of skilled workers, facilities required etc. should be collected.
- (c) The crucial step is that after studying the relevant aspects of the job, there should be development of the improved method of doing the job. An improved method of job might change the location and sequence of the work, methods of production and the layout for the job. The improved method will result in more efficiency, more simplicity and effectiveness and job will be done in a better manner.
- (d) The developed method should be applied in doing the job.
- (e) For any new method, a follow up is always required. For method study also a constant follow up is necessary to ensure that the method selected is implemented properly. Thus method study ensures efficient use of resources by reducing unnecessary work and helps to achieve highest production.

### Work Measurement

The Work Measurement aims at determining the effective time required to perform a job. The ineffective, wasteful or avoidable time is separated from required time to complete the work. The effective time so established in work measurement can be used for the following purposes:-

- (a) Incentive wage schemes which require data about the time allowed and time taken for a particular job.
- (b) Improving utilization of men, machines and materials.
- (c) Assisting in production control.
- (d) Assisting in setting labour standards.
- (e) Cost control and reduction.

The following stages are involved in work measurement:-

- (i) Selection of work.
- (ii) Measuring the actual time taken in the work done.
- (iii) Making comparison between the standard time and the actual time.

### Job Evaluation

It is necessary for the management of any organization to establish proper wage and salary structure for various jobs. For doing this in a scientific manner, it is necessary to determine the relative value of jobs and hence a job evaluation is done. Job Evaluation is a technique of analysis and assessment of jobs to determine their relative value within the firm. It aims at providing a rational and equitable basis for differential salaries and wages for different classes of workers. Job Evaluation has the following objectives:-

- (a) It helps in developing a systematic and rational wage structure as well as job structure.
- (b) Job Evaluation aims at removing the controversies and disputes relating to salary between the employers and employees. Thus the employees and also the employer remain satisfied.
- (c) Another important objective of Job Evaluation is to bring fairness and stability in the wage and salary structure so as to ensure full cooperation of workers in implementing various policies of the employers.
- (d) Job Evaluation discloses characteristics and conditions relating to different jobs. This is very useful at the time of recruiting of workers as only suitable workers can be recruited. This avoids square pegs in round holes.

### Methods of Job Evaluation

Methods of job evaluation are as follows:-

**(1) Point Ranking Method:** In this method each job is analyzed in terms of various job factors or characteristics. The characteristics are skills required, efforts involved, working conditions, hazards, responsibility and so on. In other words the job factors are the requirements needed for performing the job effectively. Each job factor is given weightage or points depending upon its value for the job. For example, for certain jobs, maximum value is assigned to experience while for some jobs, education may be the most crucial factor. Finally each job is ranked in the order of points or weights secured by them. The wage structure can be suitably designed according to the points assigned to each job. The method is quite sound in principle but difficulties may be faced assigning the weights to each job.

**(2) Ranking Method:** In this method, jobs are ranked in order of importance on the basis of skills required, experience requirements, working conditions etc. Jobs are rearranged in an order, which can be either from the lowest to the highest or in the reverse. Wage scales are determined in terms of ranks. Though this method is quite simple to operate and less costly as well as easy for understanding, it is suitable when the size of the organization is small and jobs are few and well defined. In a large organization, where jobs are quite complex, this method is not beneficial.

**(3) Grading Method:** This method is an improvement over the ranking method. Under this method, each job is analyzed in terms of a predetermined grade and then assigned a grade or class. Grades are established after making an investigation of job factors, such as complexity in the job, supervision, responsibility, education etc.

### Merit Rating

Job Evaluation is the rating of the job in order to bring rationality in the wage and salary structure in the organization. On the other hand Merit Rating is the comparative evaluation and analysis of individual merits of the employees. The Merit Rating aims at evaluation and ranking the individual employees in order to plan and implement rational promotional policies in the organization. Merit Rating has the following objectives:-

- (a) To evaluate the merit of an employee for the purpose of promotion, increment, reward and other benefits.
- (b) To establish and develop a wage system and incentive scheme.



- (c) To determine the suitability of an employee for a particular job.
- (d) To analyze the merits or limitations of a worker and help him to develop his capability and competence for a job.
- (e) To examine characteristics like cooperation, quality of work done, attendance and regularity, education, skill, experience, character and integrity and initiative.

Thus it can be understood that Merit Rating is extremely useful for organizations for evaluating the employees. However the main limitations are that the rating can be subjective which will give rise to the disputes and there is a possibility that past performance of an employee may be given too much importance.

### **Difference between Merit Rating and Job Evaluation**

The difference between the Merit Rating and Job Evaluation are as follows:-

- (a) Job Evaluation is the assessment of the relative worth of jobs within a business enterprise and Merit Rating is the assessment of the employees with respect to a job.
- (b) Job Evaluation helps in establishing a rational wage and salary structure. On the other hand, Merit Rating helps in fixing fair wages for each worker in terms of his competence and performance.
- (c) Job Evaluation brings uniformity in wages and salaries while Merit Rating aims at providing a fair rate of pay for different workers on the basis of their performance.

### **Time And Motion Study**

The study of time and motion is essential for designing an incentive system. Time Study determines the time to be spent on the job. Standard time is the time that should be taken for completing a particular job under standard or normal working conditions. For fixation of standard time, Motion Study is necessary. Thus, the Motion Study precedes the Time Study. Motion Study means dividing the job into fundamental elements or basic operations of the job or process and studying them in detail to eliminate the unnecessary elements or motions. After investigation all movements in a job, process or operation, the Motion Study aims at finding out the most scientific and systematic way of performing the job. After eliminating unnecessary motions, the time that should be taken to perform these motions is decided with the help of a stop-watch. In the time so fixed, some allowance is added in the same for normal idle time, which is due to fatigue, change of job, change of tools, and preventive maintenance of machines and so on. Thus standard time for a job or process is arrived at. The Time and Motion Study aims at:-

- (a) Eliminating unnecessary motions, thereby reducing inefficiency.
- (b) Improving methods, procedures, techniques, and processes relating to a job.
- (c) Effective utilization of men, material, machines and time.
- (d) Improving working environment, layout and design of plant and equipment.

The following are the benefits of Time and Motion Study:-

- (a) Effective utilization of resources like men, material, machine and time.
- (b) Helps in assessment of labour.
- (c) Helps in designing incentive system as many of the incentive systems are based on standard time.
- (d) Preparation of labour budget.
- (e) Proper planning of production for preparation of production budget.
- (f) Helps in improving labour productivity by designing best method for performing a job or process.
- (g) Improvement of work methods.

### **Payroll Department**

Roll of Payroll Department is of crucial importance in overall Labour Cost computation and control. The main responsibilities of this department are preparation of payroll from clock cards, job or time tickets, or time sheet. The payroll shows the amount of wages payable to each worker showing the gross wages payable, the deductions and the net wages payable. For doing this calculation, they have to work in collaboration with the time office, personnel department, Cost Accounting department and with the concerned department in which the worker is working. The functions of this department are given below:-

- (a) To compute the wages of the employees
- (b) To prepare a detailed wages sheet showing the gross wages payable, various deductions and other payroll liabilities.
- (c) To maintain individual employee payroll records.
- (d) To prepare department wise summaries of wages.
- (e) Compilation of Labour statistics for management.
- (f) To install and implement an effective internal check system for preventing frauds and irregularities in payment of wages.
- (g) To detect and prevent ghost workers.

### **Cost Accounting Department**

The Cost Accounting department is responsible for analyzing the Labour Cost for the purpose of computation and control of the same. It is responsible for the accumulation and classification of all cost data of which Labour Cost is one of the important components. The Cost Accounting department classifies the Labour Cost into direct and indirect, compares the actual Labour Cost with the budgeted cost, compute unit Labour Cost and compiles the data for further analysis of the Labour Cost. The data generated can be useful for the management in taking decisions.

### **Idle Time Cost**

Idle Time Cost represents the wages paid for the time lost during which the worker does not work, i.e time for which wages are paid, but no work is done. *As per CAS-7, Idle Time is 'The difference between the time for which the employees are paid and the employees time booked against the cost object'*. This happens because due to various causes for which he is not responsible, the worker remains idle but full wages are paid to him. Even for workers who are paid on the basis of output, idle time payment may be required to be made.

The causes leading to idle time may be broadly classified into four categories, viz. :-

- (i) *Normal, inherent or unavoidable idle time*: Time lost between the gate and place of work, break for tea, time interval between one job and another, time for tool setting, adjustment of machine, etc.
- (ii) *Normal idle time* such as waits for jobs, tools, materials or instructions, small power failures, small breakdown of machines and tools, and atmospheric conditions.
- (iii) *Abnormal idle time* such as those arising due to breakdown for considerable period, non-availability of raw materials, slack supervision, strikes or lock-outs, fire flood, storm, etc.
- (iv) *Concealed idle time* such as manipulation of job breaking, wastage of time due to under-employment, i.e., unnecessary work like cleaning, grass cutting and gardening to employ idle men, and employment of skilled workers on unskilled jobs.

Idle time should not be booked directly to jobs or production orders because such a practice not only increases the cost of direct labour, but also vitiates comparison of idle time costs from time to time. In



booking of time, idle or waiting time should not normally record in the job card but on separate idle time cards. Separate cards or registers may be provided for recording idle time according to the causes which give rise to it.

### **Treatment of Idle Time**

As per CAS-7, *Idle Time Cost shall be assigned direct to the cost object or treated as overheads depending on the economic feasibility and specific circumstances causing such idle time.*

Treatment of different categories of Idle Time are as below:-

- (a) Unavoidable idle time above would be for insignificant periods. In Cost Accounts, this is allowed to remain merged in the Production Order or Standing Order Number on which the worker was otherwise employed.
- (b) Normal Idle Time is booked to factory or works overhead. For the purpose of effective control, each type of idle time, i.e., idle time classified according to the causes is allocated to a separate Standing Order Number.
- (c) Abnormal Idle Time would usually be heavy in amount involves longer periods and would mostly be beyond the control of the management. Payment for such idle time is not included in cost and is adjusted through the Costing Profit and Loss Account or included in Profit and Loss Account, when the accounts are integrated.
- (d) Tendency to conceal Idle Time should be discouraged. It is a non-effective time and the resultant loss of profit due to reduced production activity but also increases the cost per unit of production as the fixed costs continue to be incurred, irrespective of the reduced quantum of production due to loss of labour time. Idle Time should, therefore, be highlighted prominently so that action can be taken to remove the causes thereof. Although for obvious reasons, it is not possible to record minor details, vigilance is necessary for finding out long-term idleness among the workers.

### **Idle Time Preventive Measures**

Idle Time may be eliminated or reduced to a large extent by taking suitable preventive measures such as (a) proper planning of production in advance, thus reducing imbalances in production facilities, (b) timely provisioning of materials, (c) regular maintenance of machines so as to avoid breakdown, and (d) careful watch over the labour utilization statement. The remedial measure to be taken will, no doubt, depend upon the particular factor or situation which caused the Idle Time.

### **Overtime Wages / Overtime Premium**

The Factories Act provides for payment of overtime wages at double usual rates of wages. Even where the Act is not applicable, the practice is to pay for overtime work at higher rates usually in accordance with a standing agreement between the employer and the workers. Hence, payment of overtime consists of two elements, viz., the normal (i.e., usual) amount and the extra payment, i.e., the premium. As per CAS-7, the overtime. Overtime premium is defined as '*Overtime is the time spent beyond the normal working hours which is usually paid at a higher rate than the normal time rate. The extra amount beyond the normal wages & salaries paid is called Overtime Premium*'.

### **Treatment of Overtime in Cost Records**

As per CAS-7, *Overtime Premium shall be assigned directly to the cost object or treated as overheads depending on the economic feasibility and specific circumstances requiring such overtime.*

When overtime is worked due to exigencies or urgencies of the work, the basic / normal payment is treated as Direct Labour Cost and charged to Production or cost unit on which the worker is employed. Whereas the amount of premium (extra amount) is treated as overhead.

If overtime is spent at the request of the customer, then the entire amount (including overtime premium) is treated as direct wages and should be charged to the job.

When the overtime is worked due to lack of capacity as general policy of the company, then the total amount paid is treated as direct wages which is computed at the estimated rate based on the figures of the previous years.

Overtime worked on account of the abnormal conditions such as flood, earthquake, etc., should not be charged to cost, but to costing Profit and Loss Account if integrated accounts are maintained.

It will thus be seen that overtime involves payment of increased wages and should be resorted to only when extremely essential. The disadvantages attached to overtime working are as follows :

- (a) It involves excess labour cost.
- (b) There is decrease in productivity. Output is usually proportionate to the excess time worked as efficiency during late hours is diminished.
- (c) Work in the evenings increases lighting cost.
- (d) Continuous work for long periods leads to fatigue and defective work.
- (e) It falls upon the health of the workers.
- (f) Overtime work if not properly distributed among the workers may lead to discontentment.
- (g) There is an unusual strain on plant and machinery.
- (h) Once overtime is resorted to for some time, the workers take the overtime wages as part of their normal earnings and resist future attempts to discontinue overtime work.
- (i) There is a tendency to keep the work pending to be done during overtime period or to intentionally slow down in order to compel the management to sanction overtime.

It may, however, be said in favour of overtime work that it increases the productive capacity of the concern as more work is done with the existing resources. Overtime work is particularly useful in pulling up backlog in production arising due to shutdown, breakdown, power failure and such other contingencies.

Though overtime work cannot be completely eliminated, it is essential that proper control should be exercised to keep it to the minimum. The following steps should be taken to control the Overtime:

- (a) All overtime work should be duly authorised after investigating the necessity thereof.
- (b) Overtime cost should be recorded separately and shown against the department incurring it. This will enable proper investigation and planning of production in future.
- (c) If overtime tends to be a permanent feature, the necessity of recruiting more men and shifting working should be considered.
- (d) If overtime is due to lack of plant or machinery or other resources, steps may be taken to install more machines, or to give subcontracts alternatively, to restrict production so as to complete it within the normal time.

### **General principles in designing the system of remuneration to Employee**

Remuneration is the reward for labour under normal circumstances and is generally based on either time spent or on the result produced. The former is called "time-related" remuneration and the latter is known as "Piece-related" remuneration. The fixation of method of remuneration in a proper manner is vitally important for any organisation because it deals with the most sensitive item of the input, i.e., Labour.

The general principles which should be considered in designing a proper method of labour remuneration is summarized below:-

- (a) The basis should be simple to understand and the various segments of the system, should clearly mention in detail.



- (b) The employees should be able to accept the method without any doubts or hesitation in their mind.
- (c) The method should be flexible enough to adopt any changes or variation which may become inevitable at a later stage.
- (d) The method should be able to cut down/stabilize the labour turnover which is often caused due to unsatisfactory or unacceptable method of remuneration.
- (e) The method should assure fair wages to the employees so that both the employers and the employees can gain by such methods, the former by way of higher productivity and the latter by way of higher earnings.
- (f) Incentive payments should be a part of the method of remuneration with a view to increase the labour productivity.
- (g) The method should be able to minimise the level of absentees so that avoidable wastages in labour cost can be reduced.
- (h) The method should ultimately result into higher production and improved quality of the output.

### **Methods of Wages Payment**

One of the important components of Labour Cost Control is the wages system. A system of wage payment, which takes care of both, i.e. providing guarantee of minimum wages as well as offering incentive to efficient workers helps to motivate the workers to a great extent. It should also be remembered that high wages do not necessarily mean high labour cost because it may be observed that due to high wages the productivity of workers is also high and hence the per unit cost of production is actually decreased. On the other hand, if low wages are paid, it may result in lower productivity and hence higher wages do not necessarily mean high cost.

The following are the various methods of payment of wages.

#### **A. Time Rate System**

- (a) At ordinary levels.
- (b) At high wage levels and
- (c) Graduated Time Rate.

#### **B. Piece Rate**

- (a) Straight Piece Rate.
- (b) Piece Rate with Guaranteed Day Rates and
- (c) Differential Piece Rates.

#### **C. Bonus Systems**

- (a) Individual Bonus for Direct Workers.
- (b) Group Bonus for Direct Workers and
- (c) Bonus for Indirect Workers.

#### **D. Indirect Monetary Incentives**

- (a) Profit Sharing and
- (b) Co-partnerships.

**E. Non monetary incentives like job security, social and general welfare, sports, medical facilities etc.**

These methods are discussed in the following paragraphs:-

**A. Time Rate Method**

**Time Rate at Ordinary Levels**

Under this method, rate of payment of wages per hour is fixed and payment is made accordingly on the basis of time worked irrespective of the output produced. However, overtime is paid as per the statutory provisions. The main benefit of this method for the workers is that they get guarantee of minimum income irrespective of the output produced by them. If a worker is not able to work due to genuine reasons like illness or physical disability, he will continue to get the wages on the basis of time taken for a particular job. This method is used in the following situation:-

- (a) Where the work requires high skill and quality is more important than the quantity.
- (b) Where the output/services is not quantifiable, i.e. where the output/services cannot be measured.
- (c) Where the work done by one person is dependent upon other person, in other words where a individual worker has no control over the work.
- (d) Where the speed of production is governed by time in process or speed of a machine.
- (e) Where the workers are learners or inexperienced.
- (f) Where continuous supervision is not possible.

The main advantage of this method is that the worker is assured of minimum income irrespective of the output produced. He can focus on quality as there is no monetary incentive for producing more output. However, the main limitation of this method is that it does not offer any incentive to the efficient workers. Efficient and inefficient workers are paid at the same rate of wages and hence there is a possibility that even an efficient worker may become inefficient due to lack of incentive.

**Time Rate at High Wage Levels**

This system is a variation of time rate at ordinary levels in the sense that in this system, workers are paid at time rate but the rate is much higher than that is normally paid in the industry or area. In this method, the workers are paid according to the time taken and overtime is not normally allowed. This method offers a very strong incentive to workers and it can attract talented workers in the industry. However, care should be taken that productivity also increases; otherwise the cost will go on increasing.

**Graduated Time Rate**

Under this method payment is made at time rate, which varies according to personal qualities of the workers. The rate also changes with the official cost of living index.

Thus this method is suitable for both employer and employees.

**B. Piece Rate Method**

This method is also called as payment by results where the workers are paid as per the production achieved by them. Thus if a worker produces higher output, he can earn higher wages.

Under the piece rate system of wage payment the workers receive a flat rate of wages either for time worked or for units manufactured.

The advantages of such a system are summarised below:-

- (a) As the workers are paid on the basis of the results, i.e., for each unit produced, job performed or number of operations completed, there is a tendency on their part to increase their production so that they may earn more wages.
- (b) The increased production thus achieved results in the reduction of overhead expenses per unit of production even though total overheads may increase. The increase in overheads will be relatively small as compared to the increase in turnover.
- (c) The wages being paid on the basis of production, the management know the labour cost per unit or per job.
- (d) The workers are rewarded for their efficiency because the inefficient workers will not get as much as the efficient workers.
- (e) The workers are very careful in handling their tools and machinery, etc., because on the proper maintenance of these depends their higher efficiency and in turn, their higher wages.
- (f) This method is very simple to operate.

The Disadvantages on the other hand are as follows:-

- (a) It is not easy to determine the piece work rate on an equitable basis. When a rate has been fixed and later on it is found to be too high, it is very difficult to reduce it as its reduction will cause dissatisfaction and friction among the workers.
- (b) As the labour cost per unit remains the same, the employees do not gain as a result of increase in productivity except to some extent in the form of reduction in overheads. As such if the overhead expenses per unit are relatively small, the advantage to the employer will not be significant.
- (c) Sometimes quantity may increase at the cost of quality. For the reason, a strict inspection has to be maintained in the form of quality control. This will result into additional expenditure.
- (d) Materials may be used in excessive quantities and may be handed carelessly on account of the workers' efforts to achieve high output.
- (e) This method may cause discontentment amongst those who are slow and those who are paid on time basis.
- (f) The workers may in an attempt to increase production, handle the machines carelessly causing major damage or breakdown.

The following are the variations of this method.

### **Straight Piece Rate**

In this method, rate per unit is fixed and the worker is paid according to this rate. For example, if the rate per unit is fixed at ₹10, and the output produced is 300 units, the remuneration to the worker will be ₹10 X 300 units = ₹3,000. This method thus offers a very strong incentive to the workers and is particularly suitable where the work is repetitive. The benefits of this method are as follows:-

- (a) The method is simple and provides a very strong incentive to the workers by linking the monetary reward directly to the results.
- (b) Productivity can be increased substantially if the rate of pay includes a really adequate incentive.
- (c) Higher productivity will result in lowering the cost per unit.

However, the main limitation of this method is that if a worker is not able to work efficiently due to reasons beyond his control, he will be penalized in the form of lower wages.

### Differential Piece Rates

Under these methods, the rate per standard hour of production is increased as the output level rises. The increase in rates may be proportionate to the increase in output or proportionately more or less than that as may be decided. In other words, a worker is paid higher wages for higher productivity as an incentive. The rate per unit will be higher in this case as compared to the rate paid to a worker with lower productivity. For deciding the efficiency, comparison is made between the standard production and actual production of the worker. If the actual production is more, the worker qualifies for higher rate of wages. The Differential Piece Rate methods will be useful when the production is of repetitive type, methods of production are standardized and the output can be identified with individual workers. The following are the major systems of differential piece rate system:-

(i) Taylor (ii) Merrick (iii) Gantt Task and Bonus

#### Taylor's Differential Piece Rate System

Taylor is regarded as father of scientific management and he has recommended a system of Differential Piece Rate. According to him, there are only two classes of workers, efficient and inefficient. He suggests that while efficient workers should be encouraged to the maximum possible extent, the inefficient workers should be penalized. In order to do this, he has suggested two rates for the two classes of workers. Thus according to Taylor, if the workers are efficient, they should be paid @ 120% of the normal piece rate and if they are inefficient, they should be paid @ 80% of the normal piece rate. For measuring efficiency, each worker will be given a standard production quantity to be produced in the time allowed and the actual production should be compared with the same. If a worker exceeds the standard, he will be regarded as efficient while if he fails to do so, he will be regarded as inefficient. The positive and negative points of this system are as follows:-

#### Merits:-

- (a) There is a very strong incentive to the workers, which helps to achieve higher productivity.
- (b) Due to the incentive, best workers are attracted to the company.
- (c) This method is quite simple and hence easy to understand.

#### Limitations:

- (a) Slow workers and beginners are penalized severely. Similarly workers get penalized for reasons beyond their control, e.g. medical reasons, accidents etc. Therefore it is said that there is no human element in this system.
- (b) In an anxiety to produce more, quality may be neglected in order to achieve higher quantity of production.

#### Illustration 30

From the following particulars, calculate the earnings of workers X and Y and also comment on the labour cost.

Standard time allowed: 20 units per hour

Normal time rate: ₹30 per hour

Differential Rate to be applied:

80% of piece rate when below standard

120% of piece rate at or above standard

In a particular day of 8 hours, X produces 140 units while Y produces 165 units.

**Solution:**

Standard production per day is 20 units × 8 hours = 160 units

Worker 'X' produces 140 units which means he is below standard and will get wages @ 80% of the normal piece rate.

**X's earnings:**

Normal piece rate = ₹30 per hour/20 units = ₹1.5 per unit

80% of the normal piece rate = ₹1.20 per unit

Earnings = ₹1.20 × 140 units = ₹168

Labour cost per unit = ₹168/140 units = ₹1.20

**Y's Earnings:**

Y has produced more than the standard production of 160 units and hence he will get wages @ 120% of normal piece rate. His earnings will be as shown below.

Normal piece rate = ₹30 per hour/20 units = ₹1.50 per unit

120% of normal piece rate = ₹1.80 per unit

Earnings = ₹1.80 × 165 units = ₹297

Labour cost per unit = ₹297/165 units = ₹1.80

**Comment:** Labour cost increases from ₹1.20 per unit to ₹1.80 per unit. Taylor's system is resisted on this ground as well as on the ground that it is very harsh on the workers.

**Merrick Differential Piece Rate System**

Merrick's system is modification of Taylor's system and is comparatively less harsh on the workers. The scale of remunerations is as follows:-

**Production Rates of Payment**

Up to 83% of production - Normal piece rate

83% to 100% of production - 110% of ordinary piece rate

Above 100% of production - 120% of ordinary piece rate

As mentioned earlier, this method is less harsh on the workers as compared to Taylor's system. It is particularly useful to beginners and also offers an incentive who have potential of higher productivity.

**Gantt Task Bonus Plan**

In this method, there is a combination of time rate, bonus and piece rate plan. The remuneration is computed as shown below:

Production below standard - Guaranteed time rate

Production at standard - Bonus of 20% [normally] of time rate

Production above standard - High piece rate for the entire output

This method assures minimum wages for even too less efficient workers and hence is a preferred method of payment of wages. It also offers reasonably good incentive to efficient workers. However, the main limitation is that the method is complicated to understand by the workers and hence may create confusion amongst them.

**Illustration 31**

X, Y and Z are three workers working in a manufacturing company and their output during a particular 40 hours week was 96, 111 and 126 units respectively. The guaranteed rate per hour is ₹10 per hour, low piece rate is ₹4 per unit, and high piece rate is ₹6 per unit. High task is 100 units per week. Compute the total earnings and labour cost per unit under Taylor, Merrick and Gantt Task Bonus Plan.

**Solution:****a) Taylor Plan:**

High task is 100 units

Worker X = Actual output is 96 units, which is less than the standard. This means he is inefficient and will get 80% of the normal piece rate i.e. @ ₹4.80 per unit. His wages will be = ₹4.80 × 96 units = ₹460.80.

Worker Y = Actual output is 111 units which is more than the standard. This means he is efficient and will get 120% of the normal piece rate i.e. ₹7.20 per unit. His wages will be = ₹7.20 × 111 units = ₹799.20

Worker Z = Actual output is 126 units, more than the standard. This means his wages will be = ₹7.20 × 126 units = ₹907.20.

**(b) Merrick Plan:**

Worker X = High task is 100 units, actual output is 96, this means that the efficiency level is 96%. As per Merrick Plan, wages of X will be 110% of normal piece rate which is ₹6.60 per unit = ₹6.60 × 96 units = ₹633.6

Worker Y = High task is 100 units, actual output is 111 units, efficiency level is 111%. Y will be entitled for wages @ 120% of normal piece rate i.e. @ ₹7.20 per unit. His wages will be, ₹7.20 × 111 units = ₹799.2

Worker Z = High task is 100 units, actual output is 126 units, efficiency level is 126%. Z will get at higher piece rate @ ₹7.20 per unit. His wages will be ₹7.20 × 126 units = ₹907.2

**(c) Gantt Task and Bonus Plan:**

Worker X = ₹10 × 40 hours = ₹400 [X will get guaranteed time rate as his output is below the high task]

Worker Y = ₹6 × 111 units = ₹666 [High piece rate as output is above standard]

Worker Z = ₹6 × 126 units = ₹756 [High piece rate as output is above standard]

**Individual Bonus Plans:**

We have seen earlier that in the time rate system, the workers are paid according to the time taken while in case of piece rate system, the output produced by the worker decides his wages as rate per unit is fixed rather than rate per hour. In the premium bonus plan, the gain arising out of increased productivity is shared by both, the employer and employee.

The bonus to be paid to the workers is computed on the basis of savings in the hours, i.e. the difference between the time allowed and time taken. The time allowed is the standard time, which is fixed by conducting a time and motion study by the work-study engineers. While fixing the standard time, due allowance is given for physical and mental fatigue as well as for normal idle time. The actual time taken is compared with this standard time and bonus is payable to the worker if the time taken is less than the standard time.

The individual bonus schemes commonly used are as follows.

- (a) Halsey Premium Plan
- (b) Halsey-Weir Premium Plan
- (c) Rowan Plan
- (d) Barth Variable Sharing Plan

These methods are discussed below:-

#### (a) Halsey Premium Plan

This plan was introduced by F.A. Halsey, an American engineer. In this plan, bonus is paid on the basis of time saved. Standard time is fixed for a job and if the actual time taken is less than the same, the worker becomes eligible for bonus. However bonus is paid equal to wages of 50% of the time saved. A worker is assured of time wages if he takes longer time than the allowed time. The formula for computing the total wages is as follows.

$$\text{Total Earnings} = H \times R + 50\% [S - H] R$$

Where, H = Hours worked, R = Rate per hour, S = Standard time

#### Illustration 32

Time allowed for a job is 48 hours; a worker takes 40 hours to complete the job. Time rate per hour is ₹15. Compute the total earnings of the worker.

#### Solution:

$$\text{Total Earnings} = H \times R + 50\% [S - H] R$$

$$\text{Total Earnings} = 40 \times ₹15 + 50\% [48 - 40] ₹15$$

$$\text{Total Earnings} = ₹600 + ₹60 = ₹660$$

#### (b) Halsey – Weir Plan

Under this method, there is only one difference as compared to the Halsey Plan and that is instead of 50% bonus for the time saved, it is  $33\frac{1}{3}\%$  of the time saved. Accordingly the formula for this method is modified as follows.

$$\text{Total Earnings} = H \times R + 33\frac{1}{3} [S-H]R$$

H = Hours worked. R = Rate per hour, S = Standard time

#### (c) Rowan Plan

This premium bonus plan was introduced by Mr. James Rowan. It is similar to that of Halsey Plan in respect of time saved, but bonus hours are calculated as the proportion of the time taken which the time saved bears to the time allowed and they are paid for at time rate. The formula for computation of total earnings is as follows:-

$$\text{Total Earnings} = H \times R + [S - H]/S \times H \times R$$

Where H = Hours worked, R = Rate per hour, S = Standard time,

#### (d) Barth Variable Sharing Plan:

In this system, the total earnings are calculated as follows:

$$\text{Total Earnings} = R \times \sqrt{S \times H}$$

H = Hours worked, R = Rate per hour, S = Standard time.

### Group Bonus Plan:

The plans described above are all individual bonus plans. Many times output of individuals cannot be measured. Similarly, the output of individual is dependent on the performance of the group. In such cases, rather than implementing individual bonus systems, group bonus system is implemented. The total amount of bonus, which is determined according to productivity, can then be shared equally or in agreed proportion between the group members. The main objects of group bonus system are as follows:-

- (a) Creation of team spirit.
- (b) Elimination of excessive waste of materials and time.
- (c) Recognition of group efforts.
- (d) Improving productivity.

Different Group Bonus Schemes in use are as follows:-

- (i) **Budgeted Expenses Bonus:** Under this system, bonus is based on the savings in actual total expenditure compared with the budgeted expenditure.
- (ii) **Cost Efficiency Bonus:** In this method, standards are set for expenses like material, labour and overheads. The actual expenditure against these standards is measured and if there is a savings in actual expenditure as compared to the standards, a portion of such savings is distributed as bonus amongst the workers.
- (iii) **Pristman System:** In this method, production standards are set in units or points and actual production is compared with the standards. If the actual production exceeds the standard, the workers are paid additional wages equal to the percentage of output over standard. Obviously no bonus is payable if actual production does not exceed the standard production. This method is mainly used in foundries.
- (iv) **Towne Profit Sharing Plan:** In this method standards are set for costs [mainly labour cost] and the actual cost is compared with the standards. If there is a saving in the costs, the saving is shared by workers and supervisory staff in agreed proportion. The principle behind this method is that if there is a saving in the cost, not only the workers but the supervisory staff should also get the reward because the cost reduction is the joint efforts of both the types of staff. Hence both, workers and supervisors share it.
- (v) **Waste Reduction Bonus:** This system of bonus is based on savings in the material cost. If there is a saving in the material cost, the workers share the same in the agreed proportion. This system is generally used in industries where cost of material is very high.
- (vi) **Rucker Plan:** The amount of bonus is linked with 'value added' in this system. The 'value added' is obtained by deducting the cost of material and services from sales value. In other words, value added is the total of labour, overheads and profits. Under this plan, employees receive a constant proportion of value added. For example, if the target ratio of labour cost to value added is 70%, and the actual ratio comes to 68%, 2% of the actual value added is distributed as group bonus, so that the ratio of direct labour cost to value added is maintained at 70%. Normally instead of distributing the entire bonus, some proportion is distributed and the remaining is transferred to reserve fund.
- (vii) **Scanlon Plan:** This method is similar to the Rucker plan as discussed above except that the ratio of labour cost to the sales is taken instead of direct labour cost to added value. Normally bonus is paid based on average of last three years ratios. A part of the bonus may be transferred to bonus equalization fund for future use when the workers do not get bonus under this scheme.

### Bonus System for Indirect Workers:

Indirect workers do not take part in the production process directly but they play important role in the production process. It is difficult to chalk out a bonus system for indirect workers, as there is a difficulty

in measuring their output. However it is advisable to plan a bonus system for indirect workers in order to motivate them for better productivity. Bonus to indirect workers is paid on the basis of output of the department, saving in time or expenditure against the budgeted, product quality, reduction of waste and scrap and reduction of labour turnover.

### **Indirect Monetary Incentives:**

These methods aim at giving additional remuneration based on the prosperity of the concern. The following schemes fall in this category:-

- (a) **Profit Sharing:** In this system, the profits of the organization are shared by workers in agreed proportion. The Payment of Bonus Act in India makes it mandatory to pay minimum bonus of 8.33% of salary and maximum bonus of 20% of salary to the workers.
- (b) **Co-partnership:** In this system, the workers get an opportunity to participate in the ownership of the organization and to receive the part of share of profits. The employees are given assistance to purchase shares of the company. Thus the employees get dividend and bonus also. These schemes help to boost the morale of workers to a great extent.

### **Non-Monetary Incentives**

These incentives are given in addition to monetary incentives for further boosting the moral of the employees. Though these benefits do not result in additional remuneration, they help to improve productivity by boosting the morale of the employees.

Some of the non-monetary incentives are as follows:-

- (a) Free education and training.
- (b) Medical benefits.
- (c) Subsidized canteens.
- (d) Superannuation benefits like pensions, gratuity, life assurance schemes etc.
- (e) Sports and recreation facilities, housing facilities, long service awards.
- (f) Job security, promotion schemes.
- (g) Benevolent funds and welfare fund.

### **Treatment of some of the Employee Cost items in Costing:**

#### **(a) Supervisors salary / Foreman's Salary**

The foreman is mainly concerned with the supervision of man and machines in the workshop and so his salary is 'works indirect expenses' and must be charged to Works Expenses Account and included in works overhead. It is apportioned on the basis of degree of supervision required on such machine or men.

If he devotes equal time for all the machines his salary should be equally charged off against all of them. In case he devoted more time to a particular machine or to a particular batch of workers, proportionately higher share of his salary should be borne by that particular machine or batch of workers.

#### **(b) Bonus Under Payment of Bonus Act, 1965**

The Payment of Bonus Act, 1965 provides that to the eligible employees a minimum bonus @ 8-1/3% of gross annual earning will have to be paid irrespective of profits made or losses incurred. If there is adequate profit a higher bonus is paid but upto the maximum limit of 20% of gross earnings. Therefore it is clear that the minimum bonus is a definite charge against profit because even in case of loss this bonus is payable and according to the classification of labour-direct or indirect- should be included in direct labour cost or production overhead. The portion of bonus over and above

the minimum is based on profit and should be charged off to Costing Profit and Loss Account and not taken into the cost at all. However, some accountants argued that this portion of bonus should also be taken into the cost in appropriate heads of Direct Labour or Production Overhead. But the former treatment should be taken as more sensible.

**(c) Leave Travel Assistance**

Leave Travel Assistance is paid to practically all the employees presently and therefore can be considered as a regular element of labour or staff cost as the case may be. This expenditure is of a fixed nature and can be easily predetermined. Depending whether the assistance is payable to direct labour, indirect labour or staff the expenditure should be treated as Direct Labour Cost, Production Overhead Cost or Administrative Selling Overhead Cost and should be appropriately charged.

**(d) Night Shift Allowance**

It is customary practice that the persons working in night shifts are paid some extra and such an allowance is known as night shift allowance. Such additional expenditure caused by general pressure of work in excess of normal capacity are charged to general production overhead because otherwise job performed during days will be cheaper than the jobs completed during night which by no means a fair proposition. If the additional expenditure is incurred extremely as a result of pressing demands from customers such expenditure should directly be charged to the job concerned. On the other hand if the night shifts are run for a fault of the particular department the night shift allowance should be charged as the departmental overhead applicable to the concerned department.

**(e) Fringe Benefits**

Fringe benefits are those expenses which are spent by an employer against the individual employees for their welfare. Normally such expenses do not form a part of their pay packet, e.g., ESI contribution made by an employer. Such expenses may be recovered separately as a percentage on labour cost or at an hourly rate. Alternatively, those may be treated as overheads and apportioned to cost centres on the basis of wages/salary cost.

**(f) Work on Holidays and Weekly off Days**

Usually work on such days is to be paid at a higher rate than the normal days' grace. The extra payment involved is treated in the same manner as in the cases of **overtime premium** as stated before (refer treatment of overtime). Normal wages are charged direct to the work orders/ job/process handled during the period.

**(g) Attendance Bonus**

This is paid to workers based on satisfactory attendance over a stated period and is a fringe benefit. The cost is to be collected under a standing order number and charged as a departmental overhead as the expenses cannot be allocated to cost units directly.

In case the cost is disproportionate from months to months, a proportionate amount may be charged in each period to avoid variation in cost.

When the cost is of a regular nature it may be booked as direct wages and charged by an inflated rate over the Direct Labour Cost. But this is however, not a sound policy.

**(h) Employer's contribution to Employees' Provident Fund**

This is an obligatory charge under the Employees Provident Fund Act of 1952 and the scheme framed there under. This should be treated as part of direct wages of workers. The direct wages paid should be inflated for the cost involved and the products of jobs charged at an inflated rate. An alternative treatment can be made as such that the contribution for the indirect workers is an item of overhead.

**(i) Lost time due to a major overhauling of a machine as result of severe breakdowns**

Manufacturing concerns having a number of machines in the factory usually follow a maintenance schedule whereby the entire factory is overhauled once a year. The related cost of such period consisting mainly of fixed cost is estimated and apportioned as a manufacturing/factory overhead over the annual production. But a sudden and severer breakdown may upset the production plan and call for major overhaul of machine. Such an occurrence is certainly abnormal and all costs related to the breakdown and overhaul should be collected through a separate standing order number and transferred to the costing Profit and Loss Account thereby into distorting the normal cost of production

**Illustration 31**

Calculate the total earnings and effective rate of earnings per hour of three operators under Rowan System and Halsey System from the following particulars.

The standard time fixed for producing 1 dozen articles is 50 hours. The rate of wages is ₹1/- per hour.

The actual time taken by three are as follows:-

- A 45 hours
- B 40 hours
- C 30 hours.

**Solution:**

**Computation of Total Earnings of workers under Halsey Plan**

Earnings under Halsey Plan = Hours worked × Rate per hour + (50% × Time saved × Rate per hour)

Worker	Earnings	Effective Rate
A	$E = (45 \times 1) + 50/100 (50-45) \times 1$ $= 47.5$	Effective Rate = $47.5/45$ $= 1.06$
B	$E = (40 \times 1) + 50/100 (50-40) \times 1$ $= 45$	Effective Rate = $45/40$ $= 1.125$
C	$E = (30 \times 1) + 50/100 (50-30) \times 1$ $= 40$	Effective Rate = $40/30$ $= 1.33$

**Computation of Total Earnings of workers under Rowan Plan**

Earnings under Rowan Plan =

$$\text{Hours worked} \times \text{Rate per hour} + \left( \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Hours worked} \times \text{Rate per hour} \right)$$

	Earnings	Effective Rate
A	$E = (45 \times 1) + [50-45 / 50] 45 \times 1$ $= 45 + 4.5$ $= 49.5$	Effective Rate = $49.5/45$ $= 1.1$
B	$E = (40 \times 1) + [50-40 / 50] 40 \times 1$ $= 40 + 8$ $= 48$	Effective Rate = $48/40$ $= 1.2$
C	$E = (30 \times 1) + [50-30 / 50] 30 \times 1$ $= 30 + 12$ $= 42$	Effective Rate = $42/30$ $= 1.4$

**Illustration 34**

A workman takes 9 hours to complete a job on daily wages and 6 hours on a scheme of payment by results. His hourly rate is 25 p. The Material cost of the product is ₹4 and factory overheads are recovered at 150% of the total direct wages. Calculate the factory cost of the product under following methods:-

(a) Time rate system      (b) Halsey Plan      (c) Rowan Plan.

**Solution:**

**Computation of factory cost under three systems:**

₹

	Time Rate System	Halsey Plan	Rowan Plan
Material	4.00	4.00	4.00
Labour <b>(working notes)</b>	2.25	1.88	2.00
Overheads	3.38	2.82	3.00
<b>Factory Cost</b>	<b>9.63</b>	<b>8.70</b>	<b>9.00</b>

**Working Notes:**

₹

	Time Rate System	Halsey Plan	Rowan Plan
Labour	9 x 0.25	6 x 0.25 + 1/2 (9-6) x 0.25	6 x 0.25 + (9-6 / 9) x 6 x 0.25
	<b>2.25</b>	<b>1.88</b>	<b>2.00</b>

**Illustration 35**

A worker under the Halsey method of remuneration has a day rate of ₹12 per week of 48 hours, plus a cost of living bonus of 10 p. per hour worked. He is given 8 hours task to perform, which he performs in 6 hours, he is allowed 30% of the time saved as premium bonus. What would be his earnings under Halsey Plan and Rowan Plan.

**Solution:**

**Computation of earnings of worker under Halsey Plan:**

$$\begin{aligned} \text{Earnings under Halsey Plan} &= \text{Hours worked} \times \text{Rate per hour} + (30\% \times \text{Time Saved} \times \text{Rate per hour}) \\ &= (6 \times 0.25) + 30/100 (8-6) \times 0.25 &&= 1.65 \\ (+) \text{ Cost of Living Bonus } (6 \times 0.1) &&&= 0.60 \\ \text{Earnings under Halsey Plan} &&&= \underline{\underline{₹2.25}} \end{aligned}$$

**Computation of earnings of worker under Rowan Plan:**

$$\begin{aligned} \text{Earnings under Rowan Plan} &= \text{Hours worked} \times \text{Rate per hour} + \\ &\quad \left( \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Hours worked} \times \text{Rate per hour} \right) \\ &= (6 \times 0.25) + (8-6 / 8) \times 6 \times 0.25 &&= 1.88 \\ (+) \text{ Cost of Living Bonus } (6 \times 0.1) &&&= 0.60 \\ &&&= \underline{\underline{₹2.48}} \end{aligned}$$

Earnings under Halsey Plan = ₹2.25

Earnings under Rowan Plan = ₹2.48



### Illustration 36

In a factory guaranteed wages at the rate of ₹ 1.80 per hour are paid in a 48 hour week. By time and motion study it is estimated that to manufacture one unit of a particular product 20 minutes are taken, the time allowed is increased by 25%. During the week A produced 180 units of the product. Calculate his wages under the following methods:

- (a) Time Rate.
- (b) Piece Rate with a guaranteed weekly wage.
- (c) Halsey premium Bonus.
- (d) Rowan Premium Bonus.

#### Solution:

##### (a) Calculation of wages under Time Rate System

$$\begin{aligned} \text{Earnings under time wages} &= \text{TR} \\ &= 48 \times 1.8 &= ₹ 86.4 \end{aligned}$$

##### (b) Calculation of wages under Piece Rate with a Guaranteed Wage Rate

$$\begin{aligned} \text{Normal Time for one unit} &= 20 \text{ minutes} \\ (+) \text{ Relaxation allowance @ 25\%} &= 5 \text{ minutes} \\ \text{Standard Time} &= 25 \text{ minutes} \\ \text{No. of pieces per hour} &= 60/25 \text{ pieces.} \\ \text{Piece Rate} &= \text{Hourly Rate} / \text{No. of pieces per hour} \\ &= 1.8 \div (60/25) \\ &= 0.75 \end{aligned}$$

$$\text{Earnings under Piece Rate} = 180 \times 0.75 = ₹ 135$$

##### (c) Calculation of wages under Halsey Premium Bonus

$$\begin{aligned} \text{Standard time for actual production} &= 180 \times 25 / 60 &= 75 \text{ hours} \\ \text{Earnings under Halsey Plan} &= \\ &= (48 \times 1.8) + 50/100 (75-48) \times 1.8 \\ &= 86.4 + 24.3 &= ₹ 110.70 \end{aligned}$$

##### (d) Calculation of wages under Rowan Premium Bonus

$$\begin{aligned} \text{Standard time for actual production} &= 180 \times 25 / 60 &= 75 \text{ hours} \\ \text{Earnings under Rowan Plan} &= (48 \times 1.8) + (75-48 / 75) \times (48 \times 1.8) \\ &= 86.4 + 31.104 &= ₹ 117.50 \end{aligned}$$

### Illustration 37

Calculate the earnings of workers A and B under Straight Piece Rate system and Taylor's Differential Piece Rate system from the following particulars:-

Normal rate per hour - ₹1.80

Standard time per unit 20 seconds

Differentials to be applied are:

80% of the piece rate below the standard;

120% of the piece rate at or above standard.

A produced 1,300 units per day of 8 hours & B -1,500 units per day of 8 hours.

**Solution:**

$$\text{Pieces per minute} = 60/20 = 3 \text{ units}$$

$$\text{Units per hour} = 60 \times 3 = 180 \text{ units}$$

$$\text{Normal piece rate} = 1.8 / 180 = ₹ 0.01$$

$$\text{Standard production in actual time} = 8 \times 180 = 1440 \text{ units}$$

**Earnings under Straight Piece Rate:**

$$\text{Earnings of A} = 1300 \times 0.01 = ₹ 13.00$$

$$\text{Earnings of B} = 1500 \times 0.01 = ₹ 15.00$$

**Earnings under Taylor's Differential Piece Rate:**

$$\text{A's efficiency} = 1300 / 1440 \times 100 = 90.28\%$$

$$= < 100\%$$

$$\text{A's Earnings} = 1300 \times 0.01 \times 80\%$$

$$= ₹ 10.42$$

$$\text{B's efficiency} = 1500 / 1440 \times 100 = 104.17\%$$

$$= > 100\%$$

$$\text{B's Earnings} = 1500 \times 0.01 \times 120\%$$

$$= ₹ 18$$

**Illustration 38**

The following particulars apply to a particular job:

Standard production per hour - 6 units

Normal rate per hour - ₹ 1.20

Mohan produced 32 units

Ram produces 42 units

Prasad produces 50 units

Calculate the wages of these workers under Merrick Differential Piece Rate System.

**Solution:**

**Calculation of wages of workers under Merrick Differential Piece Rate System**

$$\text{Normal Piece rate} = 1.2 / 6 = 0.20$$

$$\text{Standard Production} = 6 \times 8 \text{ (assumed hrs)} = 48 \text{ units}$$

$$\text{Mohan's efficiency} = 32/48 \times 100 = 66.67\% \quad (< 83\%)$$

$$\text{Mohan's Earnings} = 32 \times 0.2 = ₹ 6.4$$

$$\text{Ram's efficiency} = 42/48 \times 100 = 87.5\% \quad (> 83 \text{ but } < 100\%)$$



Ram's Earnings	= $42 \times 0.2 \times 110/100$	= ₹ 9.24	
Prasad's efficiency	= $50/48 \times 100$	= 104.17	(> 100%)
Prasad's Earnings	= $50 \times 0.20 \times 120/100$	= ₹ 12	

### Illustration 12

The following are the particulars applicable to a process:

Time Rate — ₹8 per hour

High Task — 200 units per week.

In a 40 hour week, the production of the workers was:

A — 180 units;      B — 200 units;      C — 205 units

Calculate the total earnings of the workers under Gantt's Task Bonus system.

#### Solution:

#### Calculation of earnings of the workers under Gantt's Task Bonus System

A — Actual output < High task i.e. below standard

A's earnings =  $40 \times 8$  = ₹ 320

B — Actual Output = High task i.e. at standard

B's earnings =  $(40 \times 8) + 20\% \text{ of } (40 \times 8)$  =  $320 + 64$  = ₹ 384

C — Actual output > High task i.e. above standard

C's Earnings =  $(40 \times 8) + 33 \frac{1}{3} \% \text{ of } (40 \times 8)$  = ₹  $320 + 106.67$  = ₹ 426.67

### Illustration 40

In a manufacturing concern the daily wage rate is ₹2.50. The standard output in a 6 day week is 200 units representing 100% efficiency. The daily wage rate is paid without bonus to those workers who show up to  $66 \frac{2}{3}\%$  of the efficiency standard. Beyond this there is a bonus payable on a graded scale as below:-

82% efficiency - 5% bonus

90% Efficiency - 9% bonus

100% efficiency - 20% bonus

Further increase of 1% for every 1% further rise in efficiency. In a 6 day week A produced 180 units; B 164 units; C 200 units; D 208 units and E 130 units.

Calculate the earnings of these workers.

#### Solution:

A's efficiency =  $(180 / 200) \times 100 = 90\%$

A's Earnings =  $(6 \times 2.5) + 9\% \text{ of } (6 \times 2.5)$  = ₹ 16.35

B's efficiency =  $(164 / 200) \times 100 = 82\%$

B's Earnings =  $(6 \times 2.5) + 5\% \text{ of } (6 \times 2.5)$  = ₹ 15.75

C's efficiency =  $(200 / 200) \times 100 = 100\%$

C's Earnings =  $(6 \times 2.5) + 20\% \text{ of } (6 \times 2.5)$  = ₹ 18.00

D's efficiency =  $(208 / 200) \times 100 = 104\%$

$$D's \text{ Earnings} = (6 \times 2.5) + 24\% \text{ of } (6 \times 2.5) = ₹ 18.60$$

$$E's \text{ efficiency} = (130 / 200) \times 100 = 65\%$$

$$E's \text{ Earnings} = 6 \times 2.5 = ₹ 15.00$$

**Illustration 41**

Fair Play Co. Ltd has introduced a Scanlon Plan of incentive bonus for its employees in 2012 based on the following information relating to previous three years:

Year	Sales Revenue ₹	Total Salaries & Wages ₹
2009	1,20,000	36,000
2010	1,25,000	35,000
2011	1,35,000	35,100

For 2012 the sales revenue has been ₹ 1,50,000 and total salaries and wages payment has been ₹ 36,000. What is the amount due as bonus to the employees according to Scanlon Plan?

If 30% is set aside in a bonus equalisation fund how much money is available to be paid out as Scanlon bonus for 2012?

**Solution:**

$$\text{Average salary} = (36,000 + 35,000 + 35,100) \div 3 = ₹ 35.367$$

$$\% \text{ of average salary \& wages on average sales} = 35367 / 126667 = 27.92\%$$

$$\text{The share of employees in 2012} = 1,50,000 \times 27.92 / 100 = ₹ 41,880$$

$$(-) \text{ Paid as wages} = ₹ 36,000$$

$$= ₹ 5,880$$

$$(-) \text{ Transfer to bonus equalization fund (30\%)} = ₹ 1,764$$

$$\text{Amount still to be paid as bonus} = ₹ 4,116$$

**Illustration 42**

In a manufacturing concern bonus to workers is paid on a slab rate based on cost savings towards labour and overheads. The following are the slab rates:

Upto 10% saving - 5% of the earning

Upto 15% Saving - 9% of the earning

Upto 20% Saving - 13% of the earning

Upto 30% Saving - 21% of the earning

Upto 40% Saving - 28% of the earning

Above 40% Saving - 32% of the earning

The wage rate per hour of workers - P, Q, R and S are respectively ₹1.00, ₹1.10, ₹1.20 and ₹1.40. Overheads is recovered on direct wages at the rate of 200%. Standard cost under wages and overhead per unit of production is fixed at ₹30. The workers have completed one unit each in 8, 7, 5½ and 5 hours respectively. Calculate in respect of each worker:

- a) amount of bonus earned      b) Total earnings;      c) Total earnings per hour.

**Solution:**

**Statement showing computation of amount of bonus, total earnings and earnings per hour**

₹

	Particulars	P	Q	R	S
1.	Standard cost	30	30	30	30
2.	Time taken in hours	8	7	5.5	5
3.	Rate per hour	1.0	1.1	1.2	1.4
4.	Actual wages (2 x 3)	8.0	7.7	6.6	7.0
5.	Overheads (200% of wages)	16.0	15.4	13.2	14.0
6.	Actual cost of Labour & Overhead (4 + 5)	24.0	23.1	19.8	21.0
7.	Savings (1 – 6)	6	6.9	10.2	9
8.	% of savings (7/1 x 100)	20%	23%	34%	30%
9.	% of bonus applicable	13%	21%	28%	21%
10.	Bonus (4 x 9)	1.04	1.62	1.85	1.47
11.	Total Earnings (4 + 10)	9.04	9.32	8.45	8.47
12.	Earnings per hour (11 / 2)	1.13	1.33	1.54	1.69

**Illustration 43**

Workmen of a particular grade working on 8 hour shift duty are guaranteed a wage of ₹ 32. An incentive scheme is in operation according to which production bonus is earned directly proportional to performance but only after 100% performance is reached. Four workmen A,B,C and D produce 48, 60, 75 and 90 units respectively in 6 hours working on a job which has standard time of 6 minutes per unit as measured work content. Remaining 2 hours of the shift are spent in doing unmeasured work for which no incentive bonus can be paid. Find for each workman:

- The production performance level achieved;
- Total earnings for the day.

**Solution:**

**Statement showing computation of performance achieved and total earnings of 4 workers:**

	Particulars	A	B	C	D
I	Standard output (6 x 60 / 6)	60	60	60	60
II	Actual output	48	60	75	90
III	Performance level	80%	100%	125%	150%
IV	Wages for measured work (6 x 4)	24	24	24	24
V	Bonus [C = 24 x 25%] [D = 24 x 50%]	--	--	6	12
VI	Wages for unmeasured work (2 x 4)	8	8	8	8
VII	Total earnings (IV + V + VI)	32	32	38	44

**Illustration 44**

The following particulars for the first week of September, 2012 relate to X and Y two workers employed in a factory:

	X	Y
a) Job Completed — units	3,600	4,200
b) Out of above output rejected and unsalable	540	420
c) Time allowed	12 Mts/dozen	3 Hrs./200 units
d) Basic wage rate per hour	₹ .5	₹ 6
e) Hours worked	45	50

The normal working hours per week are fixed at 42 hours. Bonus is paid @ 2/3 of the basic wage rate for gross time worked and gross output produced without deduction for rejected output. The rate of overtime for first 4 hours is paid at time plus 1/3 and for next 4 hours is paid at time plus 1/2.

From the above data calculate for each employed

- Number of bonus hours and amount of bonus earned;
- Total wages earned including basic wages overtime premium and bonus;
- Direct wages cost per 100 saleable units.

**Solution:**

	Particulars	X	Y
1.	No. of units completed	3,600	4,200
2.	Rejected units	540	420
3.	Saleable units	3,060	3,780
4.	Standard time	60 hrs	63 hrs
5.	Actual time worked	45 hrs	50 hrs
6.	Bonus hours	15 hrs	13 hrs
7.	Amount of bonus	50 (15 x 5 x 2/3)	52 (13 x 6 x 2/3)
8.	Overtime wages	20 (3 x 5 x 4/3)	68 [(4 x 6 x 4/3) + (4 x 6 x 3/2)]
9.	Basic wages	210 (42 x 5)	252 (42 x 6)
10.	Total wages (7 + 8 + 9)	280	372
11.	Direct wage cost of 100 saleable units.	9.15 (280 / 3060) x 100	9.84 (372 / 3780) x 100

**Illustration 45**

From the following particulars work out the earnings for the week of a worker under

- Straight Piece Rate
- Differential Piece Rate
- Halsey Premium System
- Rowan System

Number of working hours per week — 48

Wages per hour — ₹3.75

Normal time per piece — 20 Min

Normal output per week — 120 pieces

Actual output for the week — 150 pieces

Differential piece rate — 80% of the piece rate when output is below standard and 120% above standard.



**Solution:**

**Computation of earnings for the week of a worker**

- (a) Piece rate =  $(48 \times 3.75) / 120 = ₹ 1.5$   
Earnings under Straight Piece Rate =  $150 \times 1.5 = ₹ 225$
- (b) Efficiency =  $(150 / 120) \times 100 = 125\% (> 100\%)$   
Earnings under Differential Piece Rate =  $150 \times 1.5 \times 120/100$   
= ₹ 270
- (c) Standard time for actual production =  $48 \times (150 / 120) = 60$  hrs  
Earnings under Halsey Plan =  $(48 \times 3.75) + 50/100(60 - 48) \times 3.75$   
=  $180 + 22.5 = ₹ 202.5$
- (d) Earnings under Rowan Plan =  $(48 \times 3.75) + [(60-48 / 60) \times (3.75 \times 48)]$   
=  $180 + 36 = ₹ 216$

**Illustration 46**

Milling section of a factory engages 25 direct workers during the month of June, 2012 they were paid for 4,800 attendance hours at an average rate of ₹1.50 per hour. In addition they also worked for 400 overtime hours at double pay. The overtime was necessitated by abnormal circumstances in April, 2012. For the purpose of reckoning labour 40% for fringe benefits is to be added to gross wages.

From the following particulars:

- (a) Work out the total labour cost and
- (b) Allocate it to different cost elements etc.
- i) Hours booked to jobs 4,200
- ii) Allowed idle time 12½ %
- iii) There was no incidence of abnormal idle time. Actual idle time was exactly in accordance with standard for the purpose.

**Solution:**

- (a) Basic wages  $(4800 \times 1.5) = 7,200$   
Payment for OT  $(400 \times 3) = \underline{1,200}$   
= 8,400  
(+) 40% towards fringe benefits = 3,360  
Total Labour Cost = 11,760

(b)

- i) Time worked on jobs is charged to jobs and treated as direct wages.

	₹
Wages $(4200 \times 1.5)$	= 6,300
(+) 40% Fringe benefits	= <u>2,520</u>
	= <u>8,820</u>

- ii) Wages for idle time is included in indirect wages & included in Fixed Over Heads:

	₹
Wages for idle time (4800 x 12.5% = 600) (600 x 1.5)	= 900
(+) 40% towards fringe benefits	= <u>360</u>
	= <u>1,260</u>

- iii) Cost for Over Time occurred due to abnormal circumstances and therefore debited to costing P & L A/c.

	₹
Overtime Wages (400 x 3)	= 1,200
(+) 40% Fringe Benefits	= <u>480</u>
	= <u>1,680</u>

#### Illustration 47

Ten men work as a group. When the weekly production of the group exceeds standard (200 pieces per hour) each man in the group is paid a bonus for the excess production in addition to his wages at hourly rates. The bonus is computed thus:

The percentage of production in excess of the standard amount is found and one-half of this percentage is considered as the men's share. Each man in the group is paid as bonus this percentage of a wage rate of ₹ 3.20 per hour. There is no relationship between the individual workman's hourly rate and the bonus rate. The following is the week's records.

	Hours Worked	Production
Monday	90	22,100
Tuesday	88	22,600
Wednesday	90	24,200
Thursday	84	20,100
Friday	88	20,400
Saturday	<u>40</u>	<u>10,200</u>
	<u>480</u>	<u>1,19,600</u>

- (a) Compute the rate and amount of bonus for the week;  
 (b) Compute the total pay of Jones who worked 41 ½ hours and was paid ₹2 per hour basic and of Smith who worked 44 ½ hours and was paid ₹ 2.50 per hour basic.

#### Solution:

Standard production in actual time = 480 x 200 = 96,000

Excess of actual production over standard = 1,19,600 – 96,000 = 23,600.

% of excess over standard = (23,600 / 96,000) x 100 = 24.58%

% of bonus = 1/2 x 24.58 = 12.29%

Bonus rate per hour = 3.2 x 12.29% = 0.393

Total bonus for week = 480 x 0.393 = ₹ 188.64



### Computation of Total Earnings of Jones & Smith:

Particulars		Jones		Smith
Basic wages	$41.5 \times 2$	83.00	$44.5 \times 2.5$	111.25
Bonus	$41.5 \times 0.393$	16.31	$44.5 \times 0.393$	17.49
<b>Total Earnings</b>		<b>99.31</b>		<b>128.74</b>

### Illustration 48

A manufacture introduces a new machinery into his factory with the result that production per worker is increased. The workers are paid by results and it is agreed for every 2% increases in average individual output, an increase of 1% on the rate of wages will be paid.

At the time the machinery is installed the selling price of the products falls by 8-1/3%. Show the net saving in production costs which would be required to offset the losses expected from the turnover and bonus paid to workers.

	I <sup>st</sup> period	II <sup>nd</sup> period
No. of workers	175	125
Number of articles produced	16,800	14,000
Wages paid	33,600	
Total Sales	75,600	

### Solution:

$$\text{No. of units per worker in period I} \quad \text{---} \quad = 16,800 / 175 = 96$$

$$\text{No. of units per worker in period II} \quad \text{---} \quad = 14,000 / 125 = 112$$

$$\text{Increase in production per worker} \quad \text{---} \quad = 16 \text{ units}$$

$$\% \text{ of increase in output} = 16/96 \times 100 \quad \text{---} \quad = 16 \frac{2}{3} \%$$

$$\text{Wages in Period I} = 33,600$$

$$\text{Wages in Period II} = 33,600 \times (125 / 175) = 24,000$$

$$\text{Increase in wages} = 24,000 \times 8.33\% [16.67 \times \frac{1}{2} = 8.33] = 2,000$$

$$\text{Sales in Period I} = 75,600$$

$$\text{Sales in Period II} = 75,600 \times (14,000 / 16,800) = 63,000$$

$$\text{Decrease in Sales} = 63,000 \times 8 \frac{1}{3} \% = 5,250$$

$$\begin{aligned} \text{Total loss due to increase in wages \& reduction in sales} &= 5,250 + 2,000 \\ &= 7,250 \end{aligned}$$

To offset the loss, the saving in other must be ₹ 7,250

### Illustration 49

The following has been the performance of two workers A and B of an operation on three units.

	Time Taken	Rating
A 1st Count	22 minutes	70/60
2nd Count	20 minutes	70/60
3rd Count	21 minutes	70/60

B	1st Count	25 minutes	50/60
	2nd Count	26 minutes	50/60
	3rd count	24 minutes	50/60

Calculate the Standard Time for job.

**Solution:**

**Calculation of Standard Time for Job**

Standard time = Normal time + Relaxation Allowance

Normal time = Actual time x Performance rating

**Normal Time:**

A 22 x 70/60 = 25.67

20 x 70/60 = 23.33

21 x 70/60 = 24.50

B 25 x 50/60 = 20.83

26 x 50/60 = 21.67

24 x 50/60 = 20.00

= 136.00

Average Normal Time =  $136/6$  = 22.670

(+) 10% Relaxation allowance (assumed) = 2.267

Standard Time for Job = 24.937 (or) 25 Minutes

**Illustration 50**

A work measurement study was carried out in a firm for 10 hours and the following information was generated.

Units produced	:	350
Idle time	:	15%
Performance rating	:	120%
Allowance time	:	10% of standard time.

What is the standard time for task?

**Solution:**

**Calculation of standard time for task**

Total time = 10 x 60 = 600 minutes

(-) Down time or Idle time @ 15% = 90 minutes

Actual time = 510 minutes

Normal Time = 510 x 120% = 612 minutes

(+) Relaxation allowance

(10% or 1/10 on standard time

i.e. 1/9 on normal time) = 68 minutes



Standard time for job = 680 minutes

Standard time for each unit =  $680/350 = 1.943$  minutes

### Illustration 51

The extracts from the payroll of M/s. Maheswari Bros. is as follows:-

Number of employees at the beginning of 2012	150
“ “ “ “ “ “ “ end of 2012	200
“ “ resigned	20
“ “ discharged	5
“ replaced due to resignation and discharges	20

Calculate the Labour Turnover Rate for the factory by different methods.

#### Solution:

- 1) Separation Method =  $25 \div (150 + 200 / 2) \times 100$   
=  $0.1429 \times 100$   
= 14.29 %
- 2) Replacement Method =  $(20 / 175) \times 100$   
= 11.43%
- 3) Flux Method =  $(25 + 20) \div 175 \times 100$   
= 25.71%

### Illustration 52

In a factory two workmen A and B produce the same product using the same material. They are paid bonus according to Rowan System. The time allotted to the product is 40 hours. A takes 25 hours and B takes 30 hours to finish the product. The factory cost of the product for A is ₹ 193.75 and for B ₹205. The factory overhead rate is one rupee per man-hour. Find the normal rate of wages and the cost of materials used for the product.

#### Solution:

Let 'M' be the material cost and 'R' be the rate of wage per hour.

$$\begin{aligned} \text{A — Earnings} &= (25 \times R) + [(40-25) / 40] \times 25R \\ &= 25R + 9.375 R = 34.375 R \end{aligned}$$

$$\begin{aligned} \text{B — Earnings} &= (30 \times R) + [(40-30) / 40] \times 30R \\ &= 30R + 7.5 R = 37.5 R \end{aligned}$$

$$A = M + 34.375 R + 25 = 193.75$$

$$B = M + 37.5 R + 30 = 205.00$$

$$M + 34.375 R = 168.75 \quad \dots (i)$$

$$M + 37.500 R = 175.00 \quad \dots (ii)$$

Solving (i) & (ii) we get,

$$3.125 R = 6.25$$

$$R = 2$$

Normal rate of wage = ₹ 2 per hour

$$M + 37.5 R + 30 = 205$$

$$M + 75 + 30 = 205$$

$$M = 100$$

Material cost = ₹ 100

### Illustration 53

In a factory bonus to workman is paid according to Rowan Plan. Time allotted for a job is 40 hours and the normal rate of wages is ₹ 1.25 per hour. The factory overhead charges are 50 paise per hour for the hours taken.

The factory cost of a work order, executed by a worker is ₹ 161.875. The cost of material in each case is ₹100.

Calculate the hours of time taken by the workman to complete the work order.

#### Solution:

Let 'T' be the time taken by worker.

$$\begin{aligned} \text{Earnings} &= 1.25 T + [(40-T) / 40] \times [1.25 T] \\ &= 1.25 T + [(50T - 1.25 T^2) / 40] \\ &= [50T + 50 T - 1.25T^2] / 40 \\ &= [100 T - 1.25T^2] / 40 \end{aligned}$$

Materials + Wages + Factory Overheads = Factory Cost

$$\Rightarrow 100 + [100 T - 1.25T^2] / 40 + 0.5 T = 161.875$$

$$\Rightarrow 4000 + 100 T - 1.25T^2 + 20T = 6475$$

$$\Rightarrow 1.25T^2 - 120 T + 2475 = 0$$

$$\Rightarrow 5T^2 - 480 T + 9900 = 0$$

$$\Rightarrow T^2 - 96T + 1980 = 0$$

$$T = \frac{96 \pm \sqrt{9216 - 7920}}{2}$$

$$T = \frac{96 \pm 36}{2}$$

$$T = 66 \text{ (or) } 30$$

T = 30 hours (because actual time should not be more than standard time).

### Illustration 54

Two fitters, a labourer and a boy undertake a job on piece rate basis for ₹1,290. The time spent by each of them is 220 ordinary working hours. The rates of pay on time rate basis, are ₹1.50 per hour for each of the two fitters, ₹1 per hour for the labourer and ₹0.50 per hour for the boy.

The amount of piece-work premium and the share of each worker, when the piece -work premium is divided proportionately to the wages paid.

Compute the selling price of the above job on the basis of the following additional data:-

Cost of the direct material ₹2,010; works overhead at 20% of prime cost; selling overhead at 10% of works cost and profit at 25% on cost of sales.

**Solution:**

**Statement showing computation of earnings of each person**

₹

Particulars	F <sub>1</sub>	F <sub>2</sub>	Labourer	Boy	Total
Basic wages	330 (220x1.5)	330	220 (220x1)	110 (220x0.5)	990
Bonus	100	100	67	33	300
	430	430	287	143	1290

**Computation of Selling Price of Job**

Particulars	Amount (₹)
Materials	2,010
Labour	1,290
Prime Cost	3,300
(+) Works Overhead @ 20%	660
Works cost	3,960
(+) S & D overheads @ 10%	396
Cost of sales (or) Total Cost	4,356
(+) Profit @ 25%	1,084
Selling Price	5,445

**Illustration 55**

Standard time for a job is 60 hours; and hourly rate of guaranteed wage is ₹ 0.75. Because of saving in time a worker A gets an hourly wage of ₹ 0.9 under the Rowan Premium Bonus System. For the same saving in time, calculate the hourly rate of wages a worker A will get under Halsey Premium Plan assuming 40% bonus is given for the time saved.

**Solution:**

Let 'T' be the time taken.

$$E = 0.75 T + [60 - T / 60] \times [0.75T]$$

$$E = 0.75 T + [(45T - 0.75T^2) / 60]$$

$$E = 45T + 45T - 0.75T^2 / 60$$

$$E = 90T - 0.75T^2 / 60$$

Given hourly wage rate is 0.9

$$\frac{90T - 0.75T^2}{60} = 0.9$$

$$\Rightarrow 90T - 0.75T^2 / 60T = 0.90T$$

$$\Rightarrow 90T - 0.75T^2 = 54T$$

$$\Rightarrow 36T - 0.75T^2 = 0$$

$$\Rightarrow T (36 - 0.75T) = 0$$

$$\Rightarrow 36 - 0.75T = 0$$

$$\Rightarrow 0.75T = 36$$

$$\Rightarrow T = 48 \text{ hrs}$$

$$\begin{aligned} \text{Earnings under Halsey Plan} &= (48 \times 0.75) + (60 - 48) \times (40/100) \times 0.75 \\ &= 36 + 3.6 \\ &= ₹ 39.6 \end{aligned}$$

$$\begin{aligned} \text{Effective rate} &= ₹ 39.6 / 48 \\ &= ₹ 0.825 \end{aligned}$$

**Illustration 56**

Two workmen, Vishnu and Shiva, produce the same product using the same material. Their normal wage rate is also the same. Vishnu is paid bonus according to the Rowan System, while Shiva is paid bonus according to Halsey System. The time allowed to make the product is 100 hours. Vishnu takes 60 hours while Shiva takes 80 hours to complete the product. The factory overhead rate is ₹10 per man-hour actually worked. The factory cost for the product for Vishnu is ₹7,280 and for Shiva it is ₹ 7,600.

You are required:-

- to find the normal rate of wages;
- to find the cost of materials;
- to prepare a statement comparing the factory cost of the products as made by the two workmen.

**Solution:**

Let 'R' be the wage rate and 'M' be the material cost.

$$\begin{aligned} \text{Earnings of Vishnu} &= 60 R + [(100-60) / 100] \times [60R] \\ &= 60R + 24R = 84R \end{aligned}$$

Material + Wages + Factory Overheads = Factory Cost.

$$M + 84R + 600 = 7,280$$

$$\Rightarrow M + 84 R = 6,680 \quad \rightarrow (1)$$

$$\begin{aligned} \text{Earnings of Shiva} &= 80 R + 50\% \text{ of } (100-80) \times R \\ &= 80 R + 10 R \\ &= 90 R \end{aligned}$$

Material + Wages + Factory Overheads = Factory Cost.

$$M + 90R + 800 = 7,600$$

$$\Rightarrow M + 90 R = 6,800 \quad \rightarrow (2)$$

Solving Equation (1) & (2), we get

$$M + 84 R = 6,680$$

$$M + 90 R = 6,800$$

$$- 6R = -120$$

$$R = 20$$

Substitute the value of 'R' in Equation (2), we get

$$M + 90 R = 6,800$$

$$\Rightarrow M + 90 (20) = 6,800$$

$$\Rightarrow M + 1800 = 6,800$$

⇒ M = 5,000

Wages of Vishnu =  $(60 \times 20) + [(100-60) / 100] \times [60 \times 20]$   
 = 1200 + 480 = ₹ 1680

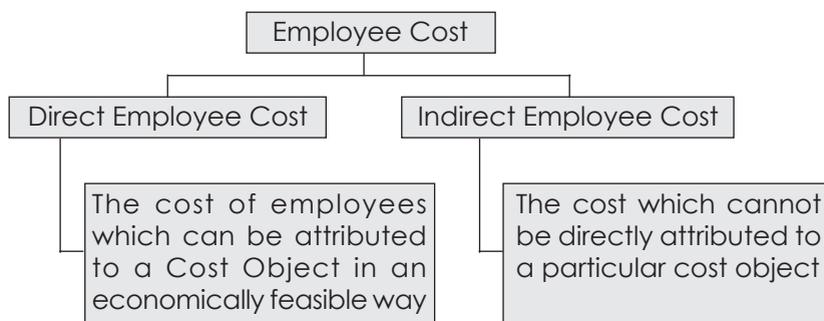
Wages of Shiva =  $(80 \times 20) + 50\% (100 - 80) \times 20$   
 = 1600 + 200 = ₹ 1800

- (a) Normal Rate of wages = ₹ 20  
 (b) Material Cost = ₹ 5,000  
 (c) Statement comparing the factory cost of the products as made by the two workmen.

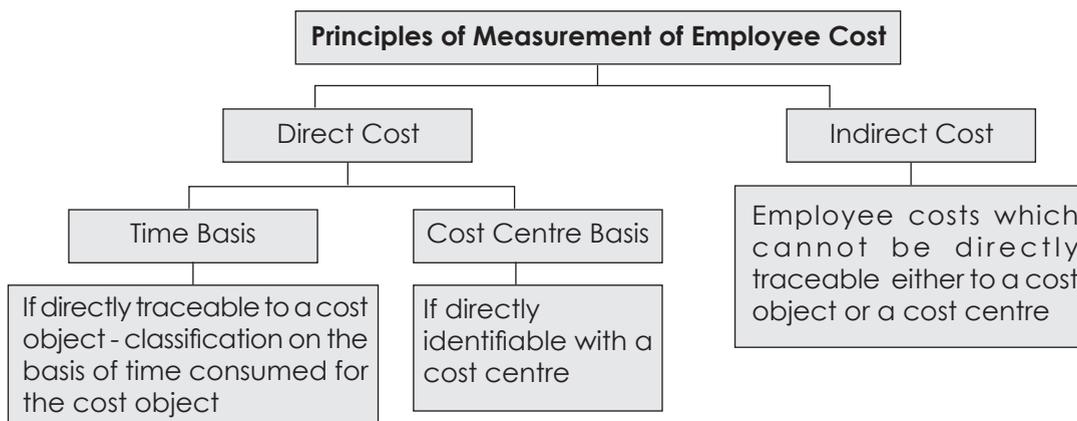
Particulars	Vishnu	Shiva
Material	5,000	5,000
Labour	1,680	1,800
Overheads	600	800
Factory Cost	7,280	7,600

### COST ACCOUNTING STANDARD-7: EMPLOYEE COST

Employee cost: The aggregate of all kinds of consideration paid, payable and provisions made for future payments for the services rendered by employees of an enterprise (including temporary, part time and contract employees). Consideration includes wages, salary, contractual payments and benefits, as applicable or any payment made on behalf of employee. This is also known as Labour Cost.



**Principles of Measurement of Employee Cost:** The principles to be followed for measurement of employee cost are:



**Measurement of Employee Cost: Inclusions and Exclusions:**

The following items are to be **'included'** for the purpose of measuring employee cost:

- (i) Any payment made to an employee either in cash or kind
- (ii) Gross payments including all allowances payable and includes all benefits
- (iii) Bonus, ex-gratia, sharing of surplus, remuneration payable to Managerial personnel including Executive Directors and other officers
- (iv) Any amount of amortization arising out of voluntary retirement, retrenchment, termination, etc
- (v) Variance in employee payments/costs, due to normal reasons (if standard costing system is followed)
- (vi) Any perquisites provided to an employee by the employer

The following items are to be **'excluded'** for the purpose of measuring employee cost:

- (i) Remuneration paid to Non-Executive Director
- (ii) Cost of idle time [ = Hours spent as idle time x hourly rate]
- (iii) Variance in employee payments/costs, due to abnormal reasons ( if standard costing system is followed)
- (iv) Any abnormal payment to an employee – which are material and quantifiable
- (v) Penalties, damages paid to statutory authorities or third parties
- (vi) Recoveries from employees towards benefits provided – this should be adjusted/reduced from the employee cost
- (vii) Cost related to labour turnover – recruitment cost, training cost and etc
- (viii) Unamortized amount related to discontinued operations.

**Illustration 58: Measurement of Employee Cost**

**Basic pay ₹5,00,000; Lease rent paid for accommodation provided to an employee ₹2,00,000, amount recovered from employee ₹40,000, Employer's Contribution to P.F. ₹75,000, Employee's Contribution to P.F. ₹75,000; Reimbursement of Medical expenses ₹67,000, Hospitalisation expenses of employee's family member borne by the employer ₹19,000, Festival Bonus Rs.20,000, Festival Advance ₹30,000. Compute the Employee cost.**

**Solution:**

Computation of Employee Cost

	Particulars	Amount (₹)
	Basic Pay	5,00,000
<b>Add</b>	Net cost to employer towards lease rent paid for accommodation provided to an employee [ = lease rent paid less amount recovered from employee] = [2,00,000 (-) 40,000]	1,60,000
<b>Add</b>	Employer's Contribution to PF	75,000
<b>Add</b>	Reimbursement of Medical Expenses	67,000
<b>Add</b>	Hospitalisation expenses of employee's family member paid by the employer	19,000
<b>Add</b>	Festival Bonus	20,000
	<b>Employee Cost</b>	<b>8,41,000</b>

**Note:**

- (i) Festival advance is a recoverable amount, hence not included in employee cost.
- (ii) Employee's contribution to PF is not a cost to the employer, hence not considered.

**Illustration 59: Measurement of Employee Cost (with special items)**

**Gross pay ₹10,30,000 (including cost of idle time hours paid to employee ₹25,000); Accommodation provided to employee free of cost [this accommodation is owned by employer, depreciation of accommodation ₹1,00,000, maintenance charges of the accommodation ₹90,000, municipal tax paid for this accommodation ₹3,000], Employer's Contribution to P.F. ₹1,00,000 (including a penalty of ₹2,000 for violation of PF rules), Employee's Contribution to P.F. ₹75,000. Compute the Employee cost.**

**Solution:**

Computation of Employee Cost

	Particulars	Amount (₹)
	Gross Pay ( net of cost of idle time) =[10,30,000 (-) 25,000]	10,05,000
<b>Add</b>	Cost of accommodation provided by employer = Depreciation (+) Municipal Tax paid (+) maintenance charges = 1,00,000 + 90,000 + 3,000 = 1,93,000	1,93,000
<b>Add</b>	Employer's Contribution to PF excluding penalty paid to PF authorities [= 1,00,000 (-) 2,000]	98,000
	<b>Employee Cost</b>	<b>12,96,000</b>

**Note:**

- (i) Assumed that the entire accommodation is exclusively used by the employee. Hence, cost of accommodation provided includes all related expenses/costs, since these are identifiable/traceable to the cost centre.
- (ii) Cost of idle time hours is assumed as abnormal. Since it is already included in the gross pay, hence excluded.
- (iii) Penalty paid to PF authorities is not a normal cost. Since, it is included in the amount of contribution, it is excluded.

**Illustration 60: Measurement of Employee Cost (with special items)**

**Trial Balance as on 31.3.2012 (relevant extracts only)**

Particulars	Amount (₹)	Particulars	Amount (₹)
Materials consumed	25,00,000		
Salaries	15,00,000	Special Subsidy received from Government towards Employee salary	2,75,000
Employee Training Cost	2,00,000	Recoverable amount from Employee out of perquisites extended	35,000
Perquisites to Employees	4,50,000		
Contribution to Gratuity Fund	4,00,000		
Lease rent for accommodation provided to employees	3,00,000		
Festival Bonus	50,000		
Unamortised amount of Employee cost related to a discontinued operation	90,000		

**Solution:**

## Computation of Employee Cost

	<b>Particulars</b>	<b>Amount (₹)</b>
	Salaries	15,00,000
<b>Add</b>	Net Cost of Perquisites to Employees = Cost of Perquisites (-) amount recoverable from employee = 4,50,000 (-) 35,000	4,15,000
<b>Add</b>	Lease rent paid for accommodation provided to employee	3,00,000
<b>Add</b>	Festival Bonus	50,000
<b>Add</b>	Contribution to Gratuity Fund	4,00,000
<b>Less</b>	Special subsidy received from Government towards employee salary	(2,75,000)
	<b>Employee Cost</b>	<b>23,90,000</b>

**Note:**

- (i) Recoverable amount from employee is excluded from the cost of perquisites.
- (ii) Employee training cost is not an employee cost. It is to be treated as an Overhead, hence, not included.
- (iii) Special subsidy received is to be excluded, as it reduces the cost of the employer.
- (iv) Unamortized amount of employee cost related to a discontinued operation is not an includible item of cost.

**SELF EXAMINATION QUESTIONS:**

1. What is Labour Turnover and what are the costs associated with it?
2. What are the causes of Labour Turnover? Suggest remedial measures to reduce the Labour Turnover?
3. How do you measure Labour Turnover?
4. What are the various methods of Time Keeping and Time Booking? Also distinguish Time Keeping and Time Booking.
5. How do you treat idle time in Cost Accounts as per CAS – 7?
6. How do you treat overtime in Cost Accounts?
7. What are the various wage payment methods?
8. What are the essentials of good remuneration system?
9. What are the advantages and disadvantages of Piece Rate System?
10. How do you treat the following in Cost Accounts:
  - a) Supervisor's salary
  - b) Night shift allowance
  - c) Last time due to major overhauling
11. Write short notes on:
  - a) Time and Motion Study
  - b) Works study and Work Measurement.
  - c) Job Evaluation
  - d) Merit Rating



- e) Straight Piece Rate vs. Differential Piece Rate
  - f) Halsey Plan
  - g) Rowan Plan
  - h) Guide lines for ascertaining the Labour Cost as per CAS – 7
12. State whether the following statements are true or false?
- a) Time recording clocks can be successfully used for recording time of workers in large undertakings.
  - b) Outworkers are those who are sent to sites or customer's premises for performing work.
  - c) Idle time arises only when workers are paid on time basis.
  - d) Personnel department is concerned with proper recruitment, placement and training of workers.
  - e) Wages paid for abnormal idle time are added to wages for calculating prime cost.
  - f) In India, if a worker works for more than 8 hours on any day or for more than 40 hours in a week, he is treated to be engaged in overtime.
  - g) The two principal systems of wage payment are payment on the basis of time and payment on the basis of work done.
  - h) The piece rate system of wage payment cannot be successfully applied where quantity of output can be measured.
  - i) A good system of wage payment should not ensure equal pay for equal work.
- [Ans: (True : a; b; c; d; g) (False : e; f; h; i)]

#### PRACTICE PROBLEMS:

13. What will be the earnings of a worker at 60 paise per hour when he takes 100 hours to do a volume of work for which the standard time is 160 hours the plan of payment for bonus is on a sliding scale as under:
- Within the first 10% saving in the Standard time, the Bonus is : 40% of the Time Saved.  
Within the second 10% saving in the Standard Time, the bonus is : 50% of the Time Saved.  
Within the third 10% saving in the Standard Time, the bonus is : 60% of the Time Saved.  
Within the Fourth 10% saving in the Standard Time, the Bonus is : 70% of the Time Saved.  
For the rest of the time saved : 75% of the Time Saved.

**[Ans: Total earnings ₹ 79.44]**

14. Using Taylor's differential piece rate system find out the earnings of X and Y from the following particulars:
- |                              |              |
|------------------------------|--------------|
| Standard time per piece      | - 20 minutes |
| Normal rate per hour         | - 90 paise   |
| In a 9 hour day : X produced | - 25 units   |
| Y produced                   | - 30 units   |

[Ans: X : ₹ 6.23; Y : ₹ 15.75]

15. The following are particulars applicable to a work process.
- |           |                      |
|-----------|----------------------|
| Time rate | - ₹5 per hour.       |
| High task | - 40 units per week. |

Piece rate above high task - ₹6.50 per unit.

In a 40 hour week, the production of the workers:

A - 35 units B - 40 Units C - 41 units D - 52 units

Calculate the wages of the workers under Gantt Task Bonus.

Ans: A : ₹ 200; B : ₹ 240; C : ₹ 266.5; D : ₹ 338]

16. In a unit, 10 men work as a group. When the production of the group exceeds the Standard output of 200 pieces per hour, each man is paid an incentive for the excess production in addition to his wages at hourly rates. The incentive is at half the percentage, the excess production over the standard hours bears to the standard production. Each man is paid an incentive at the rate of this percentage of a wage rate of ₹2 per hour. There is no relation between the individual work man's hourly rate and the bonus rate.

In a week, the hours worked are 500 hours and total production is 1,20,000 units.

- a) Compute the total amount of bonus for the week.  
b) Calculate the total earnings of two workers A and B of the group:

A worked 44 hours and his basic rate per hour was ₹ 2.20

B worked 48 hours and his basic rate per hour was ₹ 1.90

[Ans: a) Total Bonus for the week is ₹ 100

b) Earnings of A : ₹ 105.6; B : ₹ 100.8]

17. In a factory bonus system, bonus hours are credited to the employee in the proportion of time taken which time saved based to time allowed. Jobs are carried forward from one week to another. No overtime is worked and payment is made in full for all units worked, and including those subsequently rejected.

From the following information you are required to Calculate for each employee

- a) The bonus hours and amount of bonus earned;  
b) The total wages cost; and  
c) The wages cost of each good unit produced.

	A (₹)	B (₹)	C (₹)
Basic wage rate/hour	0.25	0.40	0.30
Units produced	2,500	2,200	3,600
Time allowed/100 units	2 hr.36 min	3 hrs.	1 hrs.30 min.
Time taken	52 hrs.	75 hrs.	48 hrs.
Rejects	100 units	40 units	400 units.

[Ans: A : 13 hrs; B : Nil; C : 6 hrs

Amount of bonus A : ₹ 2.6; B : Nil; C : ₹ 1.6

Total wages cost A : ₹ 15.6; B : ₹ 30; C : ₹ 16

Cost of good units produced A : ₹ 0.0065; B : ₹ 0.0139; C : ₹ 0.005]

18. In a factory bonus to workman is paid according to using the Rowan plan. Time allotted for a job is 40 hours and the normal rate of wages is ₹ 1.25 per hour. The factory overhead charges are 50 paise per hour for the hours taken.



The factory cost of a work order executed by a worker is ₹ 155,468. The cost of material is ₹100. Calculate the hours of time taken by the workman to complete the work order.

**[Ans: Actual hrs 25]**

19. A Company's basic wages rate is Re. 0.45 per. Hour and its overtime rates are:

Evenings – time and one-third;

Week-ends – double time.

During the previous year the following hours were worked:

Normal Time	4,40,000 Clock hours
Time plus one-third	40,000 Clock hours
Double time	20,000 Clock hours

The following times have been worked on the stated jobs:

	Job X	Job Y	Job Z
	Clock Hours	Clock Hours	Clock Hours
Normal Time	6,000	10,000	8,000
Evening Overtime	600	1,200	2,100
Week-end overtime	200	100	600

You are required to calculate the labour cost chargeable to each job in each of the following circumstances;

Where overtime is worked regularly throughout the year as a company policy due to labour shortage.

Where overtime is worked irregularly to meet spasmodic production requirements.

Where overtime is worked specially at the customer's request to expedite delivery.

State briefly the reason for each method.

[Ans: Job X : ₹ 3,240; Job Y : ₹ 5,310; and Job Z : ₹ 5,400]

20. A factory department has 180 workers who are paid an average of ₹ 17.50 per week (48 hours), dearness allowance per month (208 hours) of ₹ 130, provident fund deduction is at 8% on gross of which  $1\frac{1}{2}\%$  is for family pension fund of half the number of workers, and Employees' State Insurance is at ₹ 1.25 for each. The Company gives only a minimum bonus of  $8\frac{1}{2}\%$  and allows statutory leave of two weeks per year with pay. Show the weekly wage summary for the financial books and the department labour hour costs for job costing.

**Ans:** Net Wages ₹ 8,354; Labour cost per hour ₹ 1.22

21. An article passes through five hand operations as follows:

Operation No.	Time per article	Grade Worker	Wage rate per hour
1	15 minutes	A	Re. 0.65
2	25 minutes	B	Re. 0.55
3	10 minutes	C	Re. 0.45
4	30 minutes	D	Re. 0.40
5	20 minutes	E	Re. 0.35

The factory works a 40- hour week, and the production target is 600 dozen per week. Prepare a statement showing for each operation and in total the number of operations required, the labour cost per dozen and the total labour cost per week to produce the target output.

**Ans:** Total labour Cost ₹ 5,640; Labour cost per dozen ₹ 9.40

22. The Cost Accountant of Y Ltd. has computed labour turnover rates for the quarter ended 31<sup>st</sup> March, 2007 as 10%, 5% and 3% respectively under 'Flux method'. 'Replacement method' and 'Separation method' respectively. If the number of workers replaced during that quarter is 30, find out the number of:

1) Workers recruited and joined and (2) workers left and discharged.

**Ans:**

1) No. of workers recruited and joined 42. 2) No. of workers left and discharged comes to 18

23. A, B and C were engaged on a group task for which a payment of ₹ 725 was to be made. A's time basis wages are ₹ 8 per day, B's ₹ 6 per day and C's ₹ 5 per day. A worked for 25 days. B worked for 30 days; and C for 40 days. Distribute the amount of ₹ 725 among the three workers.

[Ans: A : ₹ 250; B : ₹ 225; C : ₹ 250]

24. Wage negotiations are going on with the recognized Labour Union and the management wants you as the Cost Accountant of the Company to formulate an incentive scheme with a view to increase productivity.

The case of three typical workers Achyuta, Ananta and Govinda who produce respectively 180, 120 and 100 units of the company's product in a normal day of 8 hours is taken up for study.

Assuming that day wages would be guaranteed at 75 paise per hour and the piece rate would be based on a standard hourly output of 10 units, calculate the average labour cost for the company to produce 100 pieces under i) Day wages, ii) Piece rate, iii) Halsey scheme, and iv) The Rowan scheme.

[Ans: Day wages ₹ 450; Piece Rate: ₹ 7.5; Halsey Scheme ₹ 6; Rowan Scheme ₹ 6.13]

25. Both direct and indirect labours of a department in a factory are entitled to production bonus in accordance with a group incentive scheme, the outline of which is as follows:

For any production in excess of the standard rate fixed at 16,800 tonnes per month (of 28 days) a general incentive of ₹ 15 per tone is paid in aggregate. The total amount payable to each separate group is determined on the basis of an assumed percentage of such excess production being contributed by it, namely @ 65% by direct labour, @ 15% by inspection staff, @ 12% by maintenance staff and @ 8% by supervisory staff.

Moreover, if the excess production is more than 20% above the standard, direct labour also get a special bonus @ ₹ 5 per tonne for all production in excess of 120% of standard.

Inspection staff are penalized @ ₹ 20 per tonne for rejection by customer in excess 2% of production.

Maintenance staffs are also penalized @ ₹ 20 per hour for breakdown.

From the following particulars for a month, work out production bonus earned by each group:

a) Actual working days	25
b) Production	21,000 tonnes
c) Rejection by customer	Tonnes
d) Machine breakdown	40 hours

[Ans: Direct Labour : ₹ 73,500; Inspection Staff : ₹ 11,900; Maintenance Staff ₹10,000; Supervisory Staff ₹ 7,200]

## 2.3 DIRECT EXPENSES (CAS – 10)

Direct expense or chargeable expense is that which can be allocated to a cost centre or cost unit and indirect expense is that which needs to be apportioned. There may be items of expense direct in relation to some cost centre. Thus rent and rates, heating & lighting, depreciation & insurance are often allocated or charged directly to the appropriate service cost centre, the totals of service department cost are however, apportioned to other cost centres before being absorbed by cost units as overheads. These costs are direct costs of the first cost centre, but indirect costs of other production cost centres, as well as being indirect cost of cost units.

Direct expenses as defined in CAS-10, '*Expenses relating to manufacture of a product or rendering a service, which can be identified or linked with the cost object other than direct material cost and direct employee cost*'

The more a factory is departmentalized, the greater will be the proportion of expenses which can be classified as direct. Thus cost of medicines, first aid, and other expenses in connection with the medical service are direct expenses of medical service department, but if there is no medical service department, the expenses would have been distributed to all the cost centres at the very beginning.

The following expenses may be treated as direct expenses:-

- (a) Cost of patents, royalty payment;
- (b) Hire charges in respect of special machinery or plant;
- (c) Cost of special patterns, cores, designs or tools;
- (d) Experimental costs and expenditure in connection with models and pilot schemes;
- (e) Architects, surveyors and other consultants fee;
- (f) Travelling expenses to sites;
- (g) Inward charges and freight charges on special material.

A direct expense in relation to a product forms part of the Prime Cost. Indirect expenses are treated as Overheads. In relation to products, direct material is a material that becomes a part of it and can be physically traced in some form in the finished products, where as the direct expenses are cost providing services or other kinds of special charges, but no trace of them can be obtained in the finished product like raw material. Both the direct material and direct expenses forms part of the Prime Cost.

### **General principles of measurement of Direct Expenses as per CAS-10:**

- (a) Identification of direct expenses shall be based on traceability in an economically feasible manner.
- (b) Direct expenses incurred for bought out resources shall be determined at invoice price including all taxes and duties and any other expenditure directly attributable there to net of trade discounts, taxes and duties refundable or to be credited.
- (c) Direct expenses incurred in lump-sum shall be amortized on the basis of estimated output or benefit to be derived from such expenses.
- (d) Finance cost incurred in connection with self generated or procured resources shall not form part of the direct expenses.
- (e) Any subsidy or grant or incentive or any amount received or receivable with respect to any direct expenses shall be reduced for ascertainment of the cost of the cost object.
- (f) Penalties / damages paid to statutory authorities shall not be form part of the direct expenses.
- (g) Any change in the cost accounting principles applied for measurement of the direct expenses should be made only if it is required by law or for compliance with the requirements of a Cost

Accounting Standard or a change would result in a more appropriate preparation or presentation of Cost Statement of the organization.

**The Cost Statement shall disclose the following items of Direct Expenses as per CAS-10:**

- (a) The basis of distribution of direct expenses to cost objects / cost units.
- (b) Quantity and rates of items of direct expenses as applicable.
- (c) Where direct expenses are accounted at standard cost the price and usage variance.
- (d) Direct expenses representing procurement of resources and expenses incurred in connection with resources generated.
- (e) Direct expenses paid or payable to related parties.
- (f) Direct expenses incurred in foreign currency.
- (g) Any subsidy / incentive and any such payment received from direct expenses.
- (h) Credits or recoveries relating to the direct expenses.
- (i) Any abnormal portion of direct expenses.
- (j) Penalties and damages excluded from direct expenses.
- (k) Disclosure shall be made only when material, significant and quantifiable. Disclosures shall be made in the body of the Cost Statement or as a foot note or as a separate schedule.

**Cost Accounting Standard-10: Direct Expenses**

**Direct Expenses: Expenses relating to manufacture of a product or rendering a service, which can be identified or linked with the cost object other than direct material cost and direct employee cost.**

Examples of Direct Expenses are royalties charged on production, job charges, hire charges for use of specific equipment for a specific job, cost of special designs or drawings for a job, software services specifically required for a job, travelling Expenses for a specific job.

**Measurement of Direct Expenses: Inclusions and Exclusions:**

The following items are to be '**included**' for the purpose of measuring employee cost:

- (i) Costs which are directly traceable/identifiable with the cost object
- (ii) Expenses incurred for the use of bought in resources
- (iii) Price variance if such expenses are accounted for at standard cost

The following items are to be '**excluded**' for the purpose of measuring employee cost:

- (i) If not traceable/identifiable should be considered as overheads
- (ii) Finance cost is not a direct expense
- (iii) Imputed cost ( example, if the owner of a company engages himself for facilitating the production or gets actively engaged in production or rendering of services, this would be an imputed cost)
- (iv) Recoveries, credits, subsidy, grant, incentive or any other which reduces the cost
- (v) Penalty, damages paid to statutory authorities

**Illustration 61: Measurement of Direct Expenses**

**Royalty paid on sales ₹30,000; Royalty paid on units produced ₹20,000, hire charges of equipment used for production ₹2,000, Design charges Rs.15,000, Software development charges related to production ₹22,000. Compute the Direct Expenses.**

**Solution:**

Computation of Direct Expenses

	Particulars	Amount (₹)
	Royalty paid on Sales	30,000
<b>Add</b>	Royalty paid on units produced	20,000
<b>Add</b>	Hire charges of equipment used for production	2,000
<b>Add</b>	Design Charges	15,000
<b>Add</b>	Software development charges related to production	22,000
	<b>Direct Expenses</b>	<b>89,000</b>

**Note:**

- (i) Expenses are related to either manufacturing of the product or rendering of service
- (ii) These costs are directly identifiable and can be linked with the cost object and are not related to direct material cost or direct employee cost. Hence, these are considered as Direct Expenses.

**Illustration 62: Measurement of Direct Expenses – allocation to cost object products (in a multi-product situation)**

A manufacturing unit produces two products X and Y. The following information is furnished:

Particulars	Product X	Product Y
Units produced ( Qty)	20,000	15,000
Units Sold (Qty)	15,000	12,000
Machine Hours utilised	10,000	5,000
Design charges	15,000	18,000
Software development charges	24,000	36,000

Royalty paid on sales ₹54,000 [ @ ₹2 per unit sold, for both the products]; Royalty paid on units produced ₹35,000 [ @ Re.1 per unit purchased, for both the products], Hire charges of equipment used in manufacturing process of Product X only ₹5,000, Compute the Direct Expenses.

**Solution:**

Computation of Direct Expenses

	Particulars	Product X	Product Y
	Royalty paid on Sales	30,000	24,000
<b>Add</b>	Royalty paid on units produced	20,000	15,000
<b>Add</b>	Hire charges of equipment used in manufacturing process of Product X only	5,000	----
<b>Add</b>	Design Charges	15,000	18,000
<b>Add</b>	Software development charges related to production	24,000	36,000
	<b>Direct Expenses</b>	<b>94,000</b>	<b>93,000</b>

**Note:**

- (i) Royalty on production and royalty on sales are allocated on the basis of units produced and units sold respectively. These are directly identifiable and traceable to the number of units produced and units sold. Hence, this is not an apportionment.
- (ii) No adjustments are made related to units held, i.e. closing stock.

## 2.4 OVERHEADS (CAS-3)

An overhead is the amount which is not identified with any product. The name overhead might have come due to the reason of over and above the normal heads of expenditure. It is the aggregate of indirect material, indirect labour and indirect expenditure. The generic term used to denote indirect material, indirect labour and indirect expenses. Thus overheads forms a class of cost that cannot be allocated or absorbed but can only be apportioned to cost units.

In earlier days, overheads were not given much importance, because the prime cost constitutes 50-80% of the total cost. However, with the modern trend towards the mechanisation, automation, and mass production, overhead costs have grown considerably in size and in many undertakings the proportion of overhead costs to the total costs of products is appreciably high. High overheads do not indicate inefficiency if the increase in overheads is due to the following likely causes:

- (a) Improved methods of managerial control like Accountancy, Production Control, Work Study, Cost and Management Accountancy...etc. In the process of reducing costs of other elements, viz. direct material and direct labour, overhead costs are likely to increase.
- (b) Large scale production or mass production.
- (c) Use of costly machines and equipments increases the amounts of depreciation, maintenance expenditure and similar other items of overhead costs.
- (d) Less human efforts are necessary with automatic machines. A major portion of the cost is allocated direct to machines, thus increasing the machine overhead costs.
- (e) Increased efficiency and productivity of labour has the effect of pushing up the overhead to direct labour ratio.

According to CIMA, overhead costs are defined as, 'the total cost of indirect materials, indirect labour and indirect expenses'. Thus all indirect costs like indirect materials, indirect labour, and indirect expenses are called as 'overheads'. Examples of overhead expenses are rent, taxes, depreciation, maintenance, repairs, supervision, selling and distribution expenses, marketing expenses, factory lighting, printing stationery etc. As per CAS-3, overheads are defined as follows 'Overheads comprise costs of indirect materials, indirect employees and indirect expenses which are not directly identifiable or allocable to a cost object in an economically feasible manner'

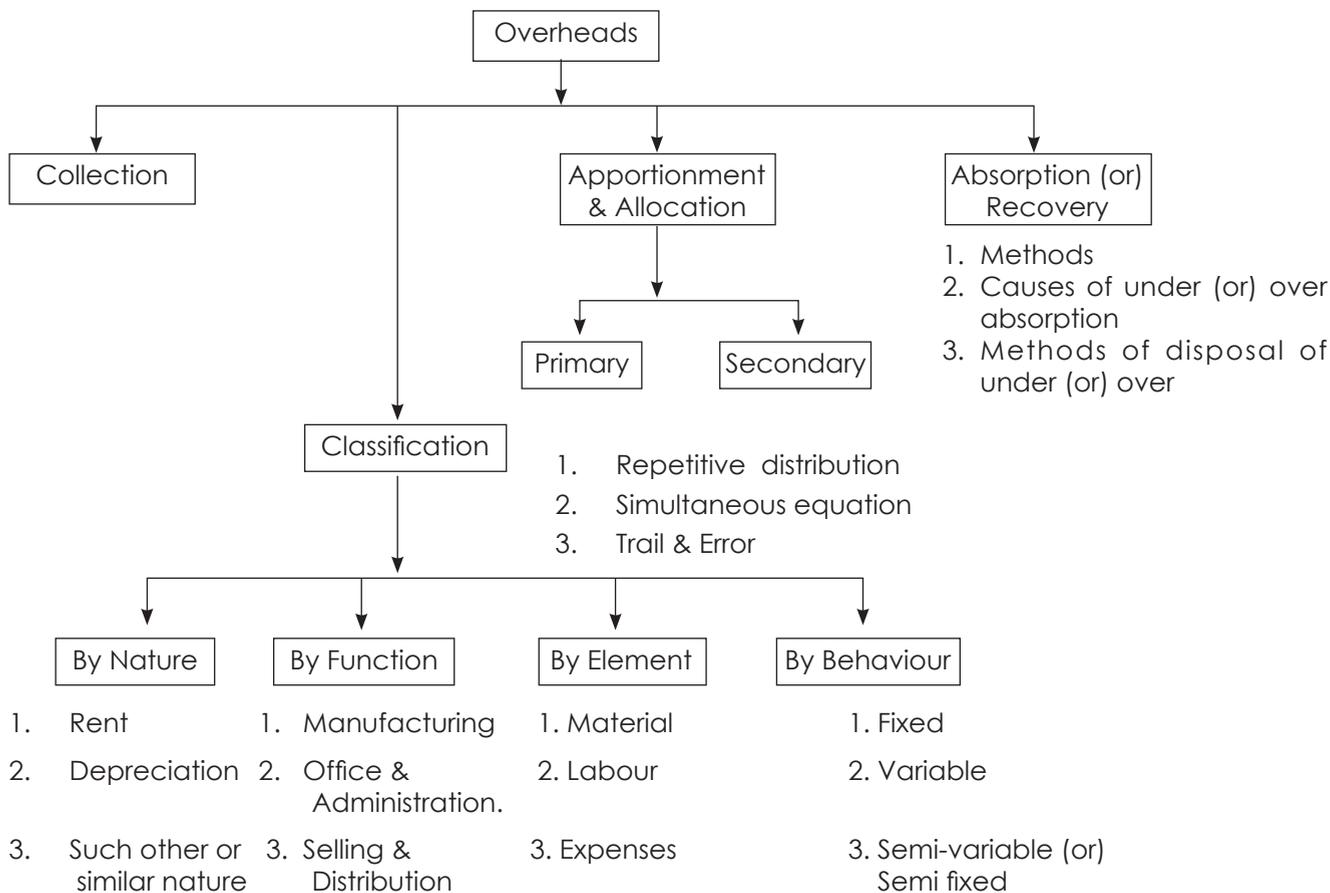
### Overhead Accounting

The ultimate aim of Overhead Accounting is to absorb them in the product units produced by the firm. Absorption of overhead means charging each unit of a product with an equitable share of overhead expenses. In other words, as overheads are all indirect costs, it becomes difficult to charge them to the product units. In view of this, it becomes necessary to charge them to the product units on some equitably basis which is called as 'Absorption' of overheads. The important steps involved in Overhead Accounting are as follows:-

- (a) Collection, Classification and Codification of Overheads.
- (b) Allocation, Apportionment and Reapportionment of overheads.
- (c) Absorption of Overheads.

As mentioned above, the ultimate of Overhead Accounting is 'Absorption' in the product units. This is extremely important as accurate absorption will help in arriving at accurate cost of production. Overheads are indirect costs and hence there are numerous difficulties in charging the overheads to the product units.

Study of Overheads can be better understood from the following diagram:



**(a) Collection, Classification and Codification of Overheads: -**

These concepts are discussed below:-

**Collection of Overheads:**

Document	Overhead Costs	Nature
Stores Issue note, purchase voucher	Indirect material	Consumables, lubricants etc.
Payroll sheets, time sheets	Indirect labour	Wages, salaries, contribution to statutory benefits, bonus, incentives, idle time
Cash books	Indirect material, Indirect labour & indirect expenses	All type of costs
Subsidiary records – journal	Indirect material, Indirect labour & indirect expenses	For provisions of costs that are not actually paid for
Other reports	Indirect expenses	Depreciation, scrap, wastage etc.

Overheads collection is the process of recording each item of cost in the records maintained for the purpose of ascertainment of cost of each cost centre or unit.

The following are the source documents for collection of overheads:-

- (i) Stores Requisition
- (ii) Wages Sheet
- (iii) Cash Book
- (iv) Purchase Orders and Invoices
- (v) Journal Entries
- (vi) Other Registers and Records

Source document and the nature of overheads are enumerated as below.

For the purpose of overhead accounting, collection of overheads is very important. It is necessary to identify the indirect expenses and the above mentioned source documents are used for this. Proper collection of overhead expenses will help to understand accurately the total overhead expenses.

### **Classification of Overheads**

Classification is defined by CIMA as, 'the arrangement of items in logical groups having regard to their nature (subjective classification) or the purpose to be fulfilled (Objective classification). In other words, classification is the process of arranging items into groups according to their degree of similarity. Accurate classification of all items is actually a prerequisite to any form of cost analysis and control system. Classification is made according to the following basis:

*Based on Elements:* Indirect Materials, Indirect labour and Indirect expenses.

*Based on Functions of the organisation:* Manufacturing overheads, Administrative overheads, Selling and Distribution overheads, Research & Development overheads.

*Based on the Behaviour:* Fixed Overheads, Variable Overheads & Semi variable overheads.

### **Classification according to Elements**

According to this classification overheads are divided according to their elements. The classification is done as per the following details:-

#### **Indirect Materials**

Materials which cannot be identified with the given product unit of cost centre is called as indirect materials. As per CAS-3 indirect material cost is defined as 'Materials, the cost of which cannot be directly attributed to a particular cost object'. For example, lubricants used in a machine is an indirect material, similarly thread used to stitch clothes is also indirect material. Small nuts and bolts are also examples of indirect materials.

#### **Indirect Labour**

As per CAS-3, indirect employee cost is the employee cost, which cannot be directly attributed to a particular cost object. Wages and salaries paid to indirect workers, i.e. workers who are not directly engaged on the production are examples of indirect wages.

#### **Indirect Expenses**

As per CAS-3, Indirect Expenses are expenses, which cannot be directly attributed to a particular cost object. Expenses such as rent and taxes, printing and stationery, power, insurance, electricity, marketing and selling expenses etc. are the examples of indirect expenses.

### **Functional Classification**

Overheads can also be classified according to their functions.

This classification is done as given below:-



## Manufacturing Overheads

As per CAS-3, Indirect Cost involved in the production process or in rendering service. Manufacturing overheads has different names such as Production Overheads, Works Overheads, Factory Overheads. Indirect expenses incurred for manufacturing are called as Manufacturing Overheads. For example, factory power, works manager's salary, factory insurance, depreciation of factory machinery and other fixed assets, indirect materials used in production etc. It should be noted that such expenditure is incurred for manufacturing but cannot be identified with the product units.

Manufacturing is a separate function like administration, selling and distribution. The term manufacturing stands for activities, which begin with receipt of order and end with completion of finished product. Manufacturing Overhead represents all manufacturing costs other than direct materials and direct labour. These costs cannot be identified specifically with or traced to cost object in an economically feasible way. In other words, manufacturing overhead are indirect manufacturing costs. The term overhead is peculiar and therefore, there is a growing tendency to prefer the term indirect manufacturing cost to overhead. Following synonyms have been used for Manufacturing Overhead:-

- (i) Factory overhead;
- (ii) Manufacturing overhead;
- (iii) Factory on cost;
- (iv) Works on cost;
- (v) Factory burden and;
- (vi) Manufacturing expenses.

Given below are a few examples of different items included in different groups of manufacturing overhead:

**Indirect Material Cost:** Glue, thread, nails, rivets, lubricants, cotton waste, etc.

**Indirect Labour Cost:** Salaries and wages of foremen and supervisors, inspectors, maintenance, labour, general labour; idle time etc.

**Indirect Services Costs:** Factory Rent, factory insurance, depreciation, repair and maintenance of plant and machinery, first aid, rewards for suggestions for welfare, repair and maintenance of transport system and apportioned administrative expenses etc.

Manufacturing Overhead further explains in apportionment, allocation and absorption.

## Administrative Overheads

Indirect expenses incurred for running the administration are known as Administrative Overheads. As per CAS-3, Administrative Overheads are defined as Cost of all activities relating to general management and administration of an organisation.

As per the functional classification, Administration Overheads comprise of those indirect costs which are related to the general administrative function in the company. Such functions are related to policy formulation, directing the organisation and controlling the operations of the company. Administration overheads are incurred for the benefit of organisation as a whole. Controlling them is difficult for they do not vary with most of the variables viz. production or sales. Examples of such overheads are, office salaries, printing and stationery, office telephone, office rent, electricity used in the office, salaries of administrative staff etc. The size as well as control over these overheads depends largely on decisions of management. Organisations growing very fast face the problem of controlling Administrative Overheads. Multi-location set up leads to duplication of many administrative costs.

## Collection and Absorption of Administration Overheads

The collection of overheads is done firstly by nature of the expenses through the chart of accounts. Administrative departments in an organisation could be Corporate Office, Finance and Accounts,

Company Secretary, Human resources, Legal, General Administration. The overheads that are common to all these departments are apportioned on some suitable basis e.g. in the following manner:

- (a) For Office rent, rates & taxes - Floor space as the basis,
- (b) For Depreciation on office building - Floor space as the basis
- (c) For Legal fees - No of cases handled as the basis
- (d) For Salaries of common staff - Ratio of salaries of departments as the basis
- (e) For Typist pool - No of documents typed as the basis

Absorption of the Administrative Overheads into cost units is very difficult. Many times it is advised that these overheads may not be absorbed into product units because of the difficulty and non-relevance of them with production activity. Normally, the Administrative Overheads are totalled together and then using a suitable basis, a rate of recovery is arrived at to absorb the same. It could be mostly a percentage of Works cost or factory cost. Based on the principle of '*charging what the traffic can bear*', the absorption could be on the basis of a percentage of gross profit. Whatever method selected, it will be arbitrary and could lead to erroneous conclusions. A Cost Accountant has to use all the experience and history of the organisation before he selects a particular method to adopt.

### **Treatment of Administration Overheads**

There are three different ways of treating the administration overheads as follows:-

#### **1) Apportion between Production and Selling & Distribution functions:**

This treatment is based on the logic that the administrative functions are for the entire company and these functions facilitate both production as well as selling. In other words, the absorption of Administration Overheads would happen through Production and Selling Overheads. This means these overheads lose their identity. The problem is of course, selection of basis to divide these overheads over the two principal functions of production and selling.

#### **2) Transfer to P & L Account**

This method agrees that administrative costs are all time based costs and as such bear no relation what is produced or what is sold. These are mainly of fixed nature. Hence there is no point in dividing them further to be included in the cost of production or cost of selling. They should be simply charged to the P & L Account. However, this may lead to undervaluation of stocks.

#### **3) Treating as a separate addition to cost of production & sales**

In this method, administration is treated as a separate function and is added as a separate line in the cost computation sheet for a job or an order. Here again, the basis for inclusion as a part of cost of a job is a difficult choice. Generally, a percentage of factory cost is taken as a basis. A care needs to be taken to ensure that the Administration Overheads are charged equitably to Cost of Sales, FG stock and WIP as well.

### **Controlling Administration Overheads**

Given the nature of these expenses, they cannot be controlled at the lower level of management. They can be better controlled by top management as they pertain to formulating policy and directing the organisation. The first step in the control mechanism is proper classification of expenses & departmentalisation. The actual expenses are collected for each department and then compared with a bench mark. Deviation are analysed and causes for increase are mitigated by fixing responsibility on the departmental head.

The control benchmarking can be done with respect to:

- (i) Figures of the previous year. Expenses could be compared with the figures of previous year and increase or decrease are analysed. However, comparison with previous year may not help as the condition may have totally changed from one year to the other.
- (ii) Use of budgets. Budgets are estimates for the current year, and they take into account the changed conditions. They also built in the year's complete plan which would factor all changes in the cost structure. It is advisable to compare budgeted overheads with actual for control purpose.
- (iii) Use of standards. Although very scientific, this method is difficult to operate. Administrative activities (being very subjective) cannot be standardised. On a certain level it can be applied e.g. the time taken to process a voucher by accountant can be standardised, or time taken for processing a payment could be standardised.

### **Selling and Distribution Overheads**

As per CAS-3, *Selling Overheads*, also known as *Selling Costs*, are the expenses related to sale of products and include all *Indirect Expenses in sales management for the organization*. Overheads incurred for getting orders from consumers are called as *Selling Overheads*. On the other hand, overheads incurred for execution of order are called as *Distribution Overheads*. As per CAS-3, *Distribution Overheads*, also known as *Distribution Cost*, are the cost incurred in handling a product from the time it is ready for dispatch until it reaches the ultimate consumer. Examples of *Selling Overheads* are sales promotion expenses, marketing expenses, salesmen's salaries and commission, advertising expenses etc. Examples of *Distribution Overheads* are warehouse charges, transportation of outgoing goods, packing, commission of middlemen etc.

The magnitude of S & D Overheads in the total cost would depend on many factors such as nature of the product, type of customers, spread of market, statutory restrictions etc. A consumer product needs heavy expense on advertising. A sale to institutions rather than individual customers needs a different selling effort. Distribution Costs will increase if the spread of the market is large. Some activities cannot be advertised at all such as a Doctor, a Cost Accountant. The total magnitude of S & D Costs and the proportion of selling and distribution efforts will decide the treatment thereof and control mechanisms to be used. For some of selling expenses there may not be a direct relationship with the product. If a company incurs expense on advertising, it may be difficult to relate to a specific product unless it's a product advertisement. But further, there may be a substantial time lag between the expense and the benefit arising out of that. In case of Distribution Costs many of them may be possibly linked to the product.

### **Collection and Absorption of S&D Overheads**

While classifying the S & D Costs are properly bifurcated and coded accordingly. This could be done by having separate account codes for *Selling Overheads* such as: advertising, sale commission, travelling expense, communication, exhibition, market survey, free samples, credit & collection costs, bad debts, and *Distribution* expenses such as: transportation vehicle related expenses, warehousing and storage at different places, depreciation. Depending upon the size of the organization, there may be proper departmentalization of S&D activities. The departments could be:

- Sales head office
- Sales regional offices
- Depots
- Direct selling department
- Dealers management
- Credit and collection (commercial)

The costs are collected through various source documents under the above heads and for the above departments. For absorption, the basis to be used will have practical difficulties, as one will have to look for a relationship between the expenses and the cost unit. Some expenses like sales commission, shipping costs, and direct selling expenses can be absorbed directly. The other expenses can be absorbed on the basis of either sales value, cost of goods sold, gross profit or number of units sold. Out of these the sales value method is the most commonly used.

### **Control over S & D Expense**

The S & D Expenses are related to sales and distribution activity which is externally focused. The extent of these expenses depend mainly on external factors like consumer profile, changing habits, technology improvements etc. Controlling these expenses does not mean capping them. It aims at increasing the effectiveness of these expenses e.g. getting maximum sales per rupee of S & D Expenses. For control purpose, a great care should be taken to ensure correct classification and collection of S & D Overheads. The collected expenses must be analysed to assess the effect of them on sales. Such analysis could be done as follows:

- (a) Analysis of sales and S & D Expenses by geographical locations – This could be regions, zones, domestic and international etc.
- (b) Analysis by type of customers - This could be done as institutional, government, retail etc.
- (c) Analysis by products or services – This may be done as range of products, the application of products, brands etc.
- (d) Analysis by salesmen.
- (e) Analysis by channel of distribution – This analysis pertains to wholesalers, retailers, commission agents etc.

The analysis of sales, profits and S & D expenses on the basis of above factors will give a good insight into the performance as well as control over expenses. All these three parameters may be compared with

- Previous year;
- Budget for the current year or
- Standards for the current year

### **Research and Development Overheads**

Research Cost is defined as the cost of searching for new or improved products, new applications of material, or new or improved methods, process, systems or services. In the modern days, firms spend heavily on Research and Development. Expenses incurred on research and development is known as Research and Development Overheads. Research may be of the following types:

- (i) Pure or basic research to gain general know-how regarding the production or market, not directed towards any particular product.
- (ii) Applied research which applies the basic knowledge in practice. i.e improvement of existing products, new process, exploring of new products, improved measures of safety, etc.

Development cost is the cost of the process which begins with the implementation of the decision to use scientific or technical knowledge to produce a new or improved product or to employ a new or improved method, process, system, etc. and ends with the commencement of formal production of that product by that method. Development starts where the research ends. Development cost is the expenditure incurred for putting the results of research on a practical commercial basis.



## Special features of Research & Development Costs

The features are as follows:-

- (a) Expenditure is incurred ahead of the actual production and may not be charged to current production.
- (b) The amount of expenditure may often be substantial.
- (c) The expenditure may at times be entirely fruitless, yielding no tangible results.
- (d) Benefit of the expenditure may be realized over a number of years.
- (e) Difficulty in fixation of standards for control.

## Collection of R&D Overheads

Accumulation of Research and Development Overheads is essential for the following reasons:-

- (a) For review of cost to date.
- (b) For planning the activities subsequent to research.
- (c) For evaluation of performance with relation to past performance or for inter-firm comparison.

The collection of R&D Overheads is made through the following documents. Material requisitions, labour time cards, invoices, vouchers (royalty, patent, license, etc.). Research & Development expenditure may be identified by its nature i.e. basic or applied research or development by the elements of cost, by business sector, by project. Each Research & Development project is allotted a project work order number. Separate series of work orders or codes should be used to distinguish from regular work orders.

R & D overheads can be accumulated as follows:-

- (a) All expenditure under the direct elements (direct material, labour and expenses) must be charged to the work orders.
- (b) Expenses like supervisor salary, material handling charges, maintenance of equipments can be directly allocated to particular research work order.
- (c) Items of general overheads like depreciation of building, depreciation of maintenance equipment, share of purchase department expenses may be suitably apportioned to the research work order.

## Accounting of R&D Overheads

Accounting of Research & Development Costs arises due to the following causes:-

- (a) The expenditure is in the nature of pre-production costs and there is a considerable time lag between the incidence and expenditure and realization of benefit.
- (b) There is no immediate production, or the production is so small that it becomes difficult to charge such costs to products.

It is because of these difficulties that the accounting of Research and Development Costs has been a subject of some controversy. Three methods are available for charging Research and Development Costs as:

- (a) Charging off to the current year Profit & Loss Account.
- (b) Capitalization so that cost may be amortized on a long term basis.
- (c) Deferment and charge-off to costs of the next two or three years—a short/medium term amortization.

Research and Development may be regarded as a function of production and the Research & Development Costs may be charged to costs to be recovered through the general overhead rates. There are many arguments for and against charging the Research & Development Costs in current revenue. The arguments in support of this method are as follows:-

- (a) All research & development expenses may not result in new processes or saleable products.
- (b) Some of the research & development projects may result in failures.
- (c) These expenses may be incurred simply to maintain the present competitive position of the concern.
- (d) It is difficult to assess the period over which the know-how or knowledge acquired may be spread over.
- (e) It may be more advantageous to recover a substantial portion of the cost immediately, as the life of the new products are uncertain.
- (f) In certain cases, the effect of these research costs on future revenues may be doubtful.

The classification used for cost collection is mostly combination of elemental and functional. The behavioural classification cannot be used for booking of costs; it is used only for analysis and decision making.

Elements	Material	Labour	Expense
Factory or production or manufacturing or works overheads	Nuts & bolts, consumables, lubricants, welding electrodes, cleaning materials, nails, threads, ropes etc.	Salaries & wages to foremen, supervisors, inspectors, maintenance labour, idle time	Factory lighting & heating, factory rent, power & electricity, factory insurance, depreciation on machinery, repairs
Administrative Overheads	Printing & stationery, office supplies	Salary of office staff, managers, directors, and other administrative departments as IT, audit, credit, taxation	General office rent, insurance, telephones, fax, travel, legal fees, depreciation on office assets
Selling Overheads	Price lists, catalogues, mailings, advertising material such as leaflets, danglers, samples, free gifts, exhibition material	Salaries of sales staff & managers, commission on sales, bonus on schemes	Sales office expenses, travelling, subscription to sales magazines, bad debts, rent & insurance of showrooms, cash discount, brokerage, market research
Distribution overheads	Secondary packing, material items used in delivery vans	Salaries of delivery staff such as drivers, dispatch clerk, logistic manager	Carriage outwards, forwarding expenses, rent & insurance of warehouses & depots, insurance, running expenses & depreciation of delivery vans

## Classification based on behaviour

### Fixed Overheads

The amount of overhead tends to remain fixed for all volumes of production within a certain range. Examples of Fixed Overheads are Audit fee, Interest on capital, Depreciation of plant & machinery, Insurance, Rent of buildings, etc. A fixed overhead represents constant expenditure incurred during a period without regarding to the volume of production during that period. Even when production completely ceases in a particular period, this constant amount of expenditure will continue to be incurred partially, if not wholly. Therefore the Fixed Overheads are also known as Period Costs. Sometimes these costs are also termed as Shutdown or Stand-by Costs.

### Features of Fixed Costs

Fixed Costs are stated to be by and large uncontrollable, in the sense they are not influenced by the action of a specified member of an undertaking. For example, the supervisor has practically no control over the fixed costs like depreciation of plant & machinery. The production supervisor can only see that the maximum possible utilization of the assets is made.

The fixed overhead amount is constant per period; the cost per unit of production varies with the volume. This variation is inverse since with increase in production, cost per unit decreases as the same amount of fixed overheads is spread over larger units of production.

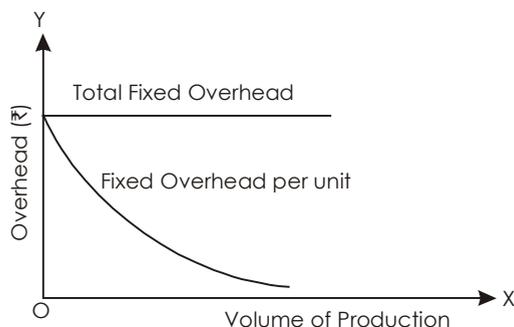
### Factors affecting the Fixed Overheads

When a plant or a department is completely idle and there is no production, several items of Fixed Overheads disappear. Fixed Overheads are thus, of two types, viz. a lower standing fixed cost when production is nil and a higher running fixed cost when the plant is running. For instance, maintenance expenditure incurred at plant shutdown has to be increased to a higher level when production starts.

Any long term change in the productive capacity of an undertaking also affects the basic characteristic of fixed overhead. Fixed costs are constant for short term periods only, within a limited range of capacity.

Another factor that affects the fixed nature of fixed overhead is the change in basic price level.

Graphical representation of Fixed Costs is depicted as below:



Fixed Costs may be broadly classified into three basic types:-

- (i) Fixed costs that have no casual relationship with the volume of output and are incurred mainly as results of policy decisions of the management. Research, development, design, employee training, advertisement and marketing expenses are examples of this expenditure. Accountants term such costs as discretionary fixed costs (also known as programmed costs or managed costs).
- (ii) Fixed costs that do not change significantly in the short term such as depreciation, rent, etc.
- (iii) Fixed costs that are fixed for short period for a particular capacity, but change considerably when there is a long-term change in the volume or capacity.

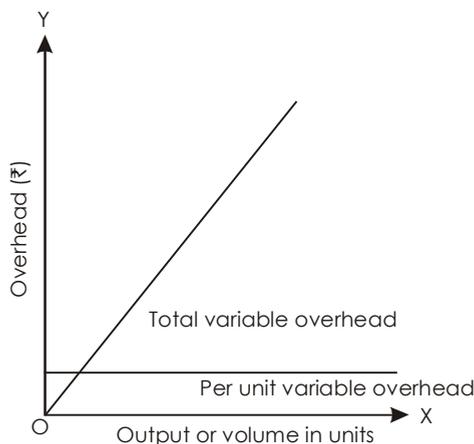
### Variable Overheads

Variable Costs are those which vary in total direct proportion to the volume of output. These costs per unit remain relatively constant with changes in production. Thus Variable Costs fluctuate in total amount but tend to remain constant per unit as production activity changes. Examples are indirect material, indirect labour, lubricants, cost of utilities, etc.

The variable overhead costs seldom reveal the characteristics of perfect variability. i.e an expenditure which varies directly with variation in the volume of output. They simply tend to vary rather than vary directly in direct proportion of output. We come across three types of variable overhead expenses in actual practice as explained below:-

- (i) 100% variable expenses. For all production the variable expenditure remains constant.
- (ii) The expense per unit of production is low at lower ranges of output but gradually increases as production goes up.
- (iii) The expenses per unit of production are more at lower ranges of output but gradually decrease with the decrease with the increase in production.

Nature of variable expenses is shown as below:-



The relationship of fixed and variable overheads with the volume of output is exhibited in the following table. The range of output is considered as 5000-10000 units. Variable overheads are taken at ₹2 per unit and fixed overheads are assumed to be at the level of ₹25000. Can you check for yourself how the graph will look like for the following figures?

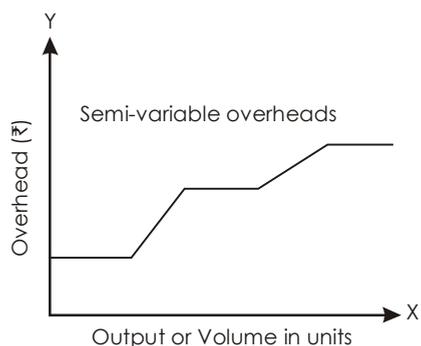
Output units	Fixed Overheads	Variable Overheads	Total Overheads	Overheads per unit		
				Fixed	Variable	Total
5000	25000	10000	35000	5.00	2.00	7.00
6000	25000	12000	37000	4.17	2.00	6.17
7500	25000	15000	40000	3.33	2.00	5.33
8000	25000	16000	41000	3.13	2.00	5.13
9000	25000	18000	43000	2.78	2.00	4.78
10000	25000	20000	45000	2.50	2.00	4.50

### Semi-Variable Overheads:

These are a sort of mixed or hybrid costs, partly fixed and partly variable costs. For example Telephone expenses, include a fixed portion of annual charge plus variable charge according to the calls. Thus total telephone expenses are semi-variable.

Semi-variable overheads are of two types:-

- (i) The expenses which change with the change in volume of output, but the variation cost is less than proportionate to change in output. Examples are power & fuel, lighting, repairs and maintenance of buildings, etc.
- (ii) The costs tend to remain constant within certain range of output, then jump up and remain constant for another range and so on.



Semi variable cost need to be classified into fixed and variable due to the following reasons:

- (a) **Effective Cost Control:** Fixed costs are in the nature of policy costs or discretionary costs and as such can be controlled by the management. However variable costs can be controlled at lower levels. Separation of two elements facilitate the fixation of responsibility, preparation of overhead budget and exercise effective control.
- (b) **Decision Making:** The classification is very useful in management decisions relating to utilization of capacity. If cost information is to be of use in such problems, it is essential that fixed and variable costs which behave differently with changes in volume should be segregated.
- (c) **Preparation of Break-even Charts:** Separation of fixed and variable cost is essential for the study of cost volume profit relationship and for the preparation of breakeven charts and profit charts.
- (d) **Marginal Costing:** The basic requirement of the technique of Marginal Costing is the separation of fixed and variable costs. While the latter are taken into consideration for the determination of Marginal Cost and contribution, the fixed costs are treated separately.
- (e) **Method of Absorption Costing:** Separate method may be adopted for determination of rates for fixed and variable costs for absorption in production. Further a separate fixed overhead rate also serves as a measure of utilization of the facilities of the undertaking; any under recovery or under absorption denotes the idle or surplus capacity or production efficiency.
- (f) **Flexible Budget:** In a Flexible Budget, the budgeted amounts vary with the levels of activity & fixed cost remains constant. It is the variable cost that varies. Breakup of overhead cost into fixed and variable is therefore necessary for establishment of budget and for the purpose of variance analysis.

Methods of classification of semi variable cost in fixed and variable

- (a) **Graphical Method** – The costs at number of levels are plotted on a graph, x-axis represents the volume and y-axis represents the amount of expenditure. A straight line known as regression line or

line of best fit is drawn between the points, plotted in such a manner that there are equal number of points on both the sides of a line and as far as practicable, pairs of points on either side are in equal distance from the line. Points falling far beyond the line are erratic and are not considered. If the regression line is drawn carefully so that most of the plotted points are on the line or not far from it, the scatter chart provides a fairly accurate method for the separation of fixed and variable.

- (b) **Simultaneous Equations** – This uses the straight line equation of  $y = m x + c$  where  $y$  represents total cost,  $m$  is variable cost per unit,  $x$  is the level of output and  $c$  is fixed costs. The total costs at two different volumes are put into these equations which are solved for the values of  $m$  and  $c$ .
- (d) **High and Low Method** – The highest and lowest levels of output and costs are taken and the differential is found. This difference arises only due to variable costs. The remaining portion will be fixed costs. Under this method the variable cost per unit will be computed first and then the fixed cost will be derived. Variable cost per unit is computed by dividing the difference in cost at highest level and lowest level with the difference in volume between highest and lowest level.
- (d) **Least Square Method** – This statistical tool uses straight line equation and finds the line of best fit to solve the equations. Also known as Simple Regression Method. Under this method first the mean of volume and mean of costs are computed. The deviations in volume ( $x$ ) from the mean and deviation in cost ( $y$ ) from mean are computed.

### Codification of Overheads

It is always advisable to codify the overhead expenses. Codification helps in easy identification of different items of overheads. There are numerous items of overheads and a code number to each one will facilitate identification of these items easily. Codification can be done by allotting numerical codes or alphabetical codes or a combination of both. Whatever system is followed, it should be remembered that the system is simple for understanding and easy to implement without any unnecessary complications.

Cost Centre codes	Department name
1100	Turning department
1200	Grinding Department
1300	Components manufacturing
1400	Assembly
2100	Maintenance
2200	Quality control
2300	Stores
3100	HR & Administration
3200	Accounts

You may observe the logic in giving the codes. All codes starting with 1 are production departments, all codes starting with 2 are factory related services and all codes starting with 3 are general services. This coding helps collection of costs on functional basis and also to identify an item of expense directly to a department or cost centre.

### Allocation, Apportionment and Reapportionment of Overheads

After the collection, classification and codification of overheads, the next step is allocation and apportionment of overheads into the product units. The following steps are required to complete this process.

## Departmentalization

Before the allocation and apportionment process starts, the first step in this direction is 'Departmentalization' of overhead expenses. Departmentalization means creating departments in the firm so that the overhead expenses can be conveniently allocated or apportioned to these departments. For efficient working and to facilitate the process of allocation, apportionment and reapportionment process, an organization is divided into number of departments like, machining, personnel, fabrication, assembling, maintenance, power, tool room, stores, accounts, costing etc and the overheads are collected, allocated or apportioned to these departments. This process is known as 'departmentalization' of overheads which will help in ascertainment of cost of each department and control of expenses.

## Allocation

CIMA defines Cost Allocation as, 'the charging of discrete, identifiable items of cost to cost centres or cost units'. In simple words *complete distribution of an item of overhead to the departments or products on logical or equitable basis is called allocation*. Where a cost can be clearly identified with a cost centre or cost unit, then it can be allocated to that particular cost centre or unit. In other words, allocation is the process by which cost items are charged directly to a cost unit or cost centre. For example, electricity charges can be allocated to various departments if separate meters are installed, depreciation of machinery can be allocated to various departments as the machines can be identified, salary of stores clerk can be allocated to stores department, cost of coal used in boiler can be directly allocated to boiler house division. Thus allocation is a direct process of identifying overheads to cost units or cost centres. So the term allocation means allotment of whole item of cost to a particular cost centre or cost object without any division.

## Apportionment

Cost Apportionment is the allotment of proportions of items to cost centers. Wherever possible, the overheads are to be allocated. However, if it is not possible to charge the overheads to a particular cost centre or cost unit, they are to be apportioned to various departments on some suitable basis. This process is called as 'Apportionment' of overheads. The basis for apportionment is normally predetermined and is decided after a careful study of relationships between the base and the other variables within the organisation. The Cost Accountant must ensure that the selected basis is the most logical. A lot of quantitative information has to be collected and constantly updated for the purpose of apportionment. The basis selected should be applied consistently to avoid vitiations. However, there should be a periodical review of the same to revise the basis if needed.

*In simple words, distribution of various items of overheads in portions to the departments or products on logical or equitable basis is called apportionment.*

A general example of various bases that may be used for the purpose of apportionment is shown below:

Overhead item	Basis
Rent and building	Floor space occupied by each department
General Lighting	No. of light points in each department
Telephones	No. of extensions in a department
Depreciation of factory building	Floor space
Material handling	No. of material requisitions or Value of material issued

The above list is not exhaustive and depending upon peculiarities of the organisation, it could be extended. *This allocation and/or apportionment is called as **primary distribution of overheads**.*

### Distinction between Allocation & Apportionment

Although the purpose of both allocation and apportionment is identical, i.e. to identify or allot the costs to the cost centres or cost unit, both are not the same.

Allocation deals with the whole items of cost and apportionment deals with proportion of items of cost.

Allocation is direct process of departmentalization of overheads, where as apportionment needs a suitable basis for sub-division of the cost.

Whether a particular item of expense can be allocated or apportioned does not depends on the nature of expense, but depends on the relation with the cost centre or cost unit to which it is to be charged.

### Principles of Apportionment of Overhead Cost

#### (i) Services Rendered

The principle followed in this method is quite simple. A production department which receives maximum services from service departments should be charged with the largest share of the overheads. Accordingly, the overheads of service departments are charged to the production departments.

#### (ii) Ability to Pay

This method suggests that a large share of service department's overhead costs should be assigned to those producing departments whose product contributes the most to the income of the business firm. However the practical difficulty in this method is that, it is difficult to decide the most paying department and hence difficult to operate.

#### (iii) Survey or Analysis Method

This method is used where a suitable base is difficult to find or it would be too costly to select a method which is considered suitable. For example, the postage cost could be apportioned on a survey of postage used during a year.

#### (iv) Efficiency Method

Under this method, the apportionment of expenses is made on the basis of production targets. If the target is exceeded, the unit cost reduces indicating a more than average efficiency. If the target is not achieved, the unit cost goes up, disclosing there by, the inefficiency of the department.

### Illustration 63

A factory has 3 production departments (P1, P2, P3) and 2 service departments (S1 & S2). The following overheads & other information are extracted from the books for the month of January 2012.

Expense	Amount ₹
Rent	6,000
Repair	3,600
Depreciation	2,700
Lighting	600
Supervision	9,000
Fire Insurance for stock	3,000
ESI contribution	900
Power	5,400

Particulars	P1	P2	P3	S1	S2
Area sq ft	400	300	270	150	80
No. of workers	54	48	36	24	18
Wages	18,000	15,000	12,000	9,000	6,000
Value of plant	72,000	54,000	48,000	6,000	
Stock Value	45,000	27,000	18,000		
Horse power of plant	600	400	300	150	50

Allocate or apportion the overheads among the various departments on suitable basis.

**Solution:**

The primary distribution of overheads is as follows:-

₹

Expense	Total	Basis	P1	P2	P3	S1	S2
Rent	6,000	Area sq ft	2,000	1,500	1,350	750	400
Repair	3,600	Plant value	1,440	1,080	960	120	-
Depreciation	2,700	Plant value	1,080	810	720	90	-
Lighting	600	Area sq ft	200	150	135	75	40
Supervision	9,000	No of workers	2,700	2,400	1,800	1,200	900
Fire Insurance for stock	3,000	Stock value	1,500	900	600	-	-
ESI contribution	900	Wages	270	225	180	135	90
Power	5,400	Horse power	2,160	1,440	1,080	540	180
Total	31,200		11,350	8,505	6,825	2,910	1,610

**Secondary Distribution of Production Overheads**

After the primary distribution as shown above is over, the next step is to re-distribute the service department costs over the production departments. This also needs to be done on some suitable basis, as there may not be a direct linkage between services and production activity. The products actually do not pass through the service departments. So does it mean that the service cost is not a part of cost of production? It very much is the part of production cost! Hence the loading of service costs onto the production departments is necessary. *This process is called secondary distribution of overheads.*

The basis for secondary distribution is dependent on:-

- (i) The nature of service given e.g. it may be maintenance department or stores.
- (ii) Measurement of service based on surveys or analysis.
- (iii) General use indices

In the above Illustration No. 1, the costs of S1 (₹2910) and that of S2 (₹1610) will have to be loaded on to the totals of P1, P2 and P3.

Some examples of the bases that can be used to distribute cost of different service departments:

Service department	Basis
Quality	No of inspection done
Maintenance	No of maintenance calls or Material usage for maintenance or Time spent on maintenance

Stores	Indirect material cost or No of issue slips or Quantity of material issued or Value of stock handled
Canteen, welfare	No workers
Internal transport	No. of trucks or trolleys used or Tonne-miles consumed
Payroll office	No. of labour hours
Purchase office	No of purchase orders or Value of material purchased

Again this is not an exhaustive list and could differ from company to company. Many times percentage estimation is also done for such distribution if the service cannot be measured on the basis of any of the above bases. It may be decided that the cost of S1 is to be distributed as P1-40%, P2-25% and P3-35%. Such arbitrary method should be avoided as far as possible.

### Methods of Secondary Distribution

#### (a) Direct Distribution Method

This method is based on the assumption that one service department does not give service to other service department/s. Thus between service departments there is no reciprocal service exchange. Hence under this method, service costs are directly loaded on to the production departments. This is simple, but the assumption may not be correct. Can we say that the canteen service is not available to other service departments like labour office or stores or maintenance department? This is incorrect and thus the method should not be used as far as possible.

In the above example consider that if the S1 and S2 costs are to be distributed on assumption of services rendered as S1 to P1- 40%, P2-30% and P3-10% and the S2 costs are on the basis of 5:3:2, then the table for redistribution of S1 and S2 costs over the production departments P1, P2 and P3 will be as given below.

Department	Total	Basic	P1	P2	P3
Overheads as per primary distribution	26,680		11,350	8,505	6,825
Distribution of S1	2,910	40%;30%;30%	1,164	873	873
Distribution of S2	1,610	5:3:2	805	488	322
Total	31,200		13,319	9,861	8,020

#### (b) Step Distribution Method

This method does away with the assumption made under above method, but only partly. It recognises that a service department may render service to the other service department, but does not receive service from it. In above example, S1 may render services to S2 but not vice versa, i.e. S2 may not render service to S1. In such situation, cost of that service department will be distributed first which render services to maximum number of other service departments. After this, the cost of service department serving the next large number of departments is distributed. This process is continued till all service departments are over. Because it is done in steps, it is called as Step Method of Distribution.

#### Illustration 64

A manufacturing company has two production departments Fabrication and Assembly and 3 service departments as Stores, Time Office and Maintenance. The departmental overheads summary for the month of March 2012 is given below:



Fabrication	- ₹24000
Assembly	- ₹16000
Stores	- ₹5000
Time office	- ₹4000
Maintenance	- ₹3000

Other information relating to the department was:

Particulars	Production departments		Service departments		
	Fabrication	Assembly	Stores	Time office	Maintenance
No of employees	40	30	20	16	10
No of stores requisition slips	24	20			6
Machine Hours	2400	1600			

Apportion the costs of service departments to the production departments.

**Solution:**

We will have to determine the sequence in which the service departments should be selected for distribution and the bases on which each of them will be distributed. The following logical bases are decided based on the additional information given:

- Time office - No of employees
- Stores - No of stores requisitions
- Maintenance - Machine hours

Also, it can be easily noticed that the time office serves maximum departments (i.e. both production departments, stores & maintenance departments). Stores serve the next larger number of departments (i.e. both production departments and maintenance department).

Maintenance department serves only production departments. Hence the sequence for distribution will be time office, stores and maintenance. This is shown in the following table:

₹

Particulars	Total	Basis	Fabrication	Assembly	Time office	Stores	Maintenance
As per primary distribution	52,000	as given	24,000	16,000	4,000	5,000	3,000
Time office	4,000	no of employees	1,600	1,200	(4,000)	800	400
Stores	5,800	no of req. slips	2,784	2,320		(5,800)	696
Maintenance	4,096	Machine hours	2,458	1,638			(4,096)
		Total	30,842	21,158			

Please notice when we distribute the time office costs first, the charge to stores department is ₹800. This makes the total cost of stores to be distributed as ₹5800 (5000+800). Same is the logic for ₹4096 of Maintenance department.

**(c) Reciprocal Service Method:** This method takes cognizance of the fact that service departments may actually give as well as receive services from and to the other service departments on reciprocal basis. Such inter-departmental exchange of service is given due weight in the distribution of the overheads. *There are two methods used for distribution under this logic. One is called Repeated Distribution Method and the other Simultaneous Equation Method.*

**(d) Repeated Distribution Method:** This is a continuous distribution of overhead costs over all departments. The decided ratios are used to distribute the costs of service departments to the production and other service departments. This is continued till the figures of service departments become 'nil' or 'negligible'.

### Illustration 65

The summary as per primary distribution is as follows:

Production departments A- ₹2400; B- ₹2100 & C- ₹1500

Service departments X – ₹700; Y- ₹900

Expenses of service departments are distributed in the ratios of:

X dept. : A- 20%, B- 40%, C- 30% and Y- 10%

Y dept. : A- 40%, B- 20%, C- 20% and X- 20%

Show the distribution of service costs among A, B and C under repeated distribution method.

### Solution:

₹

Particulars	Production departments			Service departments	
	A	B	C	X	Y
As per primary distribution	2400	2100	1500	700	900
Service dept X	140	280	210	-700	70
Service dept Y	388	194	194	194	-970
Service dept X	38.8	77.6	58.2	-194	19.4
Service dept Y	7.76	3.88	3.88	3.88	-19.4
Service dept X	0.776	1.552	1.164	-3.88	0.388
Total	2975.336	2657.032	1967.244	0	0.388

It can be noticed that the undistributed balance in service department is very negligible and thus can be ignored for further distribution

**(e) Simultaneous Equations Method:** Under this method, simultaneous equations are formed using the service departments' share with each other. Solving the two equations will give the total cost of service departments after loading the inter-departmental exchange of services. These costs are then distributed among production departments in the given ratios.

In the above Illustration No. 3, service dept X gives 10% of its service to Y and receives 20% of Y's service.

Let 'x' be the total expenses of dept X (its own + share of Y) and

'y' be the total expenses of dept Y (its own + share of X)

This can be expressed as:

'x' = 700 + 20% of 'y' and

'y' = 900 + 10% of 'x'

i.e.  $x = 700 + 0.2y$  and

$y = 900 + 0.1x$

Multiplying both equations by 10, we get

$10x = 7000 + 2y$  i.e.  $10x - 2y = 7000$  and

$10y = 9000 + x$  i.e.  $-x + 10y = 9000$

Now multiplying 2nd equation by 10, and then adding the two equations we get,

$98y = 97000$

Thus  $y = 990$  and  $x = 898$

Based on this we distribute the service department costs over production departments.

#### **(f) Trial and Error method**

This method is to be followed when the question of distribution of costs of service cost centres which are interlocked among them arises. In the first stage, gross costs of services of service cost centres are determined. In the second stage cost of service centres are apportioned to production cost centres.

#### **Limitations of Apportionment**

Whichever method we may use, it still depends on a suitable basis used. The basis will always lead to approximations. If an approximate data is used for analysis, control and decision-making, it may cause erroneous results. Thus one has to be careful in relating the cost data to cost centre or cost unit. The natural relation of most of the indirect costs i.e. overheads is to a time period. In other words, almost all overheads are period costs and hence an attempt to link it to cost unit will always be arbitrary. As such, the traditional methods of allocation and apportionment are often challenged by many in the industry. The techniques like Marginal Costing owe their origin to such limitations of Traditional Costing.

#### **Capacity of Overhead Rate**

##### **Influence of activity level on overhead rate**

In determination of overhead rate, a good deal depends upon the activity level, which is assumed. In other words, capacity consideration influence overhead rate. Overhead rate will be different at different capacity levels. Efficient utilization of capacity is desirable both for society and management. Following capacity concepts merit consideration for overhead rate determination:-

##### **Theoretical or Maximum Plant Capacity**

Maximum Capacity or the Ideal Capacity is the capacity for which plant is designed to operate. It is only Theoretical Capacity. It does not give allowance for waiting, delays and shut-down. The capacity is significant for designing the plant mechanically. For cost considerations, this capacity is not important. Ideal Capacity is never used to determine overhead rates for its disregard to even necessary interruptions in production process.

##### **Practical Capacity**

When this capacity is determined, allowance is given for unavoidable interruptions like time lost for repairs, inefficiencies, breakdown, delay in delivery of raw material and supplies, labour shortages and absence, Sunday, holidays, vacation, inventory taking, etc. Thus, Practical Capacity is the maximum Theoretical Capacity with minor unavoidable interruptions. These unavoidable interruptions are based

mostly on internal influences and do not consider main external causes like lack of customers orders. The Practical Capacity is determined with reference to nature of industry and circumstances in which a particular factory is situated. Normal unavoidable interruptions account for 15% to 25% of the maximum capacity. The Practical Capacity, thus, ranges between 75% and 85% of maximum capacity after giving allowance for normal unavoidable interruptions.

### **Normal Capacity**

Idle capacity due to long-term sales trend only is reduced from Practical Capacity to get Normal Capacity. Calculation of Normal Capacity of a plant presents considerable problems. Normal Capacity is determined for the business as a whole. Then, it is broken down by plants and departments. For Normal Capacity determination, prime considerations are physical capacity and average sales expectancy. It should be noted that average sales expectancy to be considered for this purpose takes into account a period enough to level out cyclical fluctuations. The determination of Normal Capacity helps in: i) the preparation of flexible budgets and computation of predetermined factory overhead rates. ii) the use of Standard Costing, iii) estimating sales price etc., iv) scheduling production, v) inventory valuation, vi) determination of breakeven point, vii) controlling costs.

### **Importance of determining Normal Capacity**

The Normal Capacity considerations are important for:

- (a) budget preparation;
- (b) determination of overhead rate;
- (c) determination of standard cost, and
- (d) preparation of operation of operational plans.

For determining the Normal Capacity, machinery purchased for future use and outmoded machinery should be excluded for consideration.

### **Capacity based on Sales Expectancy**

Capacity may be based on sales expectancy for the year. The distinction between Normal Capacity and capacity based on sales expectancy should be properly understood. While Normal Capacity considers the long-term trend analysis of sales, which is based on sales of a cycle of years, the capacity based on sales expectancy is based on sales for the year only. When long-term sales trends are determined, cycle of years long enough to even out cyclical fluctuations is considered. Capacity based on sales expectancy is influenced more by general economic conditions and forecast of industry than long term sales trends. The main advantages of determining overhead rate based on sales expectancy are i) Overhead rate is linked with actual sales expectancy, ii) Overhead costs are adequately spread over the production and iii) Overhead rate determined for this purpose is very useful for making decisions like price fixation, etc.

### **Idle Capacity and Excess Capacity**

Practical Capacity is determined after giving allowance to unavoidable interruptions like time lost for repairs, inefficiencies, breakdown and labour shortage, etc., Even this Practical Capacity is not normally fully achieved. Some losses due to idleness of workers and plant facilities to occur even in most carefully administered companies. These losses are not taken into account for determining the Practical Capacity, because for the purpose of determining Practical Capacity only unavoidable interruptions are considered. Thus, the difference between Practical Capacity and Normal Capacity, i.e., the capacity based on long-term sales expectancy is the Idle Capacity. However, if Actual Capacity happens to be different from capacity based on sales expectancy, the idle capacity will represent difference between Practical Capacity and Actual Capacity. Idle Capacity is that part of Practical Capacity which is not utilized due to factors like temporary lack of orders, bottlenecks and machine breakdown, etc. Idle Capacity represents unused productive potential, which fails to be realized due



to interruptions that are not unavoidable. Idle capacity is that part of Practical Capacity which is not utilized due to irregular interruptions.

Idle Capacity is different from Excess Capacity. Idle Capacity refers to temporary idleness of available resources due to irregular interruptions. Excess Capacity results either from managerial decision to retain larger production capacity or from unbalanced equipment or machinery within departments. Excess Capacity refers to that portion of Practical Capacity which is available, but no attempt is made for its utilization for strategic or other reasons. If the Excess Capacity results from purchase of assets not required, it will be a prudent policy for company to dispose of the assets which cause Excess Capacity. Alternatively, action should be taken for utilization of resources in the form of Excess Capacity. Excess Capacity also results from imbalance or bottlenecks in certain departments. This situation can be remedied by attempting synchronization in the working of various departments, working overtime, running double shift and temporary off-loading to departments having spare capacity. While overhead rate includes cost of Idle Capacity, Excess Capacity is excluded from overhead rate consideration.

Idle time is distinguished from Idle Capacity and its cost is separated in the accounts. Idle time represents lost time of men and machines arising from lack of business or of material, a breakdown of equipment, faulty supervision or other similar causes whether avoidable or not. Idle Capacity is the difference between Practical Capacity and Actual Capacity and represents the unused production potential.

Idle Capacity costs are represented mostly by the fixed charges of owning and maintaining plant and equipment and of employing services, which are not used to their maximum potential. The principal causes of idle capacity are:

#### **Production Causes**

These causes primarily result from poor organization of operational plan. Following production causes often lead to Idle Capacity:-

- (a) Repetitive machine adjustment - i) Setup and change-over. ii) Repairs and adjustment.
- (b) Lack of materials or tools – i) Internal ii) External
- (c) Lack of supervision, inspection and instruction.
- (d) Lack of power – i) Internally produced. ii) Externally produced

#### **Administrative Causes:**

Sometimes various administrative decisions taken at various level of management result in Idle Capacity. Major administrative causes that lead to Idle Capacity are: a) Excess plant for anticipated expansion, b) Special machines prepared for particular jobs, and c) Strikes / Lockouts.

#### **Economic Causes**

Sometimes demand for the goods is seasonal as in case of wool, ice cream and furs and production cannot be evenly distributed. This is especially true, when there exists danger of deterioration of the product or where carrying charges for stock are too large. Thus, seasonal, cyclical and industrial causes also lead to Idle Capacity.

Various practices are followed in different companies for disposing of Idle Capacity cost. It is often agreed in principle that normal production losses should be absorbed in product costs. Abnormal losses should be treated as non-operating expenses in product costs. Abnormal losses should be treated as non-operating expenses by direct debit to Profit and Loss Account. Certain companies follow the practice of computing idle time costs on their leading products by use of statistical techniques. Cost Accountants should particularly analyse the reasons for idle plant and equipment not used during the period for non-controllable causes. The review of practices of different companies reveals that Idle Capacity is a somewhat flexible concept. It is an individual problem which should be considered after taking into account the special situations. For the growth and survival of the organisation, the management is keenly interested to know the idleness, its causes, its cost and its available remedies.

Normally different companies follow a bit varying restricted accounting concept of Idle Capacity. In many cases unabsorbed fixed overhead represents losses due to managerial decisions and it becomes a subjective matter to refer it as idle capacity cost. Overhead rates of different capacity levels will be different due to influence of fixed overhead.

### Absorption of Overheads

Once the steps of primary and secondary distribution are carried out, what we get is total indirect costs of production departments. The next step is to assign these totals to the individual product units. A job or a product passes through all or many production departments before it is formed into a finished saleable product. It is necessary to know the cost of each department it passes through per unit. The absorption of overhead enables a Cost Accountant to recover the overhead cost spent on each product department through each unit produced. Overhead absorption is also known as levy or recovery of overheads. How is this done? Suppose in turning department a total of 1200 tubes are turned and the cost of turning department overheads (after secondary distribution) are ₹72000, then can we say the cost of turning per tube is ₹6/-? Most probably yes. This ₹6 per unit is called as *Overhead Absorption Rate*.

*Absorption means 'recording of overheads in Cost Accounts on an estimated basis with the help of a predetermined overhead rate, which is computed at normal or average or maximum capacity'*

In general, the formula for overhead absorption rate is give as:-

Overhead Rate = Amount of Overhead / No of units of the base

Overhead Absorption Rates: For the purpose of absorption of overhead in costs of jobs, processes, or products overhead rates related to suitable factors or bases to be determined. There are several methods in use for determining the overhead rates i.e Actual or Predetermined Overhead Rate, Blanket or Multiple Rates.

### Actual Overhead Rate

Actual Overhead Rate is obtained by dividing the overhead expenses incurred during the accounting period by actual quantum on the base selected. Assuming that the rates are worked out on a monthly basis the formula is:-

Overhead Rate = Actual overhead during the month ÷ Value/Quantity of the base during the month

Absorption of overheads based on actual rates may not be adopted due to the following reasons:-

- (a) Actual overhead rate can be computed only after the accounting period is over.
- (b) The incidence of some of the items of expenses like repairs, overhauling, etc is not uniformly spread over all the accounting periods.
- (c) Actual overhead rates do not provide any basis for cost control.

### Pre-determined Overhead Rate

Predetermined Rate is computed by dividing the budgeted overhead expenses for the accounting period by the budgeted base (quantity, hours, etc)

Overhead Rate= Budgeted overhead expenses for the period / Budgeted Base for the period

### Advantages of Predetermined Overhead Rate

- (a) Enables prompt preparation of cost estimates, quotations and fixation of selling prices.
- (b) Cost data is available to management along with financial data.
- (c) In case of Cost –plus contracts prompt billing is possible through pre-determined recovery rates.
- (d) In concerns having budgetary control system, no extra clerical efforts are required in computing the pre-determined overhead rate.



### **Blanket (Single) Overhead Rate**

A single overhead rate for the entire factory may be computed for the entire factory. So this is known as factory wide or Blanket Overhead Rate Method.

Blanket Rate = Overhead Cost for the factory / Total Quantum of the base.

Blanket Rate of overheads may be applied suitable in a small size concerns. Blanket Rates are easy to compute. The use of Blanket Rate of overheads gives erroneous and misleading results, where several products passing through number of different departments. With Blanket Rate of overhead, satisfactory level of managerial control is not possible.

### **Multiple Rates:**

This method is most commonly used to determine the multiple overhead rates, i.e separate rates:

- (a) For each producing department;
- (b) For each service department;
- (c) For each Cost Centre; and
- (d) For each product line.

The multiple rates are worked out according to the below formula:

Overhead Rate = Overhead cost allocated & apportioned to each product, dept / Corresponding Base

The number of overhead rates a firm may compute would be fixed taking into consideration of two opposing factors viz clerical costs involved and the degree of accuracy level desired.

### **Production Unit Method**

Simply put the concept here is to average out the total overheads on total units produced. In a tube manufacturing unit the total overheads are ₹72000 and total tubes processed are 12000. The overhead absorption rate is:  $72000/12000$  i.e. ₹6 per tube. If this rate is based on the budgeted costs and number of units, and if the factory now gets an order for 2500 tube processing, the amount of production overheads to be charged to that order will be  $(2500 * 6)$  i.e. ₹15000/-

### **Percentage of Direct Wages**

Under this method, overhead for a job is recovered on the basis of a predetermined percentage of direct wages. This method is used when the component of direct wages is higher. If the overhead to be absorbed is ₹120000 and the direct wages are estimated at ₹800000, the predetermined rate will be calculated as  $(120000/800000)$  i.e. 15%. If a job is received where direct wages are estimated at ₹9000/- then the production overheads to be absorbed will be 15% of ₹9000 i.e. ₹1350 This method is useful if the direct labour hours can be standardised and the labour rates do not fluctuate too much. However, this method ignores the contribution made by other resources like machinery. The method also ignores the fact that there may be different types or grades of workers and each may cost differently. It also sidelines the fact that most of the production overheads are time-related.

### **Percentage of Direct Material Cost**

Here the absorption rate is expressed as a percentage of direct material cost. This method is useful when the proportion of material cost is very high and that of labour cost is comparatively negligible. It is useful if material grades and rates do not fluctuate too much. If production overhead to be absorbed is ₹2000 and the material cost is expected to be ₹4000, then the absorption rate will be  $(2000/4000)$  i.e. Thus 50% of direct material cost. Thus for a job requiring direct material of ₹200, the production overheads to be absorbed will be ₹100 i.e. 50% of ₹200. However, many overhead items bear no relationship with material cost, and also the fact of time dimension of overheads is not taken into account by this method.

### Percentage of Prime Cost

This method combines the benefits of direct wages and direct material cost methods as we know prime cost means direct material plus direct wages plus direct expenses. This method could be used when prime cost constitutes a major proportion of the cost and the rates of material & labour are stable. It is needed that the product made is standard product. If the prime cost is expected to be ₹50000 and the production overheads are estimated at ₹2500, then the absorption rate will be 5% of prime cost. If a job has a prime cost of ₹800, then overhead absorbed on that job will be ₹40/-

### Direct Labour Hour

Under this method, the absorption rate is calculated by dividing the overhead amount by the actual or predetermined direct labour hours. This is extremely useful when the production is labour intensive. This method is superior to the earlier ones, because it takes cognizance of the time factor. If the direct labour hours for a month amount to 10000 and the overheads to be absorbed are ₹5000, then the absorption rate is ₹0.50 per hour (i.e.  $5000/10000$ ). If a job is going to require a labour time of 250 hours, the production overheads to be loaded on the job will be ₹125 (i.e.  $250 * 0.50$ ). The data related to labour hours has to be properly collected or estimated. The labour hour rate may be calculated as a single rate or different for different group of workers.

### Machine Hour Rate

In the days of mechanised production processes, the most relevant rate to be applied is the machine hour rate. This is the rate calculated by dividing the actual or budgeted overhead cost related to a machine or a group of machines by the appropriate number of machine hours. These hours could be actual hours or budgeted hours. When budgeted hours are used they are taken at average capacity at which a factory normally operates. You cannot take full capacity hours as the factory may not operate at that level and then the absorption rate may be unnecessarily fixed at a lower level. The overheads in a highly mechanised factory are mostly related to the number of hours a machine runs. Hence this is supposed to be the best method for absorbing overhead costs into the cost unit. If a machine normally runs for 2000 hours in a month and monthly overheads to be absorbed are ₹15000, then the machine hour rate will be calculated as  $(15000/2000)$  i.e. ₹7.50 per machine hour. If a job take 75 hours on that machine, then ₹562.50 ( $75 * 7.5$ ) will have to be loaded as cost of using the machine for that job.

A machine hour rate may be calculated using only those overheads which are directly related to the machine e.g. power, fuel, repairs, maintenance, depreciation etc. These expenses are totalled and then divided by the hours to compute the rate. This is called as *Ordinary Machine Hour Rate*. Whereas, if costs not related to machine are also included (e.g. supervision, rent, lighting, heating etc.) for the rate calculation, such rate is called as *Composite Machine Hour Rate*. While calculating machine hour rate, the wages paid to machine operators may be added to the total costs. This is because these operators directly work on the machines & thus related to machine operation. At times a factory may have more than one similar machines simultaneously working. In such case, a *group machine hour rate* may be calculated.

### Factors influencing the selection of Overhead Recovery Rate

The particular method or methods selected for application in a company would depend upon the factors mentioned below. Selection of the most equitable method is of paramount importance since a method that is not suitable will distort costs and thus make them useless for control and decision making purpose.

Selection of Overhead Recovery Rates depends on the following factors:-

- (a) Nature of the product and process of manufacture.
- (b) Nature of overhead expenses.
- (c) Organisational set-up of the undertaking into departments and or cost centers.



- (d) Individual requirements with regard to the circumstances prevailing.
- (e) Policy of the management.
- (f) Accuracy vis-a-vis cost of operating the method. Some of the methods are comparatively more accurate and provide equitable bases for overhead absorption.

The main features of a satisfactory overhead rate are as follows:-

- (a) Simple, easy to operate, practical and accurate;
- (b) Economic in application;
- (c) Fairly stable so that cost from period to period does not vary;
- (d) Related to time factor as far as practical;
- (e) Departmental rates are preferable to blanket rates;
- (f) Area of activity selected for computation of the rate should be homogeneous cost unit;
- (g) Base for the rate should lay stress on the main production element of the concern.

#### **Under-absorption and Over-absorption of Overhead**

The amount of overhead absorbed in costs is the sum total of the overhead costs allotted to individual cost units by application of the overhead rate. When a predetermined rate worked out on the basis of anticipated or budgeted overhead and base is applied to the actual base, the amount absorbed may not be identical with the amount of overhead expenses incurred if either the actual base or the actual expenses or both deviate from the estimates or the budget.

If the amount absorbed is less than the amount incurred, which may be due to actual expenses exceeding the estimate and / or the output or the hours worked may be less than the estimate, the difference denotes under-absorption.

On the other hand if the amount absorbed is more than the expenditure incurred, which may be due to the expense being less than estimate and / or the output or hours worked may be exceeding the estimate, this would indicate over-absorption, which goes to inflate the costs.

Under or over absorption of overhead may arise due to one or the other of the causes given below:-

- (a) Error in estimating overhead expenses.
- (b) Error in estimating the level of production, i.e the base.
- (c) Major unanticipated changes in the methods of production.
- (d) Unforeseen changes in the production capacity.
- (e) Seasonal fluctuations in the overhead expenses from period to period.
- (f) Overhead rate may be applied to the Normal Capacity which may be less than the full operating capacity of the undertaking.

How does one deal with the situation of over or under absorption. There are three ways to handle it:

- (a) *Write-off (in case of under absorption) or write back (in case of over-absorption) to the P & L Account.* This treatment is valid if most of the overhead items are related to time.
- (b) *Carry forward to the next period through a reserve account.* This method is not recommended on the logic that it is inconsistent with Accounting Standards.
- (c) *Use of supplementary rates* to adjust the effect to the cost of sales, finished stocks and Work in Process stocks. This sounds logical as it does not carry forward the unabsorbed or over absorbed overheads to the next accounting period entirely. It aims at splitting the total effect between the

cost of sale (which is charged to current year's profits) and stocks (which get carried forward to the next year).

**Illustration 66**

Overhead incurred	₹ 1,50,000
Overhead recovered	₹ 1,00,000
Cost of sales	₹ 10,00,000
Finished goods	₹ 8,00,000
Work in process	₹ 7,00,000

**Solution:**

Here, the overheads under-absorbed are  $(1,50,000 - 1,00,000)$  ₹50,000.

Total of Cost of sales, FG stock & WIP is ₹25,00,000

The supplementary rate will be  $50,000/25,00,000$  i.e. ₹0.020

This will be distributed as:

₹20,000 to cost of sales (i.e.  $10,00,000 \times 0.020$ )

₹16,000 to FG stock (i.e.  $8,00,000 \times 0.020$ ) and

₹14,000 to WIP (i.e.  $7,00,000 \times 0.020$ )

## 2.5 TREATMENT OF SPECIAL ITEMS

**After Sales Service:**

This relates to services rendered after a product is sold. If the service is rendered during the warranty period, it is normally free of cost. The cost of in-warranty service is treated as S & D Overhead and accounted for accordingly. The services provided after expiry of warranty period, are normally charged to the customer. In such cases, the actual cost incurred on such service is collected as per element in the routine way and treated as cost of production of the service. Let us take sale of a car as an example. Usually, there's one year warranty for manufacturing defects and many companies also provide 3 year or 40000 km servicing free. The cost of this service being free is treated as S & D Overhead. The services after that period will be billed to the customer. A job card is issued for each car when it comes for servicing and the costs of parts, consumables and labour time are booked against that job number. This cost will be charged off against the billing done for service.

**Packing Costs**

Packing may refer to primary packing and secondary packing. Primary packing is the minimum necessary without which a product cannot be handled. Liquid products must either have bottles or sachets. This packing is considered as direct material cost. These bottles may be further kept in bigger boxes or cartons for ease of transportation, which is nothing but a distribution cost. This packing cost is treated as S & D Overhead.

**Advertising Expenses**

The advertising could be done for different purposes. There could be a recruitment ad, which is booked under personnel department and treated as Administration Overhead. At times there could be a corporate advertisement to be booked under the corporate office and treated as Administration Overhead. If a product specific advertisement is done, it is treated as selling cost. If there is a big advertisement campaign the benefits of which are expected to accrue over a longer term, it may be treated as deferred revenue expenditure.



## **Market Research**

Many times organisations appoint professional bodies or conduct by themselves a study of potential market for their products. This study is aimed at finding the customer needs, their habits, changing market for the products, technological changes in the product, competition etc. This is treated as S & D cost.

## **Bad Debts**

We know bad debts refer to customers who do not pay money after having purchased the product. This situation arises after the sale is done. Many experts say that bad debt is not an item of expense but it's a financial loss and thus should be excluded for the purpose of costing. However, normal bad debts may be considered as selling expense and included in the cost. An exceptional case like bankruptcy of a big institution may be excluded from cost.

## **Tool Set Up Costs**

If the set up is related to specific product or a job, such cost may be treated as a direct cost of the job. But if the set is related to different products, it may be charged as a part of factory overheads.

## **Royalties**

Royalties are prices paid to acquire the right to manufacture and/or sell some goods. When the royalty is paid to acquire the right to manufacture or to produce the cost of the royalty should be charged as a production cost and included in production overhead. Where, however, the royalty is the price of the right to sell, the cost of such royalty should form a part of selling and distribution cost and included in selling overheads. If royalty is paid both for production and sales the cost of such royalty should be apportioned between production costs and selling cost on some equitable and appropriate such royalty cost should be treated as direct cost of the particular product.

## **Spoiled Work**

The loss by spoilage may be inherent to the nature of the product or it may be caused by normal circumstances. If it is of an inherent nature and cannot be avoided, it would be charged either to the specific job in which it is accrued or should be recovered as overhead charge from the entire production, where there is no specific job or work order. In case it has been caused by abnormal circumstances, it should be charged to the Costing Profit and Loss Account. While accounting for loss by spoilage, any proceeds of the scrap should be accounted for either as a deduction from spoilage or by crediting it to the account which has been debited with the spoilage.

## **Cost of Containers Relating to Materials Purchased**

Usually the cost of the containers containing the materials purchased is included in the cost of materials and therefore is automatically forms a part of material cost. The containers may be returnable or non returnable. The cost of the non returnable contains should be charged as a part of the materials cost and ultimately would go into the Prime Cost or Factory Overhead depending upon the usage of the materials as direct or indirect. In the case of returnable containers the cost of them should not be included either in cost of materials or in any other head, because when they are returned to the supplier, full credit would be received. If, however, container becomes damaged, it should be charged to the cost of the materials.

## **Interest on Borrowing for Working Capital**

Inclusion of interest as an item of overhead in the cost is controversial and will depend upon circumstances. The general opinion is that interest on capital whether for working capital fund or otherwise, should not burden the product costs. If extra working capital funds are required for some specific gainful purpose, viz., to purchase bulk material in view of emergency, the interest may be included as an element of the material cost.

### **Obsolescence to Fixed Assets**

Obsolescence represents the loss arising as a result of discarding an asset due to its supersession in favour of a more productive asset at an earlier date than planned/contemplated. It is sometimes called "external depreciation" because the existing asset is replaced by a new asset on account of invention/innovation.

The loss due to obsolescence to fixed assets may be dealt with in the following manner:-

- (a) In industries which are vulnerable to the risks of obsolescence, e.g., electronics, it is somewhat predictable that obsolescence will take place with certain frequency. In such case, higher rates of depreciation may be charged to take care of such obsolescence.
- (b) For industries which are not vulnerable to frequent obsolescence it is prudent to create a reserve fund to take care of such eventualities.
- (c) For other industries bearing a remote possibility of obsolescence in the event of obsolescence taking place, loss is to be written off to Profit and Loss Account.

### **Write off Obsolete Inventory**

Obsolete inventory may consist of raw materials, stores of finished goods. In either case, the write off is made direct to Profit and Loss Account and no charge is made to cost of production.

### **Insurance Charges**

The insurance premium paid may cover several kinds of insurances.

- (a) The amount of premium paid on insurance of fixed assets is allocated to particular departments or cost centres where the assets are located, as items of overhead costs.
- (b) Premium for insurance of material and process goods is treated as factory or manufacturing overhead and charged to production costs.
- (c) Premium for insurance of finished goods in stock or in transit is absorbed as distribution overhead.
- (d) Premium for other types of insurance such as those relating to fire, burglary etc., are treated as general administration overhead.

### **Rectification Cost / Re-Work Cost**

In the course of manufacturing/process, there is likely to be some defective which can be rectified or brought upto the standard by incurring some extra material, labour and overheads. The cost is booked under 'Cost on rectification of defectives or re-processing cost'. The defectives should be classified under (i) normal (ii) abnormal for the purpose of control and treated as :

**Normal defectives** - Rectification cost may be treated as part of the product cost if this is identifiable with any specific product or process, otherwise this may be treated as manufacturing overhead

**Abnormal defectives** - Such defectives should not normally have arisen and therefore, rectification cost is not to be charged in Cost Accounts but to Profit and Loss Account.

### **Incentives to Indirect Workers**

Incentives to indirect workers means the monetary inducements extended to these category of workmen who are not directly involved in the production operations. The main pre-requisite of a good incentive plan is to measure the time taken for completing a job as compared to standard time. It is not always possible to set time standards for indirect workers engaged in activities like maintenance and repairs work, materials handling department, inspection, warehousing, transportation, etc. However, in case where an incentive scheme is in operation for Direct Workmen, it is necessary to provide incentives to Indirect Workers because it inculcates a spirit of teamwork and goodwill amongst direct and indirect workers.

### **Indirect Incentives to Workers**

These are primarily physiological incentives extended to the workers with a view to improve productivity and also to promote a sense of belonging amongst them. It is increasingly realized that an undertaking does not work with full efficiency unless its work conditions and environment are satisfactory. While an employee is primarily interested in the size of his pay pocket, he is never the less influenced by indirect incentives of the kind that provides an atmosphere in which direct monetary incentives have the greatest chance of success. Confidence, in the ability of management and of its sincerity and fair-mindedness is in itself almost indirect incentive. In addition, provision of canteens, recreation facilities, suggestions awards and bonus scheme, accident prevention plans, etc., all assists in maintaining the worker's goodwill.

### **Differences between Chargeable Expenses and Overheads:**

Expenses like materials and wages form a part of the total cost. Chargeable expense are those expenses which can be directly charged to cost units or cost centres. Overhead expenses are those expenses which cannot be directly charged to any cost units or cost centres and are apportioned or allocated.

The dividing line between chargeable expenses and overhead expense is very thin. Same item of expenses can be treated either as chargeable item or overhead item depending upon the situation. Rent for a service department is chargeable to that department cost. To the production units such rent is treated as an indirect cost because the total service department cost itself is apportioned to cost units as indirect cost. Where a factory is more decentralised we will find more and more expenditure as direct. Basically we can conclude that chargeable expenses are directly chargeable to the production units whereas overhead expenses include expenses which either cannot be chargeable to any production units or can be charged as direct only upto the department cost.

### **Interest on Capital**

Interest on Capital is a notional charge since it does not involve any actual payment. When actual payments made it is an appropriation of profit and not a charge against profit. Based on this logic the accountants feel that the interest on capital should not be treated as an element of cost but the economists argue otherwise. Their contention is that such an item should be taken as cost because of instead of putting own capital the entrepreneurs use borrowed capital. The interest on such borrowings is a real cost and is treated as an element of cost. The various arguments for and against inclusion of Interest on Capital in Cost Accounts and appended below.

#### **Arguments favoring inclusion in cost:-**

- (a) Interest on Capital is an opportunity cost and its inclusion in cost will make cost of identical assets comparable to each other. If some assets are purchased with borrowed capital and others with own capital it would be difficult to compare their respective costs if interest is ignored.
- (b) If manual labour is replaced by machines non-inclusion of interest on cost will be the real saving achieved. By the same count if a cheap machine is replaced by a costly machine the cost-effectiveness and operational economy cannot be correctly judged unless the interest on capital is taken into consideration.
- (c) The cost of different departments/products may not indicate their true cost specially when some use costly assets and some use hired assets.
- (d) Cost of identical assets rented or leased cannot be compared with assets purchased with own capital unless interest is taken into consideration.
- (e) Interest is paid on borrowed capital and so on the same analogy Interest on capital should be charged whether paid or not.

#### **Arguments against inclusion in cost:-**

- (a) Interest on capital whether paid or not is an appropriation of profit and not a charge against profit and hence should not be included in cost.

- (b) Cost of using a machine instead of labour is reflected by the inclusion of charges for depreciation, repairs, maintenance, insurance, power etc. in the cost. Therefore, it is not correct to say that unless interest on capital is taken into cost the basis of cost comparison becomes difficult. This also applies in the cost when a costlier machinery or assets are used.
- (c) Cost of using assets rented or leased includes an element of profit which should not be included in the charge for using the asset owned by the concern to make it comparable with the asset which is rented.
- (d) Interest on capital if at all to be included in cost should be taken as a notional cost used for comparison purpose but should never be taken in actual cost of production.

### Plant Register

A plant register is a record which contains the relevant details pertaining to the plants and equipments and other fixed assets. The details normally included in the plant register are description of the plant make, supplier's invoice/bill reference, date of purchase, price, freight, cost of installation, additions, renewals, major repairs and maintenance, location, estimated life, method of depreciation, annual depreciation charge, written down value, disposal value, gain/loss in disposal etc. Basically, a plant register is a high story sheet of a plant right from the purchase/installation to its disposal.

Such a register is helpful to a Cost Accountant in more than one way. The register forms the basis of calculation of depreciation charge to individual cost centres since the location of the plant is easily identifiable. To find out the original cost, cumulative charge of depreciation, charge in any particular year, this register is extremely useful. The identification of the plant in the event of a physical verification can be easily done. Even when a plant is fully depreciated, to keep a physical control it proved to be extremely useful. The Manufacturing and Other Companies (Auditor's Report) Rules, 1975, makes it obligatory on the part of the Statutory Auditors to certify whether a company is duly maintaining proper record of fixed assets and in the context, the plant register is considered to be absolutely essential to enable the auditors to form opinion in this matter.

### Illustration 67

In an Engineering Factory, the following particulars have been extracted for the quarter ended 31st December, 2012. Compute the departmental overhead rate for each of the production departments, assuming that overheads are recovered as a percentage of direct wages.

	Production Depts.			Service Depts.	
	A	B	C	X	Y
Direct Wages (₹)	30,000	45,000	60,000	15,000	30,000
Direct Material	15,000	30,000	30,000	22,500	22,500
No. of workers	1,500	2,250	2,250	750	750
Electricity KWH	6,000	4,500	3,000	1,500	1,500
Assets Value	60,000	40,000	30,000	10,000	10,000
No. of Light points	10	16	4	6	4
Area Sq. Yards	150	250	50	50	50



The expenses for the period were:

	₹
Power	1,100
Lighting	200
Stores Overhead	800
Welfare of Staff	3,000
Depreciation	30,000
Repairs	6,000
General Overheads	12,000
Rent and Taxes	550

Apportion the expenses of Service Dept. Y according to direct wages and those of Service Department X in the ratio of 5: 3 : 2 to the production departments.

**Solution:**

Statement showing apportionment of overheads and computation of OH rates:

Particulars	Basis	Total (₹)	A (₹)	B (₹)	C (₹)	X (₹)	Y (₹)
Power	KWH (4:3:2:1:1)	1,100	400	300	200	100	100
Wages	Actual	45,000	—	—	—	15,000	30,000
Material	Actual	45,000	—	—	—	22,500	22,500
Lighting	Light Points (5:8:2:3:2)	200	50	80	20	30	20
Stores overhead	Materials (2:4:4:3:3)	800	100	200	200	150	150
Welfare of staff	No. of workers (2:3:3:1:1)	3,000	600	900	900	300	300
Depreciation	Assets Value (6:4:3:1:1)	30,000	12,000	8,000	6,000	2,000	2,000
Repair	Assets Value (6:4:3:1:1)	6,000	2,400	1,600	1,200	400	400
General Over-heads	Direct Wages (2:3:4:1:2)	12,000	2,000	3,000	4,000	1,000	2,000
Rent & Taxes	Area (3:5:1:1:1)	550	150	250	50	50	50
		<b>1,43,650</b>	<b>17,700</b>	<b>14,330</b>	<b>12,570</b>	<b>41,530</b>	<b>57,520</b>
Costs of 'X'	5:3:2		20,765	12,459	8,306	(41,530)	—
Costs of 'Y'	2:3:4		12,782	19,173	25,565	—	(57,520)
			<b>51,247</b>	<b>45,962</b>	<b>46,441</b>	—	—

Overhead Rate as % on direct wages

A =  $[51,247/30,000] \times 100 = 170.82\%$

B =  $[45,962/45,000] \times 100 = 102.14\%$

C =  $[46,441/60,000] \times 100 = 77.40\%$

**Illustration 68**

The New Enterprises Ltd. has three producing departments A,B and C two service Departments D and E. The following figures are extracted from the records of the Co.

	₹
Rent and Rates	5,000
General Lighting	600
Indirect Wages	1,500
Power	1,500
Depreciation on Machinery	10,000
Sundries	10,000

The following further details are available:

	A	B	C	D	E
Floor Space (Sq.Mts.)	2,000	2,500	3,000	2,000	500
Light Points	10	15	20	10	5
Direct Wages	3,000	2,000	3,000	1,500	500
H.P. of machines	60	30	50	10	--
Working hours	6,226	4,028	4,066	--	--
Value of Material	60,000	80,000	1,00,000	--	--
Value of Assets	1,20,000	1,60,000	2,00,000	10,000	10,000

The expenses of D and E are allocated as follows:

	A	B	C	D	E
D	20%	30%	40%	--	10%
E	40%	20%	30%	10%	--

What is the factory cost of an article if its raw material cost is ₹50, labour cost ₹30 and it passes through Departments A, B and C. For 4, 5 & 3 hours respectively.

**Solution:****Statement showing apportionment of overheads to departments**

Particulars	Basis	Total (₹)	A (₹)	B (₹)	C (₹)	D (₹)	E (₹)
Rent & Rates	Space (4:5:6:4:1)	5,000	1,000	1,250	1,500	1,000	250
Lighting	Light Points (2:3:4:2:1)	600	100	150	200	100	50
Indirect wages	Direct wages (6:4:6:3:1)	1,500	450	300	450	225	75
Power	Horse Power (6:3:5:1)	1,500	600	300	500	100	--
Depreciation	Value of Asset (12:16:20:1:1)	10,000	2,400	3,200	4,000	200	200
Sundries	Direct wages (6:4:6:3:1)	10,000	3,000	2,000	3,000	1,500	500
Wages	Actual	2,000	--	--	--	1,500	500
		<b>30,600</b>	<b>7,550</b>	<b>7,200</b>	<b>9,650</b>	<b>4,625</b>	<b>1,575</b>



### Repetitive Distribution Method

₹

Particulars	A	B	C	D	E
Totals	7,550	7,200	9,650	4,625	1,575
Cost of D (2:3:4:1)	925	1,387	1,850	(4,625)	463
	8,475	8,587	11,500	--	2,038
Cost of E (4:2:3:1)	815	408	611	204	(2,038)
	9,290	8,995	12,111	204	--
Cost of D (2:3:4:1)	41	61	82	(204)	20
	9,331	9,056	12,193	--	20
Cost of E (4:2:3:1)	8	4	6	2	(20)
	9,339	9,060	12,199	2	--
Cost of D (2:3:4:1)	--	1	1	(2)	--
	9,339	9,061	12,200	--	--
Working Hours	6,226	4,028	4,066		
Rate per hour	1.5	2.25	3.00		

### Computation of Factory Cost of the Article ₹

Particulars	Amount
Material	50.00
Labour	30.00
Overheads	6.00
Dept A (4 x 1.5)	11.25
Dept B (5 x 2.25)	9.00
Dept C (3 x 3)	
<b>Factory Cost</b>	<b>106.25</b>

### Simultaneous Equation Method

Let total cost of Service Department D be ₹ 'd'.

Let total cost of Service Department E be ₹ 'e'.

$$d = 4625 + 10/100 e$$

$$e = 1575 + 10/100 d$$

$$\Rightarrow 100 d = 462500 + 10 e$$

$$\Rightarrow 100 d - 10e = 462500 \quad \rightarrow (1)$$

$$\Rightarrow 100 e = 157500 + 10 d$$

$$\Rightarrow -10 d + 100 e = 157500 \quad \rightarrow (2)$$

$$\text{Equ. (1)} \quad 100 d - 10e = 462500$$

$$\text{Equ. (2) x 10} \quad -100 d + 1000e = 1575000$$

$$990e = 2037500$$

$$e = 2037500 / 990$$

$$= 2,058$$

Substituting the value of 'e' in Equation (1), we get

$$\Rightarrow 100d - 10(2058) = 462500$$

$$\Rightarrow d = 483080 / 100$$

$$\Rightarrow d = 4831$$

Particulars	A	B	C	D	E
Totals	7,550	7,200	9,650	4,625	1,575
Costs of D (2:3:4:1) (4831)	966	1,450	1,932	(4,831)	483
Costs of E (4:2:3:1) (2,058)	823	412	617	206	(2058)
	9,339	9,062	12,199	--	--

**Illustration 69**

The following information relates to the activities of a production department of factory for a certain period.

	₹
Material used	36,000
Direct Wages	30,000
Labour hours	12,000
Hours of Machinery-operation	20,000
Overhead Chargeable to the Dept	25,000

On one order carried out in the department during the period the relevant data were:-

Material used (₹)	6,000
Direct Wages (₹)	4,950
Labour hours worked	1,650 Hrs.
Machine Hours	1,200

Calculate the overheads chargeable to the job by four commonly used methods.

**Solution:**

The four commonly used methods of absorbing or recovering overheads are as follows:

1. % of overheads on material =  $(25,000 / 36,000) \times 100 = 69.44\%$
2. % of overheads on direct wages =  $(25,000 / 30,000) \times 100 = 83.33\%$
3. Overhead rate per labour hour =  $25,000 / 12,000 = 2.083$
4. Machine hour rate method =  $25,000 / 20,000 = 1.25$

The overheads chargeable to job under the above methods is as follows:

1. Material =  $6,000 \times 69.44\% = 4,166.40$
2. Wages =  $4,950 \times 83.33\% = 4,125$
3. Labour hour rate =  $1,650 \times 2.083 = ₹ 3,437$
4. Machine hour rate =  $1,200 \times 1.25 = ₹ 1,500$

**Illustration 70**

In a machine department of a factory there are five identical machines. From the particulars given below; prepare the machine hour rate for one of the machines.



Space of the department	10,000 sq.mts.
Space occupied by the machine	2,000 sq.mts.
Cost of the machine (₹)	20,000
Scrap value of the machine (₹)	300
Estimated life of the machine	13 years
Depreciation charged at	7 ½ % p.a
Normal running of the machine	2,000 hours
Power consumed by the machine as shown by the meter	3,000 p.a
Estimated repairs and maintenance throughout the working life of the machine (₹)	5,200
Sundry supplies including oil, waste etc. charged direct to the machine amount to ₹ 600 p.a.	
Other expenses of the department are :	₹
Rent and Rates	9,000
Lighting (to be apportioned according to workers employed)	400
Supervision	1,250
Other charges	5,000

It is ascertained that the degree of supervision required by the machine is  $\frac{2}{5}$ th and  $\frac{3}{5}$ th being devoted to other machines.

There are 16 workers in the department of whom 4 attended to the machine and the remaining to the other machines.

#### Solution:

#### Computation of Machine Hour Rate

₹

Particulars		Rate per hr.
<b>Standing Charges</b>		
Rent & Rates	$9000 \times (2000 / 10000) = 1800$	
Lighting	$400 \times (4 / 16) = 100$	
Supervision	$1250 \times (2/5) = 500$	
Other Charges	$5000 \times (1/5) = 1000$	
	$= 3400$	
Standing charges per hour	$3,400 / 2,000 =$	1.70
<b>Machine Expenses</b>		
Depreciation	$(20000 \times 7.5\%) \div 2,000 = 0.750$	2.75
Power	$(3,000 / 2,000) = 1.500$	
Repairs & Maintenance	$(5200 / 13) \div 2,000 = 0.200$	
Sundry Supplies	$(600 / 2,000) = 0.300$	
<b>Machine Hour Rate =</b>		<b>4.45</b>

#### Illustration 71

From the following particulars given below compute Machine hour rate for a machine.

- Cost ₹ 24,000
- Scrap value ₹ 4,000

- c. Estimated Working life 40,000 hours
- d. Estimated cost of repairs and maintenance during the whole life ₹2,000
- e. Standard charges of the shop for 4 weekly period ₹ 3,000
- f. Working hours in 4 weekly period 100 hours
- g. No.of machines in the shop each of which is liable for equal charge are 30 machines.
- h. Power used per hour 4 units @ 10p. per unit.

**Solution:****Computation of Machine Hour Rate**

₹

Particulars		Rate per hr.
<b>Standing Charges</b>		
Standing Charges	$[3,000 / (100 \times 30)]$	1.00
<b>Machine Expenses</b>		
Depreciation	$[(24,000 - 4,000) / 40,000] = 0.50$	
Repairs	$[2,000 / 40,000] = 0.05$	
Power	$[4 \times 0.1] = 0.40$	0.95
<b>Machine Hour Rate =</b>		<b>1.95</b>

**Illustration 72**

The following particulars relate to a processing machine treating a typical material. You are required to calculate the machine hour rate.

The cost of the machine	₹ 10,000
Estimated life	10 years
Scrap value	₹1,000
Working time (50 weeks of 44 hrs. each)	2,200 hrs.
Machine maintenance per annum	200 hrs
Setting up time estimated @ 5% of total productive time	
Electricity is 16 units per hour @ 10 paise per unit.	
Chemicals required weekly	₹20
Maintenance cost per year	₹1,200

Two attendants control the operations of the machine together with 6 other machines, their combined weekly wages are ₹ 140-. Departmental overhead allocated to this machine per annum ₹ 2,000

**Solution:**

Annual Working hours: 50 weeks X 44 hrs.	2,200
Less : Maintenance time	<u>200</u>
Productive hours	2,000
Less : 5% Setting up time	<u>100</u>
Effective hours	<u>1,900</u>



### Computation of Machine Hour Rate

₹

Particulars		Rate per hr.
<b>Standing Charges</b>		
Chemical Solution	(50 x 20) = 1,000	
Attendants wages	(140 x 50 x 1/7) = 1,000	
Departmental overheads	= 2,000	
	= <u>4,000</u>	
Rate per hour	4,000 / 2,200	1.82
<b>Machine Expenses</b>		
Depreciation	[(10,000 – 1,000)/10] ÷ 1900 = 0.47	
Maintenance	(1,200 / 1,900) = 0.63	
Power	(16 x 0.1) = 1.60	2.70
<b>Machine Hour Rate =</b>		<b>4.52</b>

### Illustration 73

A manufacturing company, using a job cost system, has been allocating departmental factory expenses to job costs on the percentage of direct labour method.

From the following information prepare a departmental factory expenses (to jobs distribution) showing the rate which would be computed as per the following methods:-

- Percentage of Direct Labour Method
- Labour Hour Method
- Machine Hour Method

Advise which method in your opinion would be the most equitable for each department. Give reasons.

	Dept.1	Dept.2	Dept.3	Total
Direct labour cost ₹	6,000	2,000	10,000	18,000
Direct labour hours	20,000	5,000	40,000	65,000
Machine hours	2,000	6,000	2,000	10,000
Indirect labour	50%	20%	30%	7,500

Overtime penalty (2% of indirect and direct labour for all departments)

Supervision — One supervisor for each department ₹ 3,000

	Dept.1	Dept.2	Dept.3	Total
Floor Space (Sq.ft)	2,000	4,000	4,000	10,000
Machinery value	2,000	15,000	1,000	18,000
Rent, Rates and Taxes				1,000
Power usage (KWH)	100	1,500	50	1,650
Power cost				1,650
Sundries	40%	50%	10%	500
Depreciation rate				10%

Bonus and Insurance (20% on total salaries and wages)

Class of employees      adult      male      adult      male      adult      male      and female.

**Solution:****Statement showing apportionment of overheads to departments and computation of overhead rates under different methods:**

Particulars	Basis	Total	Dept 1	Dept 2	Dept 3
Direct wages	Actual	18,000	6,000	2,000	10,000
Indirect wages	50%:20%:30%	7,500	3,750	1,500	2,250
		25,500	9,750	3,500	12,250
Overtime Penalty (2%)		510	195	70	245
Indirect wages		7,500	3,750	1,500	2,250
Supervision	(1:1:1)	3,000	1,000	1,000	1,000
Rent, Rates	Floor space (1:2:2)	1,000	200	400	400
Power	KWH (2:30:1)	1,650	100	1,500	50
Sundries	(4:5:1)	500	200	250	50
Depreciation (10%)		1800	200	1500	100
Bonus & Insurance	(20% of salary & wages)	5,100	1,950	700	2,450
		<b>21,060</b>	<b>7,595</b>	<b>6,920</b>	<b>6,545</b>

	Particulars	Dept 1	Dept 2	Dept 3
1.	% of overheads on direct wages	$(7595/6000) \times 100$ = 126.58%	$(6920/2000) \times 100$ = 346%	$(6545 \times 10000) \times 100$ = 65.45%
2.	Overhead rate per labour hour	$(7595/20000)$ = 0.38	$(6920/5000)$ = 1.384	$(6545/40000)$ = 0.1636
3.	Overhead rate per machine hour	$(7595/2000)$ = 3.798	$(6920/6000)$ = 1.1533	$(6545/2000)$ = 3.273

In Dept. 1, it is better to use overhead rate based on direct labour hour because they are predominant.

In Dept. 2, it is better to use machine hour rate, because they are predominant.

In Dept. 3, it is better to use overheads as % of direct wages because employees are paid different wage rates.

**Illustration 74**

Your company uses a historical cost system and applies overheads on the basis of "Predetermined" rates. The following are the figures from the Trial Balance as at 30-9-192012:-

	Dr. (₹)	Cr. (₹)
Manufacturing overheads	4,26,544	---
Manufacturing overheads-applied	---	3,65,904
Work-in-progress	1,41,480	---
Finished Goods Stock	2,30,732	---
Cost of Goods Sold	8,40,588	---



Give two methods for the disposal of the under absorbed overheads and show the profit implications of the method.

**Solution:**

	₹
Overheads incurred	= 4,26,544
Overheads absorbed	= <u>3,65,904</u>
Under absorption	= <u>60,640</u>

The following are the 3 methods for disposing off this under absorbed overheads:

1. Transferring to the costing P & L A/c under this method, the profit will decrease by ₹ 60,640.
2. The amount may be disposed off by carrying forward to the next year. In this case, there will be no effect on profit.
3. Applying Supplementary Overhead Rate and further absorbing, which may be shown as follows. Under this method also, the profit will decrease by ₹ 60,640.

$$\begin{aligned} \text{Supplementary OH Rate} &= [60,640 / 12,12,800] \times 100 \\ &= 5\% \end{aligned}$$

₹

		<b>Suppl. OH (5%)</b>	<b>Total</b>
Work in Progress	1,41,480	7,074	1,48,554
Finished Goods	2,30,732	11,537	2,42,269
Cost of goods sold	8,40,588	42,029	8,82,617
	12,12,800	60,640	12,73,440

**Illustration 75**

A Manufacturing company has four production departments. Overhead is absorbed to its production departments by means of departmental rates per direct labour hour.

In a particular year there was a large difference between the overhead incurred and overhead absorbed. On analysis you get the following information:-

	Departments			
	1	2	3	4
Overhead incurred (₹)	12,320	44,385	18,180	16,720
Actual direct labour hours worked	30,800	80,700	40,400	30,400
Estimated department rates used	0.50	0.45	0.40	0.50
Total overhead absorbed	15,400	36,315	16,160	15,200
Direct labour hours contained in:				
Work-in-progress	3,000	10,400	1,900	7,200
Finished goods	4,800	8,300	4,000	2,900

You are required to:

- (a) Calculate for each department the direct labour hour rates of overhead incurred.
- (b) Calculate the extent to which the values of work-in progress and finished goods be increased for each department for the year in the view of corrected rate.
- (c) What will be the impact on total profit of the company in view of the correction in (b) above.

**Solution:****Statement Showing computation of overhead rate incurred per hour and corrected values of WIP and Finished goods:**

	Particulars	Dept 1	Dept 2	Dept 3	Dept 4	
I.	Overhead incurred	12,320	44,385	18,180	16,720	
II.	Actual labour hours	30,800	80,700	40,400	30,400	
III.	Overhead rate (I / II)	0.40	0.55	0.45	0.55	
IV	Estimated rate	0.50	0.45	0.40	0.50	
V	Difference being Supplementary OH Rate	(0.10)	0.10	0.05	0.05	
VI	Stock of WIP (V x hrs)	- 300	1,040	95	360	1,195
	Stock of Finished Goods	- 480	830	200	145	695

Due to correction of OH rate, the value of WIP and Finished Goods stocks were increased by ₹ 1,195 and ₹ 695 respectively.

By this correction of stocks, the profits will come down by ₹ 1,890 for the year.

**Illustration 76**

In a factory the expenses of factory are charged on a fixed percentage basis on wages and office overhead expenses are calculated on the basis of percentage of works cost.

	I Order (₹)	II Order (₹)
Material	12,500	18,000
Wages	10,000	14,000
Selling price	44,850	61,880
Percentage of profit on cost	15%	12%

Find the rate of Factory OH and Office OH.

**Solution:**

Let 'X' and 'Y' be the % of Works Overhead on wages and Office Overhead on works cost respectively.

Particulars	Order I	Order II
Material	12,500	18,000
Wages	10,000	14,000
Prime Cost	22,500	32,000
(+) Factory OH's	$(10,000 \times X/100) = 100X$	$(14,000 \times X/100) = 140X$
Works Cost	$22,500 + 100X$	$32,000 + 140X$
(+) Office Overheads		
$[(100X + 22,500) \times Y/100]$	$XY + 225Y$	$1.4XY + 320Y$
$[(140X + 32,000) \times Y/100]$		
Total Cost	$100X + XY + 225Y + 22,500$	$140X + 1.4XY + 320Y + 32,000$
Cost	$44,850 \times (100/115) = 39,000$	$61,880 \times (100/112) = 55,250$

$$100X + XY + 225Y + 22,500 = 39,000$$

$$\Rightarrow 100X + XY + 225Y = 16,500 \quad \rightarrow \text{Equ. (1)}$$

$$140X + 1.4XY + 320Y + 32,000 = 55,250$$

$$\Rightarrow 140X + 1.4XY + 320Y = 23,250 \quad \rightarrow \text{Equ. (2)}$$

$$\text{Equ. (1)} \times 1.4 \Rightarrow 140X + 1.4XY + 315Y = 23,100$$

$$\text{Equ. (2)} \quad \Rightarrow 140X + 1.4XY + 320Y = 23,250$$

$$\begin{array}{r} (-) \quad (-) \quad (-) \quad (-) \\ \hline 5Y = 150 \end{array}$$



Therefore,  $Y = 150/50 = 30$

Substituting the value of Y in Equ. (1), we get X

$$100X + 30X + 225 \times 30 = 16,500 \quad \rightarrow \text{Equ. (1)}$$

$$130X + 6750 = 16,500$$

$$130X = 9,750$$

$$X = 9,750/130 = 75$$

% of Factory OH on wages = 75%

% of Office OH on works cost = 30%

### Illustration 77

X Ltd. manufactures four brands of toys A, B, C and D. If the company limits the manufacture to just one brand the monthly production will be:-

A	-	50,000	Units
B	-	1,00,000	Units
C	-	1,50,000	Units
D	-	3,00,000	Units

You are given the following set of information from which you are requested to find out the profit or loss made on each brand showing clearly the following elements:-

a) Direct Cost      b) Works Cost      c) Total Cost

	Brands			
	A	B	C	D
Actual Production (units)	6,750	18,000	40,500	94,500
Direct Wages	15,000	27,500	37,500	1,05,000
Material Cost	50,000	92,500	1,27,500	3,80,000
Selling price per unit	20	15	10	8

Factory Overhead expenditure for the month was ₹1,62,000. Selling and Distribution cost should be assumed @ 20% of works cost. Factory Overhead expenses, should be allocated to each brand on the basis of units which could have been produced in a month when single brand production was in operation.

### Solution:

#### Equivalent units of D:

One unit of A = 6 units of D

One unit of B = 3 units of D

One unit of C = 2 units of D

One unit of D = 1 unit of D

$$\begin{aligned} \text{Total equivalent units of D} &= (6750 \times 6) + (18000 \times 3) + (40500 \times 2) + (94500 \times 1) \\ &= 2,70,000 \end{aligned}$$

$$\text{Factory Overhead per unit of D} = 1,62,000 / 2,70,000 = 0.60$$

Cost per unit of A =  $6 \times 0.6 = 3.6$

Cost per unit of B =  $3 \times 0.6 = 1.8$

Cost per unit of C =  $2 \times 0.6 = 1.2$

Cost per unit of D =  $1 \times 0.6 = 0.6$

**Statement showing computation of Total Cost and Profit**

₹

Particulars	A	B	C	D	Total
Material	50,000	92,500	1,27,500	3,80,000	6,50,000
Wages	15,000	27,500	37,500	1,05,000	1,85,000
Direct Cost	65,000	1,20,000	1,65,000	4,85,000	8,35,000
(+) Works OH	24,300	32,400	48,600	56,700	1,62,000
Works Cost	89,300	1,52,400	2,13,600	5,41,700	9,97,000
(+) Selling expenses	17,860	30,480	42,720	1,08,340	1,99,400
Total Cost	1,07,160	1,82,880	2,56,320	6,50,040	11,96,400
Profit/(Loss)	27,840	87,120	1,48,680	1,05,960	3,69,600
Sales	1,35,000	2,70,000	4,05,000	7,56,000	15,66,000

**Illustration 78**

Self-help Ltd. has gensets and produced its own power Data for power costs are as follows :-

	Production Depts.		Service Depts.	
	A	B	X	Y
Horse Power Hours				
Needed at capacity production	10,000	20,000	12,000	8,000
Used during the month of May	8,000	13,000	7,000	6,000

During the month of May costs for generating power amounted to ₹9,300, of this ₹2,500 was considered to be fixed. Dept x renders service to other Depts. in the ratio of 13:6:1, while Y renders service at A & B in the ratio of 31:3. Given that the direct labour hours in Depts. A and B are 1,650 hours and 2,175 hours respectively, find the power cost per labour hour in each of these two departments.

**Solution:**

**Statement Showing apportionment of power cost and computation of cost per hour**

₹

Particulars	Basis	Total	A	B	X	Y
Fixed Cost	(5:10:6:4)	2,500	500	1,000	600	400
Variable Cost (9,300 – 2,500)	(8:13:7:6)	6,800	1,600	2,600	1,400	1,200
		9,300	2,100	3,600	2,000	1,600
Costs of X [(as it renders to more depts. (3)]	(13:6:1)		1,300	600	(2,000)	100
			3,400	4,200	--	1,700
Costs of Y	(31:3)		1,550	150	--	(1,700)
			4,950	4,350	--	--
Labour Hours			1,650	2,175		
Cost of power per labour hour			3	2		



### Illustration 79

At Ltd engineering Co. having 25 different types of automatic machines, furnishes you the following data for 2011-12 in respect of machine B:

1. Cost of the machine ₹ 50,000  
Life - 10 years Scrap value is nil
2. Overhead expenses are:
  - Factory Rent ₹ 50,000 p.a.
  - Heating and Lighting ₹ 40,000
  - Supervision ₹ 1,50,000 p.a
  - Reserve equipment of machine B ₹ 5,000 p.a.
  - Area of the factory 80,000 sq.ft.
  - Area occupied by machine B 3,000 sq.ft.
3. Wages of operator is ₹24 per day of 8 hours including all fringe benefits. He attends to one machine when it is under set up and two machines while under operation.
4. Estimated production hours 3,600 p.a.  
Estimated set up time 400 hrs.p.a.  
Power 0.5 per hour

Prepare a schedule of comprehensive machine hour rate and find the cost of the following jobs:

	JOB 1102	JOB 1308
Set up time (Hrs.)	80	40
Operation time (Hrs.)	130	160

### Solution:

#### Computation of machine hour rate when machine is in operation

Particulars		Amount
<b>Standing Charges:</b>		
Rent	$50,000 \times 3/80 = 1875$	
Heating & Lighting	$40,000 \times 3/80 = 1500$	
Supervision	$1,50,000 \times 1/25 = 6000$	
Reserve equipment	$= 5000$	
	$= 14375$	
Cost per hour	$14375/4000$	3.59
<b>Machine Expenses:</b>		
Depreciation	$[50,000 \div (10 \times 3600)] = 1.39$	3.39
Wages	$[24/8 \times 1/2] = 1.50$	
Power	$= 0.50$	
Machine Hour Rate		6.98

**Computation of machine hour rate when machine is under setup**

Particulars		Amount
<b>Standing Charges:</b>		
Rent	50,000 x 3/80 = 1875	
Heating & Lighting	40,000 x 3/80 = 1500	
Supervision	1,50,000 x 1/25 = 6000	
Reserve equipment	= 5000	
	= 14375	
Cost per hour	14375/4000	3.59
<b>Machine Expenses:</b>		
Depreciation	[50,000 x (10 x 3600)] = 1.39	4.39
Wages	[24/8] = 3.00	
Power	= ----	
<b>Machine Hour Rate</b>		<b>7.98</b>

**Computation of cost of the jobs**

Particulars	Job 1102	Job 1308
Setup cost		
Job 1102 : 80 x 7.98	638.40	
Job 1308 : 40 x 7.98		319.20
Operation Cost		
Job 1102 : 130 x 6.98	907.40	
Job 1308 : 160 x 6.98		1,116.80
<b>Total Cost of the Job</b>	<b>1,545.80</b>	<b>1,436.00</b>

**Illustration 80**

Ganges Printing Co. has three operating departments:

1. Printing and Binding
2. Lithographing and
3. Engraving.

The company has a job order cost system using a single predetermined expense rate. The management has been made aware of the deficiencies of using such a rate and is now interested in departmentalising factory overhead. A study reveals that:

Department 1 has 3 similar machines representing a large investment and calling for high repairs and depreciation charges.

Department 2 has the workers perform similar tasks and are therefore paid the same hourly wage.

Department 3 however has several classes of workers, each group being paid the same hourly wage.

The estimated factory overhead and production data costs are as follows

	<b>Printing &amp; Binding</b>	<b>Litho- Graphing</b>	<b>Engraving</b>
Factory overhead (₹)	40,000	68,750	1,20,000
Direct labour hours	10,000	20,000	40,000
Direct labour cost (₹)	25,000	55,000	80,000
Machine hours	20,000	NIL	NIL

**Required:**

- 1) An analysis to advise the management regarding the types of rates to be used in these departments.
- 2) A computation of the rates recommended.

**Solution:**

1. It is appropriate to use machine hour rate method of absorbing overheads in Dept 1 because there is large investment in machine and therefore they are predominant.

$$\text{OH rate per machine hour} = 40,000 / 20,000 = ₹ 2 \text{ per hour.}$$

2. In Dept 2, it is better and appropriate to use labour hour rate of overheads because all the workers are paid at uniform wage rate.

$$\text{OH rate per labour hour} = 68,750 / 20,000 = ₹ 3.4375 \text{ per hour.}$$

3. In Dept 3, it is better and appropriate to use overhead rate based on certain % of wages because workers are paid at different rates.

$$\text{OH \% on wages} = (1,20,000 / 80,000) \times 100 = 150\%$$

**Illustration 81**

For a department the standard overhead rate is ₹2.50 per hour and the overhead allowances are as follows:

Activity Level (Hours)	Budget overhead Allowance (₹)
3,000	10,000
7,000	18,000
11,000	26,000

**Calculate:**

- a) Fixed cost
- b) The standard activity level on the basis of which the standard overhead rate has been worked out.

**Solution:****(a) Fixed Cost**

$$\begin{aligned} \text{Variable OH per hour} &= \frac{\text{High level cost} - \text{Low level cost.}}{\text{High level hours} - \text{Low level hours}} \\ &= [(26,000 - 10,000) / (11,000 - 3,000)] \\ &= ₹ 2 \text{ per hour} \\ \text{Fixed Cost} &= 10,000 - (3,000 \times 2) = ₹ 4,000 \end{aligned}$$

**(b) Standard activity level at which the rate has been determined**

$$\begin{aligned} \text{Standard activity level at which the rate has been determined} \\ &= \text{Fixed Cost} / \text{Fixed OH per hour} \\ &= 4,000 / (2.5 - 2) = 8,000 \text{ hours} \end{aligned}$$

**Illustration 82**

In a certain factory three products are made from different materials by similar process. For a typical period production costs are as under:

	Product A	Product B	Product C
	₹	₹	₹
Material used	1,600	2,000	800
Direct labour cost	1,200	1,000	400
Overhead (actual)	800	650	350

Overhead is charged to cost of each product at the rate of 25% on prime cost.

Do you see anything wrong in principle in this method of charging overheads? If so, suggest a preferable method.

**Solution:**

Since, different materials are used for producing products, it is advisable, preferable and appropriate to use the method of absorbing overheads based on % of materials instead of % on prime cost which is shown as follows:

	₹		
	A	B	C
Materials	1,600	2,000	800
Labour	1,200	1,000	400
Prime Cost	2,800	3,000	1,200
OH @ 25% on prime cost	700	750	300

% of OH on Material Cost:

$$A = [700/1600 \times 100] = 43.75\%$$

$$B = [750/2000 \times 100] = 37.5\%$$

$$C = [300/800 \times 100] = 37.5\%$$

**Illustration 83**

A company produced a simple product in three sizes A, B and C. Prepare a statement showing the selling and distribution expenses apportioned over these three sizes applying the appropriate basis for such apportionment in each case from the particulars indicated:

Express the total of the costs so apportioned to each size as:

- Cost per unit sold (nearest paise)
- A percentage of sales turnover (nearest to two places for decimal).

The Expenses are:

Expenses	Amount ₹	Basis of apportionment
Sales salaries	10,000	Direct charge
Sales commission	6,000	Sales turnover
Sales office expenses	2,096	Number of orders
Advt. General	5,000	Sales turnover
Advt. specific	22,000	Direct charge
Packing	3,000	Total volume cu.ft. product sold
Delivery expenditure	4,000	--- do ---
Warehouse expenses	1,000	--- do ---



Expenses credit collection 1,296      Number of orders

Data available relating to the three sizes are as follows :

	TOTAL	SIZE A	SIZE B	SIZE C
1. No. of salesmen, all paid same salary	10	4	5	1
2. Units sold	10,400	3,400	4,000	3,000
3. No. of orders	1,600	700	800	100
4. % of specific advt.	100%	30%	40%	30%
5. Sales turnover	2,00,000	58,000	80,000	62,000
6. Volume of cu.ft. per unit of finished products	--	5	8	17

**Solution:**

**Statement Showing apportionment of selling expenses over the sizes and computation of cost per unit and % on sales:**

₹

Particulars	Basis	Total	A	B	C
Sales Salaries	(4:5:1)	10,000	4,000	5,000	1,000
Sales Commission	(29:40:31)	6,000	1,740	2,400	1,860
Sales Office expenses	(7:8:1)	2,096	917	1,048	131
Advt. General	(29:40:31)	5,000	1,450	2,000	1,550
Advt. Specific	(3:4:3)	22,000	6,600	8,800	6,600
Packing	(17:32:51)	3,000	510	960	1,530
Delivery	(17:32:51)	4,000	680	1,280	2,040
Warehouse	(17:32:51)	1,000	170	320	510
Credit collection	(7:8:1)	1,296	567	648	81
		54,392	16,634	22,456	15,302

	Particulars	A	B	C
a)	Cost per unit sold	$(16,634/3,400) \times 100$ = 4.89	$(22,456/4,000) \times 100$ = 5.614	$(15,302/3,000) \times 100$ = 5.10
b)	% on sales	$(16,634/58,000) \times 100$ = 28.67%	$(22,456/80,000) \times 100$ = 28.07	$(15,302/62,000) \times 100$ = 24.68

**Working:**

	A	B	C
Volume of cu. ft. per unit of finished products	5	8	17
Units sold	3,400	4,000	3,000
Total volume of cu. ft.	17,000	32,000	51,000

**Illustration 84**

For a production department of a manufacturing company you are required to :

- Prepare a fixed budget of overhead;
- Prepare a flexible budget of overhead, at 70% and 110% of budget volume;
- Calculate a departmental hourly rate of overhead absorption as per (a) and (b) above.

The budgeted level of activity of the department is 5,000 hours per period and the study of the various items of expenditure reveals the following :

	₹	₹ per hour
Indirect wages		0.40
Repairs upto 2,000 hours	100	
for each additional 500 hours		
upto a total of 4,000 hours	35	
Additional from 4,001 to 5,000 hours	60	
Additional above 5,000 hours	70	
Rent and Rates	350	
Power Upto 3,600 hours	0.25	
for hours above 3,600	0.20	
Consumable supplies		0.24
Supervision Upto 2,500 hours		400
Additional for each extra 600 hours		
above 2,500 and upto 4,900 hours		100
Additional above 4,900 hours		150
Depreciation upto 5,000 hours		650
above 5,000 hours and upto 6,500 hours	820	
Cleaning upto 4,000 hours	60	
above 4,000 hours	80	
Heat and lighting from 2,100 hours to 3,500 hours	120	
from 3,500 hours to 5,000 hours	150	
above 5,000 hours	175	

**Solution:****Fixed and Flexible Budget showing overhead cost per hour:**

₹

Particulars	(3,500) 70%	(5,000) 100%	(5,500) 110%
Indirect wages (0.4 / hrs.)	1,400	2,000	2,200
Repairs	205	300	370
Rent & Rates	350	350	350
Power	875	1,180	1,280

Consumable Supplies	840	1,200	1,320
Supervision	600	950	950
Depreciation	650	650	820
Cleaning	60	80	80
Heating & Lighting	120	150	175
	5,100	6,860	7,545
OH rate per hour	[5,100/3,500] = 1.457	[6,860/5,000] = 1.372	[7,545/5,500] = 1.372

1. If under absorbed OH is 10% or more of actual OH incurred – Supplementary OH rate is applied.  
(or)
2. If the amount is considerable, supplementary OH rate applied otherwise we may follow, transferring to P & L A/c or carry forward to next year.

#### Working Notes:

₹

Repairs	100 + (3x35) = 205	100 + (4x35) + 60 = 300	100 + (4x35) + 60 + 70 = 370
Power	(3500 x 0.25) = 875	(900 + 280) = 1,180	900 + 280 + 100 = 1,280
Supervision	400 + (2 x 100) = 600	400 + (4 x 100) + 150 = 950	400 + (4x100) + 150 = 950

#### Illustration 85

In a manufacturing unit, overhead was recovered at a predetermined rate of ₹25 per man-day. The total factory overhead incurred and the man-days actually worked were ₹ 41,50,000 and 1,50,000 respectively. Out of the 40,000 units produced during a period 30,000 units were sold. There were also 30,000 uncompleted units which may be reckoned at 66.67% complete.

On analysing the reasons, it was found that 40% of the unabsorbed overheads were due to defective planning and the rest were attributable to increase overhead costs.

How would unabsorbed overhead be treated in Cost Accounts?

#### Solution:

₹

Overheads incurred	= 41,50,000
Overheads absorbed (1,50,000 x 25)	= 37,50,000
Under absorption	= 4,00,000

The under absorption of ₹ 4,00,000 being considerable whether due to defective planning or due to increase in prices, would be disposed off by applying supplementary OH rate in the following manner:

$$\begin{aligned} \text{Supplementary OH rate} &= \frac{4,00,000}{30,000 + 10,000 + (30,000 \times \frac{2}{3})} \\ &= 4,00,000 / 60,000 = 20/3 \\ \text{To be absorbed on cost of goods sold} &= 30,000 \times 20/3 = 2,00,000 \\ \text{To be absorbed on closing stock} &= 10,000 \times 20/3 = 66,667 \\ \text{To be absorbed on Work in progress} &= 30,000 \times 2/3 \times 20/3 = 1,33,333 \\ &= 4,00,000 \end{aligned}$$

**Illustration 86**

The pipe company manufactures two products A and B during the first year of its operations. For purposes of product costing, an overhead rate of application of ₹1.70 per direct labour hour was used, based on budgetary factory overhead of ₹3,40,000 and budgeted direct labour hours of 2,00,000 as follows:

	Budgeted overhead	Budgeted Hours	Product A	Product B
Department 1	₹ 2,40,000	1,00,000	Dept I 1 hour	4 hours
Department 2	₹ 1,00,000	1,00,000	Dept II 4 hours	1 hour
	<u>3,40,000</u>	<u>2,00,000</u>	<u>5 hours</u>	<u>5 hours</u>

At the end of the year, there was no work on process. There were, however, 2,000 and 6,000 finished units, respectively of products A and B on hand. Assume that budgeted activity was attained.

- What was the effect on the company's income of using a plant wise overhead rate instead of departmental overhead rates?
- Assume that material and labour costs per unit of product A were ₹ 10 and that the selling price was established by adding 40% to cover profit and selling and administrative expenses. What difference in selling price would result from the use of departmental against plant wise overhead rates?
- Explain why departmental overhead rates were generally preferable to plant wise rates.

**Solution:****(a) Computation of effect on income of company by using Plant wise over head rate instead of departmental Overhead Rates:**

Particulars	A	B
Overheads using plant wise OH rate A = (1.7 x 5)      B = (1.7 x 5)	8.5	8.5
(-) Overhead using dept OH rate A = [(1x2.4) + (4x1)] = 6.4 B = [(4x2.4) + (1x1)] = 10.6	6.4	10.6
	2.1	(-) 2.1
No. of units of stock	2,000	6,000
Increase or decrease in value of stock	4,200	12,600

Closing stock of A will increase by ₹ 4200 and that of B will decrease by ₹ 12,600. As a result of this, company's profit was shown in excess by ₹ 8,400.

**(b) Computation of selling price of Product A by using plant wise Overhead Rate:**

Particulars	Amount (₹)
Materials & Labour	10.00
Overheads	8.50
	18.50
(+) 40% towards Selling & Distribution OH's and profit	7.40
Selling Price	25.90



### Computation of Selling Price of Product 'A' by using dept. OH rates:

Particulars	Amount
Materials & Labour	10.00
Overheads	6.40
	16.40
(+) 40% towards Selling & Distribution OH's and profit	6.56
Selling Price	22.96

Difference in Selling Price = 25.90 – 22.96 = 2.94

(c) When there are departments, departments OH rate should be used for absorbing factory overheads and not by using plant wise/general/blanket/single overhead rate. The reason being in different departments, nature of working differs. In one department, machine play dominant role. In some other department, material play dominant role. Depending upon dominance of each factor, OH rate should be used for absorbing overheads.

Therefore, it is always advisable, preferable and appropriate to use departmental overhead rate instead of blanket overhead rate.

### Illustration 87

A company is producing three types of products A, B, C. The sales territory of the company is divided into three areas X, Y, Z.

The estimated sales and the advertising costs for the next year are as under :-

Products	Territories		
	X (₹)	Y (₹)	Z (₹)
A	25,000	10,000	---
B	15,000	—	40,000
C	---	35,000	20,000

Advertising cost:

Local direct cost	11,900	3,200	4,500	4,200
Common cost	<u>5,800</u>	---	---	---
	<u>17,700</u>			

You are required to prepare a statement showing territory wise advertising cost expressed as a percentage of sales. The allocation of advertising cost should be based on sales as given above.

### Solution:

#### Statement showing apportionment of common advertising cost among territories:

Particulars	X	Y	Z	Total
Common Cost [40:45:60]	1,600	1,800	2,400	5,800
Local Direct Cost	3,200	4,500	4,200	11,900
	4,800	6,300	6,600	17,700

**Statement showing apportionment of selling & distribution among areas as well as by products and computation of percentage on sales:**

Products	Areas			Total
	X	Y	Z	
A	3,000	1,400	--	4,400
B	1,800	--	4,400	6,200
C	--	4,900	2,200	7,100
	4,800	6,300	6,600	17,700

	X	Y	Z
% on sales	$[(4800/40000) \times 100]$ = 12%	$[(6300/45000) \times 100]$ = 14%	$[(6600/60000) \times 100]$ = 11%

**SELF EXAMINATION QUESTIONS:**

1. What is meant by classification of overheads and why it should be attempted?
2. What do you understand by Semi-Variable Overheads? Explain the various methods of segregating Fixed and Variable Overhead Costs.
3. What are the main sources of overhead expenses? State with examples the procedure for such collection from these sources.
4. Define Cost Allocation and Cost Apportionment. Explain fully the distinction between Cost Allocation and Cost Apportionment.
5. Explain the various basis of apportionment of overheads to departments with illustrations as to the items of expenses.
6. Briefly describe two ways of dealing with the problem of apportioning service department costs among service departments which, in addition to do work for the main operational departments, also serve one another.
7. How are the following items treated in Cost Accounts?
  - a. Defectives due to bad workmanship and bad materials.
  - b. Major repairs of a plant to prolong its useful life.
  - c. Labour amenities.
  - d. ESI contribution
  - e. Fringe benefits to workers.
  - f. After sales service cost
  - g. Losses due to obsolescence.
  - h. Lay off wages paid to workers.
8. As a Cost Accountant explain with reasons how would you treat the following items in Cost Accounts:
  - a. Bonus payable under the Payment of Bonus Act, 1965.
  - b. Bad Debts
  - c. Leave Travel Assistance.
  - d. Night Shift Allowance.



9. Explain the terms "Practical Capacity", "Normal Capacity", "Idle Capacity", and "Imbalanced Capacity". With reference to any industry with which you are familiar, how will you measure the effect of Idle Capacity?
10. What is Absorption? What are the various methods of absorbing overheads in Cost Accounts?
11. What is Under or Over Absorption? What are the causes for Under or Over Absorption?
12. What are the various methods of disposing off under or over absorbed overheads?
13. Write a note on Supplementary Overhead Rate.

### PRACTICE PROBLEMS

14. The 'Prabhat Ltd.' is divided into two production cost centers A and B, and two service cost centers X and Y. The following is the summary of overhead costs for a particular period. Works Manager's Salary ₹4,000; Power ₹21,000; Contribution to PF ₹9,000; Rent ₹6,000; Plant Maintenance ₹4,000. Canteen expenditure ₹12,000; Depreciation of Plant and Machinery ₹ 20,000.

The following information is made available from the various departments.

	DEPT. A	DEPT. B	DEPT. X	DEPT. Y
No. of Employees	16	8	4	4
Area Sq. Ft.	2,000	3,000	500	500
Value of Plant (₹)	75,000	1,00,000	25,000	—
Wages (₹)	40,000	20,000	10,000	5,000
Horse Power	3	3	1	—

Apportion the costs to the various departments on the most equitable basis.

**[Ans: A : ₹ 32,800; B : ₹ 30,400; X : ₹ 9,700; Y : ₹ 3,100]**

15. In a factory there 5 machines, you are required to calculate Machine hour rate from the following data.

Space of the Departments 8,000 Sq.ft.

Cost of machine (₹) 20,000

Space occupied by each machine 1,600 Sq.ft.

Power consumed as indicated by meter is ₹3,000 p.a. for this machine.

Depreciation 7 ½ % p.a

Estimated life 10 years (working hours 2,000 p.a)

Estimated Repairs p.a. for this machine ₹ 520

Rent & Rates 9,000+

Lighting 750+ for all machines

Supervision 1,500

Other charges 4,000+

2/5 of the supervision is for this machine. There are three mechanics drawing ₹ 50, ₹60, ₹70 p.m respectively.

**[Ans: Machine hour rate ₹ 4.401]**

16. You are required to calculate the machine hour rate from the following particulars.
- Cost of the machine ₹10,000/- its estimated working life is 10 years and the estimated scrap value at the end of its life is ₹ 1,000. The estimated working time per year (50 weeks of 40 hours each) is 2,000 hours.
  - Electricity used by the machine is 16 units per hour at the cost of ₹0.10 per unit.
  - The machine requires a chemical solution which is replaced at the end of each week at cost of ₹20/- each time.
  - The estimated cost of maintenance per year is ₹1,200.
  - Two attendants control the operation of the machine together with five other identical machines their combined week wages amount to ₹120.
  - Departmental and General works overheads allocated to the machine for the year were ₹2,000.

**[Ans: Machine hour rate : ₹ 4.65]**

17. XYZ manufactures household pumps which pass through three departments viz. Foundry, Machine Shop and Assembling.

The manufacturing expenses are as follows:

	Foundry ₹	Machine ₹	Assembling ₹	Total ₹
Direct wages	10,000	50,000	10,000	70,000
Works Overhead	5,000	90,000	10,000	1,05,000

The factory cost of manufacturing a type of 'C' pump was prepared by the company as follows:

	₹
Material	16
Wages: Foundry	2
Machine Shop	4
Assembling	2
	8
Works Overhead:	
150% of Direct Wages	12
	36

It seems that there is some fallacy. Try to correct it.

**[Ans: Correct Factory cost ₹ 34.20]**

18. The following are the maintenance costs incurred in a machine shop for six months with corresponding machine hours.

MONTH	MACHINE HOURS	MAINTENANCE COSTS (₹)
January	2,000	300
February	2,200	320
March	1,700	270
April	2,400	340
May	1,800	280
June	1,900	290
	12,000	1,800

Analyse the Machine cost which is semi variable into fixed and variable element.

**[Ans: Variable cost per machine hour = ₹ 0.10; Fixed cost ₹ 100]**

19. From the following data segregate fixed cost and variable costs.

	Level of Activity	
Capacity (%)	80	100
Labour Hours	400	500
Maintenance expenses of a plant (₹)	2,600	2,750

**[Ans: Variable Cost per hour ₹ 1.5; Fixed Cost ₹ 2,000]**

20. In a factory, there are two service departments P and Q and three production departments A, B and C. In April 2012, the departmental expenses were:

Departments	A	B	C	P	Q
₹	6,50,000	6,00,000	5,00,000	1,20,000	1,00,000

The service department expenses are allotted on a percentage basis as follows:

Service Departments	Production Depart.			Service Departs.	
	A	B	C	P	Q
P	30	40	15	-	15
Q	40	30	25	5	-

Prepare a statement showing the distribution of the two service departments' expenses to the three departments by a) Simultaneous Equation Method b) Repeated Distribution Method.

**[Ans: Total Cost: A – ₹ 7,35,340; B – ₹ 6,86,045 and C – ₹ 5,48,615]**

21. The monthly budget of a department is as under:

	₹
Direct material	45,000
Direct wages	60,000
Overheads	90,000
Direct labour hours	15,000
Machine hours	30,000

Find out the overhead recovery rate based on at least five different possible methods of absorption of overheads.

**[Ans: Direct Material Cost method 200%; Direct Labour Cost Method 150%; Prime Cost Method 85.71%; Direct Labour Hour Rate Method ₹ 6; Machine Hour Rate Method ₹ 3]**

22. A machine shop has 8 identical drilling Machines manned by 6 operators. The machines cannot be worked without an operator wholly engaged on it. The original cost of all these 3 machines work out to ₹ 8 lakhs. The following particulars are furnished for a 6 month period.

Normal available hours per month	208
Absenteeism (without pay) – hours	18
Leave (with pay) – hours	20
Normal idle time unavoidable hours	10
Average rate of wages per day of 8 hours	₹ 20
Productive Bonus estimated	15% on wages

	₹
Value of power Consumed	8,050
Supervision and Indirect Labour	3,300
Lightening and Electricity	1,200

These particulars are for a year:

Repairs and maintenance including consumables 3% on value of machine

Insurance ₹ 40,000

Depreciation 10% on original cost

Other sundry works expenses ₹ 12,000

General Management expenses allotted ₹ 54,530

You are required to work out a comprehensive machine hour rate for the Machine Shop.

**[Ans: ₹ 23.87]**

23. The following particulars were extracted from the records of Epsilon Ltd. on 31<sup>st</sup> December:

	Dept. A	Dept. B	Dept. C
	₹	₹	₹
Overhead incurred	2,000	1,500	2,500
Overhead absorbed	2,200	1,400	2,250

The departmental loads during the three months to 31<sup>st</sup> December averaged:

Dept. A	100% of Normal Capacity
Dept. B	75% of Normal Capacity
Dept. C	50% of Normal Capacity

How would you deal with the balances under or over-absorbed? What preliminaries enquiries would you make?

**[Ans:** Dept. A Over-absorbed ₹ 200

Dept. B under-absorbed ₹ 100

Dept. C Under-absorbed ₹ 250]

24. The overhead expenses of a factory are allowed on the machine hour method. You are required to calculate the hourly rate for a certain machine from the following information:

Cost	₹ 58,000
Estimated scrap value	₹ 3,000
Estimated working life	20,000 hours
Estimated cost of maintenance during working life of machine	₹ 12,000
Power used for machine	₹ 1 per hour
Rent, rates etc. per month (10% to be charged for this machine)	₹ 1,500
Normal machine running hours during a month	180 hours
Standing charges other than rent, rates etc. per month	₹ 200

**[Ans: ₹ 6.30]**



25. An engineering company, engaged in the manufacture of various heavy engineering products, has installed one Horizontal Borer for specialized manufacturing operations. Calculate the machine hour rate on the basis of the following particulars:
1. F.O.B cost of machine – ₹ 24 lakhs.
  2. Customs duty, insurance, freight etc. – ₹ 11 lakhs.
  3. Installation expenses – ₹ 3 lakhs.
  4. Cost of tools adequate for 2 years only – ₹ 4 lakhs.
  5. Cost of machine room – ₹ 3 lakhs.
  6. Cost of air-conditioning for the machine Room – ₹ 2 lakhs.
  7. Rate of interest on term-loan to finance the above capital expenditure – 12% per annum.
  8. Salaries etc. for operators and supervisory staff – ₹ 2 lakhs per year.
  9. Cost of electricity – ₹ 11 per hour.
  10. Consumption of the stores – ₹ 5,000 per month.
  11. Other expenses – ₹ 5 lakhs per annum.
  12. Assume rate of depreciation 10% per annum on Fixed Assets.
  13. Total working hours in the Machine Room is 20,000 hours a month.
  14. Loading & unloading time is 10% of the machining time.

You can make suitable assumptions, if necessary, for the purpose of your computation.

[Ans: ₹ 101.46]

26. The following data is available in respect of a machine:

Cost of machine ₹ 10,000

Estimated scrap value ₹ 1,000

Working life of the machine 6 years

The machine is discarded because of obsolescence after 4 years of service and sold for ₹ 2,000. What is the resultant loss and how would you treat the same in Cost Accounts?

[Ans: ₹ 2,000, Entire loss may be charged to Costing Profit & Loss A/c in the year of sale or may be spread over the balance period of life of the machine]

27. In a Company the department in which the machine (capable of turning out finished product every hour) is located, normally operates five days a week on a single eight hour shift. The plant is closed for 16 working days each year for holidays and vacation. Equipment is idle for 160 hours each year for cleaning, oiling and maintenance. Normal sales demand averages 3,000 units a year over a fixed period. The expected sales volume for the year 2011 is 2,800 units.

Calculate machine hours at:

- (a) Maximum Capacity
- (b) Practical Capacity
- (c) Normal Capacity
- (d) Expected Actual Capacity

[Ans: (a) 1,952 hrs; (b) 1,792 hrs; (c) 3,000 hrs (d) 1,792 hours]

28. Because of shortages of labour and materials, a department in a factory is working at 55 percent of its normal capacity. In its cost records, it charges manufacturing overhead to work-in-process as a percentage of direct labour.

For the current year, budgeted direct labour cost is ₹ 2,50,000 and budgeted manufacturing overhead is ₹ 2,25,000 (Fixed ₹ 1,00,000 and variable ₹ 1,25,000)

A dispute has arisen as to the percentage of direct labour which should be charged to work-in-process. One officer claims that it should be 90 per cent; another claim that it should be much less than this.

Give your opinion and a brief reason for it.

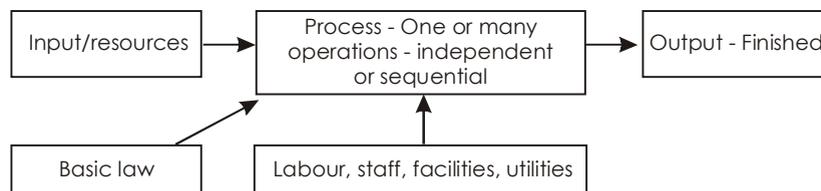
[Ans: 72%]

## 2.6 COST SHEET

In the preceding sections, we have dealt with the basic concepts of costs and the various elements of costs. We have also seen the different steps followed in determination of cost of a product or rendering a service. Treatment of various costs has been discussed at length. You are by now very well aware that the term cost has wide connotations and would not mean anything in isolation. Costs must be understood if they are to be controlled. Measurement of costs is the first step in the process of control simply because you cannot control unless you measure. Measurement of cost would mean different when applied to different industries.

The cost has to be measured with respect to the cost centers first and then at a broader level with respect to the cost unit. The journey towards the aim of determining cost of a product or service may take various routes. But the logic is same i.e. collect all relevant costs in the process of converting raw material into finished product and accumulate the total costs.

To put in simple words, to generate any product or service, resources are needed called as inputs. These inputs are used in a process of conversion. The end result is the output which could either be a product or a service. The resources consume costs. While determining total cost of resources, the costs of all resources used (directly or indirectly) in the process are accumulated. This requires establishing the relationship between the resource and the product or service.



The process of accumulating costs will differ according to the nature of business and the activities carried out. The common way to accumulate costs is to prepare cost sheets.

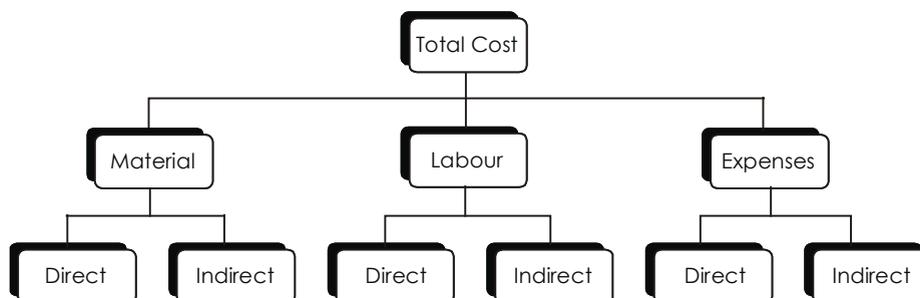
### Cost Accumulation

The logic of Cost Accumulation is to track costs in the same sequence as the resources get used. See the following flow of activities:

- Raw material & other material are purchased and stored
- The material is used up in process of conversion
- People or machines work upon the material while in the process
- The process results into some products that are finished

The cost data needs to be collected along this whole chain that ends when a final product is produced. The cost accumulation is done based on the source documents which are used in booking the costs. Depending upon the type of business, a cost unit is determined for which costs must be accumulated. The departmentalisation of the business organisation is done to suit the production process. For example, in a fruit processing industry, the costs would be accumulated as per different process involved i.e. cutting, pulp formation, blending, purifying and final packing. As the physical flow of material happens from one process to the other, costs are also passed on from one process to the next in line.

For the purpose of convenience, a cost tree in the following format explains the composition of costs.



As we know all the direct element of cost together make Prime Cost. Sequentially, production overheads are added to get Factory Cost or Works Cost. Then Administration overheads are added to the Factory Cost to get Cost of Production. Once the product is ready for sale, the selling and distribution overheads are added to get Cost of Sales or Cost of Goods Sold. When this is deducted from Sales revenue we get profit or loss.

Process of accumulation of cost comprises of:

- Identification of costs to the cost centers or departments.
- Apportionment of service costs to production costs.
- Absorption of costs into cost units.

### Cost Collection

Cost Collection is the process of booking costs against a particular Cost Account code under a particular cost center or directly under a cost unit, as the case may be. Source documents are used to generate the record of the costs incurred or to be incurred. These source documents are properly authorised and numbered. They act as the primary source of entry. In additions to these documents there could be other documents and reports such as allocation sheets, labour utilisation reports, idle time & overtime analysis, scrap reports etc which help in identifying costs. Let us see how the costs are collected.

### Material costs

These costs are identified with cost unit with the help of 'stores issue summary'. In case of job costing, there will be job-wise summary prepared on the basis of 'material issue notes'. In case of contracts, the summary will be made contract-wise. At times instead of procuring & storing material, it may be procured and directly used on contract site. 'Purchase Invoice' may be the basis to capture such direct material costs. In case of process industry, the material is issued to different processes. Here, the costs input to a process may be collected based on the cost of materials processed in the previous process. A process-wise summary of material issues is maintained. Some material may get added to a process but may not become part of final product. The cost of such material is apportioned on the output of that process. The indirect material costs may be gathered on the basis of consumable issues, scrap reports, standard parts list etc. Care should be taken to account for material losses. Normal material losses are to be apportioned to the good units produced, whereas, abnormal losses should be excluded from computation of cost of good units and should be directly taken to P & L Account.

### **Labour Cost**

Salaries and wages summary prepared after the monthly payroll run is the main basis for labour cost collection. The summary shows department-wise break up, so that the Direct Labour Cost of production department is separately known and that for the other indirect departments is also available to be charged as overheads. In case of contracting business, labour force is usually dedicated to various sites. The cost of labour used on different contracts can be found based on wages sheet maintained for each contract site. In addition, the idle time reports, overtime reports are used for booking of the costs of idle time & overtime. In case labourers are common to various jobs or contracts or processes, an estimate of the time that they spend on each of them is made and the costs are allocated accordingly.

### **Expenses**

Accounting entries in cash book or journal proper help to collect the expenses. Direct expenses which are job or contract or process specific may be collected on the basis of vouchers. The indirect expenses are collected and then apportioned in a summarised form using apportionment sheets.

### **Collection of Budgeted costs**

The cost calculation for the selected cost unit could be either of actual cost or budgeted cost. While actual costs are collected on the basis of documents explained above, the budgeted costs are computed using the standard bill of material, and predetermined overhead rates. For budgeted direct material, a bill of material is prepared for each product (including sub-assemblies). This is a quantitative estimate. Based on the estimates a budgeted material price is considered to value the material cost. Estimated labour hours are costed using estimated Labour Hour Rates. Pre-determined overheads are also computed considering the base selected for absorption. Thus an estimate of total cost with full composition may be made.

### **Cost Accountant & Cost Data collection**

The Cost Accountant must play a pivotal role in ensuring that the process of cost data collection is very strong. The cost analysis and reporting will not be useful for managerial decision-making if the data collection process is wrong. Presence of a strong and robust Costing System is needed to ensure comprehensive data collection process. The Costs Account may carry out periodical checks to evaluate the system and also may do the Internal Audit. He can use all his expertise in the process of establishing cost estimates which will help in decision making.

Cost data collected must be reported in proper format to make it more informative and meaningful. As can be understood, the report must serve the purpose for which it was sought. A complete cost sheet may not be always necessary. The production manager may require the cost of production only. The cost report should be able to give this figure separately broken up into all its elements. The sales and marketing cost may be given for each channel of distribution, customers, regions etc in addition to the product-wise break up.

The cost data should be collected in a manner that will make available cost information to all those who are responsible for the costs. A cost sheet should give the figures of each element of cost broken up into direct and indirect and also according to functions like production, administration and selling & distribution. It is therefore logical that the format of the Cost Sheet is derived from the requirements for which it is to be used. Apart from exhibiting the total cost deducted logically, it should highlight other cost also, so that comparison with budget can be made, variances analysed and cost could be controlled to increase profits.

### **Cost Sheet Formats & Preparation**

The cost concept itself being subjective, there is no standard format in which the collected costs can be presented. It has to suit the type of business, need of the details, and management's requirement of control over costs. Yet a simple way to show the Total Cost of any cost unit is shown below:



### Specimen Cost Sheet

Period From .....	Cost Units	
To .....	.....	
Cost Items	Amount (₹)	Amount (₹)
<b>Direct Material</b>		
Opening Stock	xxxxx	
Add: Purchases	xxxxx	
Add: Incidental charges	xxxxx	
Less: Closing Stock	xxxxx	xxxxx
Direct Labour		xxxxx
Direct Expenses		xxxxx
PRIME COST		xxxxx
Add: Production Overheads	xxxxx	
Add: Opening work in process	xxxxx	
Less: Closing work in process	xxxxx	xxxxx
FACTORY COST OR WORKS COST		xxxxx
Add: Administrative Overheads		xxxxx
COST OF GOODS MANUFACTURED		xxxxx
Add: Opening Finished goods stock	xxxxx	
Less: Closing Finished goods stock	xxxxx	xxxxx
COST OF FINISHED GOODS SOLD		xxxxx
Add: Selling & Distribution overheads		xxxxx
COST OF GOODS SOLD		xxxxx

You can observe the logical way in which the cost flow has been shown in the above chart. The focus in this specimen is on elements and functions split further into direct and indirect costs with respect to the cost units. Although the formats could be different, the contents of a cost sheet must be understood and interpreted correctly so that one can analyse it for control and decision making. For example if it has to be prepared for a process industry, the format would reflect the portion up to factory cost for each process separately. Then the administration costs will be added together. The cost per unit will be computed for every process separately. The stock for processes subsequent to process one will mean stocks transferred from earlier processes and stocks transferred to the next processes. The objective here is to compute the cost per process. The cost sheet format here could be:

### Specimen Cost Sheet

Period From ..... To .....	Cost Units	
Cost Items	Amount (₹)	Amount (₹)
<b>Direct Material</b>		
Opening Stock	xxxxx	
Add: Purchases	xxxxx	
Add: Incidental charges	xxxxx	
Less: Closing Stock	xxxxx	xxxxx
Direct Labour		xxxxx
Direct Expenses		xxxxx
PRIME COST		xxxxx

Add: Production overheads	XXXXX	
Add: Opening work in process	XXXXX	
Less: Closing work in process	XXXXX	XXXXX
FACTORY COST OR WORKS COST		XXXXX
Add: Administrative Overheads		XXXXX
COST OF GOODS MANUFACTURED		XXXXX
Add: Opening Finished goods stock	XXXXX	
Less: Closing Finished goods stock	XXXXX	XXXXX
COST OF FINISHED GOODS SOLD		XXXXX
Add: Selling & Distribution overheads		XXXXX
COST OF GOODS SOLD		XXXXX

Depending on number of processes, the working will be shown up to factory cost. Subsequently, the administration, selling & distribution overheads are added like that shown in the first format. Some process companies may prepare a different cost sheet for each process. When it is available process wise, control of process costs and process losses could be better controlled by the concerned process managers.

### Important Components of Cost Sheet

- Cost sheet has reference to the job or contract or a batch or production or a service undertaken to be rendered. If the completion of the job at hand relates to more than one accounting period, it is better that separate columns are provided to mention figures for those period. The job or batch reference should also be mentioned on the header.
- If there is an estimate made for the costs, a separate column must be provided for estimated costs against which the actual costs should be plotted to get ready comparison. This will make cost sheets more user-friendly and meaningful.
- In certain cases, material may not form any significant portion of the total cost and as such may be treated as an overhead item. In such cases, the Prime Cost will mainly constitute as labour and other expenses.
- Treatment of raw material stocks should be carefully understood. As the costs are to be linked to the units produced, the material consumption, completion of earlier period's semifinished goods and the finished goods sold needs to be properly computed.

### Raw Material Consumed: Opening Stock + Purchases – Closing Stock

One has to go into the depth of this arithmetical formula. Where do we get the figure of purchases from? It is from the suppliers invoices for purchase of stockable material. It also should include all charges incidental to purchase of goods like carriage, insurance, customs duty etc. which is directly associated with the incoming material.

As we know that the stocks are always valued at cost or market price whichever is less. This norm has to be applied to the rates of all the items of material in stock, and then the total valuation of stock is done. The stock ledger records all receipts and issues of the quantity and rate of material items. The valuation of material issues has to be properly done based on correctly chosen method of issue pricing. This summary figure as per the issue column should exactly match with the raw material consumed figure as included in the cost sheet.

The normal losses on account of material shortages must be included in the cost of raw material consumed. Care should be taken to remove the abnormal losses there from.

- Treatment of work in process is another important step. If the format is carefully seen, it will be noticed that the cost of WIP stocks is adjusted specifically after adding Factory Overheads! Why adjusted? And why at that stage only? Please note that Cost Sheet is prepared for a period of time for a cost



unit. At the beginning of that period, if the job has been carried forward from the previous period, there may be some partly finished work that is carried forward. At the same time there may be partly finished production at the end of current period. These stocks must be adjusted to reflect the cost consumed during the current period. Further, the work in process is normally valued at Factory Cost. It does not include Administration Overheads as the production of goods is not yet fully complete. Administration costs are absorbed at the stage of finished production. Hence the adjustment of WIP stocks is to be done before adding the Administration Overheads.

- (f) Similarly, the adjustment for the opening and closing stocks of finished goods should be done. This has to be done after the stage of cost of production.
- (g) One could have separate columns for total costs and per unit costs side by side. This will help have a quick glance at the per unit figures. Management at operating level will find this very helpful.

### **Cost Sheet format for Service Costing**

The Cost Sheet format for Service Costing takes into account the requirements of different types of services. It could be used to find out cost of internal services like boiler house, maintenance of delivery van fleet etc. In such cases the main purpose is to control the costs. It could also apply in case of services that are sold such as transport companies, hospitals, hotels, etc. Selling services and making profit thereon is the main purpose of these services.

As we know, material costs constitute a lower proportion of the total costs and the proportion of labour and other expenses is higher. As most of the costs are indirect, it is difficult to accumulate costs in the traditional format as shown above, neither is it useful. Hence, the emphasis is on variability of expenses. The cost collection is also done in the same manner. All items of costs are bifurcated into:

- (a) Fixed or Standing Costs;
- (b) Maintenance Expenses; and
- (c) Other Variable or Running Expenses

Based on this bifurcation a Cost Sheet is prepared. In most of the services, the cost unit is a composite unit such as per passenger-kilometer, per patient-bed, per Kilo-Watt-Hour, per room day etc. In such cases it is necessary that quantity of the cost units is properly mentioned in the Cost Sheet so that per unit cost can be correctly calculated.

Here are some examples of contents of Cost Sheets for different services:

**(a) Transport:** The costs are shown under the heads of fixed expenses, running expenses and maintenance expenses. The fixed expenses will be time related such as salaries, garage rent, insurance etc. The maintenance charges will be like tyres & tubes, repairs, etc. The operating expenses will mainly include petrol, diesel & fuel oil, drivers & cleaners' wages etc. The cost unit data will comprise of mileage run, tonnage carried, days on road etc. The specimen Cost Sheet format is shown below:

**Specimen Cost Sheet – Transport Service**

Period From ..... To .....	Vehicle No. xx	Vehicle No. yy
Cost Items	Amount (₹)	Amount (₹)
<b>Operating Costs</b>		
Petrol	Xxxx	Xxxx
Diesel	Xxxx	Xxxx
Engine Oil	Xxxx	Xxxx
Driver's wages	Xxxx	Xxxx
Cleaner's wages	Xxxx	Xxxx
Depreciation	Xxxx	Xxxx
Sub – total	Xxxx	Xxxx
<b>Maintenance Costs</b>		
Tyres and tubes	Xxxx	Xxxx
Painting, denting	Xxxx	Xxxx
Cleaning & Overhauls	Xxxx	Xxxx
Sub – Total	Xxxx	Xxxx
<b>Fixed Costs</b>		
Garage rent	Xxxx	Xxxx
Insurance	Xxxx	Xxxx
Taxes	Xxxx	Xxxx
Road permits	Xxxx	Xxxx
General supervision	Xxxx	Xxxx
Sub – Total	Xxxx	Xxxx
<b>Grand Total</b>	Xxxx	xxxxx
<b>Cost Units</b>	Xxxx	Xxxx
Mileage run	Xxxx	Xxxx
Days on road	Xxxx	Xxxx
Load carried (tones)	Xxxx	Xxxx
Capacity utilization %	Xxxx	Xxxx
Total Tonne-miles	Xxxx	Xxxx
Cost per tone-mile		

**(b) Boiler house:** It generates steam that is used in production activity. Main items of costs are fuel & labour, power, fuel handling, ash removal, water softening, maintenance etc. The cost unit will be **cubic feet**.

**Specimen Cost Sheet – Boiler House**

Period From ..... To .....	Total Cost	Cost per 1000 hours
Steam produced in 1000 hours .....		
Less: used in boiler house .....		
Less: Lines losses		
Net Production		



Cost Items	Amount (₹)	Amount (₹)
<b>Fuel &amp; Labour</b>		
Fuel oil	Xxxxx	Xxxxx
Electric power	Xxxxx	Xxxxx
Fuel handling	Xxxxx	Xxxxx
Ash removal & disposal	Xxxxx	Xxxxx
Direct wages	Xxxxx	Xxxxx
Sub-Total	Xxxxx	Xxxxx
<b>Water</b>		
Storage	xxxxx	xxxxx
Softening	xxxxx	xxxxx
Sub-Total	xxxxx	xxxxx
<b>Maintenance</b>		
Boiler cleaning	Xxxxx	Xxxxx
Coal bunkers	Xxxxx	Xxxxx
Economisers	Xxxxx	Xxxxx
Mechanical stokers	Xxxxx	Xxxxx
Service pipes	Xxxxx	Xxxxx
Sub-Total	Xxxxx	Xxxxx
<b>Fixed Costs</b>		
Supervision	Xxxxx	Xxxxx
Rent	Xxxxx	Xxxxx
Depreciation	Xxxxx	Xxxxx
Sub-Total	Xxxxx	Xxxxx
Grand Total	Xxxxx	Xxxxx

(c) **Power House:** The main components of cost are steam production and electricity generation. The former comprises of coal, water, wages, maintenance etc. and the later contains steam consumption, wages, supervision etc. Cost units will be for steam produced and electricity generated.

#### Specimen Cost Sheet – Power House

Period From .....	To .....	Total Cost	Cost per KWH
Electricity generated in KWH .....			
Less: Lines losses			
Net production			
Cost Items	Amount (₹)	Amount (₹)	
<b>Steam Production Costs</b>			
Coal bunkers	Xxxxx	Xxxxx	
Water	Xxxxx	Xxxxx	
Wages	Xxxxx	Xxxxx	
Maintenance of boilers	Xxxxx	Xxxxx	
Depreciation	Xxxxx	Xxxxx	
Sub-Total	Xxxxx	Xxxxx	
<b>Less: Used for heating purposes</b>			
Steam used for electricity generation	Xxxxxx	Xxxxxx	

<b>Electricity Generation Costs</b>		
Wages	Xxxxx	Xxxxx
Stores	Xxxxx	Xxxxx
Maintenance of Power Generators	Xxxxx	Xxxxx
Repairs	Xxxxx	Xxxxx
Transmission lines	Xxxxx	Xxxxx
Sub-Total	Xxxxx	Xxxxx
<b>Grand Total</b>	Xxxxxx	Xxxxxx

(d) **Canteen:** Here the cost will be labour, consumption of provision such as vegetables, meat, fruits, and other costs like depreciation, maintenance, power & electricity etc. In case canteen is an internal service, it is subsidised. The company contributes a portion of the costs. From total costs subsidy is reduced and then the net costs are reflected.

### Specimen Cost Sheet – Canteen

Period From ..... To .....	Total Cost	Cost per meal
Number of meals		
Less: Meals consumed by staff		
Net Meals		
Cost Items	Amount (₹)	Amount (₹)
<b>Provisions</b>		
Meat, fish, eggs	Xxxxx	Xxxxx
Vegetables	Xxxxx	Xxxxx
Fruits	Xxxxx	Xxxxx
Milk	Xxxxx	Xxxxx
Tea, Coffee	Xxxxx	Xxxxx
Bread, Cakes	Xxxxx	Xxxxx
Others	Xxxxx	Xxxxx
Sub-Total	Xxxxx	Xxxxx
<b>Wages &amp; Salaries</b>		
Cooks	Xxxxx	Xxxxx
Cleaning Staff	Xxxxx	Xxxxx
Helpers & Servers	Xxxxx	Xxxxx
Supervision	Xxxxx	Xxxxx
Sub-Total	Xxxxx	Xxxxx
<b>Services</b>		
Steam, Gases	Xxxxx	Xxxxx
Electricity & Lights	Xxxxx	Xxxxx
Power	Xxxxx	Xxxxx
Sub-total	Xxxxx	Xxxxx
<b>Fixed Costs</b>		
Rent	Xxxxx	Xxxxx
Depreciation	Xxxxx	Xxxxx
Sub-Total	Xxxxx	Xxxxx
<b>Grand Total</b>	Xxxxx	Xxxxx

Similarly one can develop Cost Sheets for other services like education, BPO, consulting etc. The basic idea is to be able to correctly report costs for the selected cost unit. In case of services, comparison with budgets will enable the management to control cost of services in a better way.



### Illustration 1

Following data is available from the cost records of a company for the month of March 2012:

(1) Opening stock of job as on 1st March 2012

Job no. A 99: Direct Material ₹80, Direct Wages ₹150 and Factory Overheads ₹200

Job no. A 77: Direct Material ₹420, Direct Wages ₹450 and Factory Overheads ₹400

(2) Direct material issued during the month of February 2012 was:

Job no A 99 ₹120

Job no A 77 ₹280

Job no A 66 ₹225

Job no A 55 ₹300

(3) Direct labour details for March 2012 were:

Job no	Hours	Amount (₹)
A 99	400	600
A 77	200	450
A 66	300	675
A 55	100	225

(4) Factory Overheads are applied to jobs on production according to direct labour hour rate which is ₹2 per hour.

(5) Factory Overhead incurred in March 2012 were ₹2100.

(6) Job numbers A 99 & A 77 were completed during the month. They were billed to the customers at a price which included 15% of the price of the job for Selling & Distribution expenses and another 10% of the price for Profit.

Prepare:

(a) Job cost sheet for job number A 77 and A 99.

(b) Determine the selling price for the jobs.

(c) Calculate the value of work in process.

### Solution:

### Remarks :

(1) The Factory Overheads actually incurred are ₹ 2100. This amount to be apportioned on the basis of labour hours. So the rate to be considered as ₹ 2.1 per unit  $= (2100/1000)$  and not ₹2 per unit. If we consider the above mentioned point the calculations for Job Sheets & for the work in progress will change accordingly.

(2) Work in progress is to be calculated for the incomplete jobs hence job no. A 66 and A 55 should only be included in the calculations of work in progress.

**Job Cost Sheets for the month of March 2012**

₹

Cost Items	Job A 77	Job A 99
Direct Material issued	280	120
Direct labour spent	450	600
Prime Cost	730	720
Factory Overheads @ ₹ 2.1 per hour	420	840
Add: Opening WIP (Material + Labour + Overheads)	1,270	430
Factory Cost	2,420	1,990
Add: Selling & Distribution Overheads (Note 1)	484	398
Cost of Sales	2,904	2,388
Profit (Note 1)	323	265
Billing price for the job	3,227	2,653

<b>Note 1</b>		
S & D and profit are given in indirect way.	480	300
Assume Selling price as 100	320	200
Less: S & D @ 15% (15)		
Less: Profit @ 10% (10)		
Balance has to be the Factory Cost <u>75</u>		
S & D price will be 15/75 of Factory Costs		
Profit will be 10/75 of Factory Cost		

**Computation of Work in Process for March 2012**

₹

Items			
Opening balance as on 1 <sup>st</sup> March	Job A 99	430	
	Job A 77	1,270	1,700
Material issued during the month of March	Job A 99	120	
	Job A 77	280	
	Job A 66	225	
	Job A 55	300	925
Direct Labour	Job A 99	600	
	Job A 77	450	
	Job A 66	675	
	Job A 55	225	1,950
Factory Overheads on 1000 hours @ ₹ 2.1			2,100
Factory Cost			6,675
Less: Factory Cost of completed jobs	Job A 77	2,420	
	Job A 99	1,990	4,410
Closing work in process as on 28 <sup>th</sup> March 2012			2,265

Another way to calculate WIP is

Job A 66 and A 55 are in progress & WIP includes only incomplete Jobs.

Direct Material (225+300)	525
Direct Labour (675+225)	900
Factory Overheads [2.1 *(300+100)]	<u>840</u>
Total WIP	<u>2,265</u>

## Illustration 2

Prepare Cost Sheet for an engineering company which produces standard components in batches of 1000 pieces each. A batch passes through three processes viz. Foundry, Machining & Assembly.

The materials used for a batch number 001 were: Foundry 1300 tonnes @ ₹50 per tonne of which 50 tonnes were sent back to stores.

### Other details

Process	Direct Labour	Overheads
Foundry	200 Hrs @ ₹ 10	₹ 15 per Labour Hour
Machining	100 Hrs @ ₹ 5	₹ 20 per Labour Hour
Assembly	100 Hrs @ ₹ 15	₹ 10 per Labour Hour

A comparison of actual costs with estimated cost discloses that material and overheads have exceeded the estimates by 20% whereas the estimated labour cost is 10% more than the actual. Show the variances with respect to the estimates

### Solution:

#### Cost sheets for the Batch number 001

##### Standard batch size 1000 pieces

	Actual	Estimated	Variance	F/A
Direct material issued 1250 x 50	62,500	52,083	(10,417)	A
Direct labour spent				
Foundry - 200 x 10	2,000	2,200	200	F
Machining - 100 x 5	500	550	50	F
Assembly - 100 x 15	1,500	1,650	150	F
Prime Cost	66,500	56,483	(10,017)	A
Factory Overheads applied				
Foundry - 200 x 15	3,000	2,500	(500)	A
Machining - 100 x 20	2,000	1,667	(333)	A
Assembly - 100 x 10	1,000	833	(167)	A
Factory Cost	72,500	61,483	(11,017)	A
Cost per unit (Factory Cost/1000)	72.5	61.48	11.02	

## Illustration 3

An advertising agency has received an enquiry for which you are supposed to submit the quotation. Bill of material prepared by the production department for the job states the following requirement of material:

Paper 10 reams @ ₹1800 per ream

Ink and other printing material ₹5000

Binding material & other consumables ₹3000

Some photography is required for the job. The agency does not have a photographer as an employee. It decides to hire one by paying ₹10000 to him. Estimated job card prepared by production department specifies that service of following employees will be required for this job:

Artist (₹12000 per month) 80 hours

Copywriter (₹10000 per month) 75 hours

Client servicing (₹9000 per month) 30 hours

The primary packing material will be required to the tune of ₹4000. Production Overheads 40% of direct cost, while the S & D Overheads are likely to be 25% on Production Cost. The agency expects a profit of 20% on the quoted price. The agency works 25 days in a month and 6 hours a day.

**Solution:****Quotation for a Printing Job**

Items	Amount ₹	Amount ₹
Direct material required:		
Paper 10 x 1800	18,000	
Ink & other printing material	5,000	
Binding material & consumables	3,000	
Primary packing material	4,000	30,000
Direct labour spent		
Artist (12,000/25 x 6) x 80	6,400	
Copy writer (10,000 / (25 x 6)) x 75	5,000	
Client Servicing (9,000 / (25 x 6)) x 30	1,800	13,200
Photographer's charges		10,000
Prime Cost		53,200
Factory Overheads applied @ 40% on Direct Cost		21,280
Production Cost		74,480
S & D overheads applied @ 25% on Production Cost		18,620
Total Cost		93,100
Profit (20% on price i.e. 25% on cost)		23,275
Price to be quoted		1,16,375

**Illustration 4**

The following figures were extracted from the Trial Balance of a company as on 31<sup>st</sup> December 2012.

Particulars	Debit (₹)	Credit (₹)
<b>Inventories</b>		
Raw Material	1,40,000	
WIP	2,00,000	
FG	80,000	
Office Appliances	17,400	
Plant and Machinery	4,60,500	
Buildings	2,00,000	
Sales		7,68,000
Sales Returns	14,000	
Material purchased	3,20,000	
Freight on materials	16,000	
Purchase returns		4,800
Direct labour	1,60,000	
Indirect labour	18,000	
Factory supervision	10,000	



Factory repairs & upkeep	14,000	
Heat, light & power	65,000	
Rates & taxes	6,300	
Misc factory expenses	18,700	
Sales commission	33,600	
Sales travelling	11,000	
Sales Promotion	22,500	
Distribution department salaries & wages	18,000	
Office salaries	8,600	
Interest on borrowed funds	2,000	

**Further details are given as follows:**

Closing inventories are Material ₹180000, WIP ₹192000 & FG ₹115000.

Accrued expenses are Direct Labour ₹8000, Indirect Labour ₹1200 & interest ₹2000.

Depreciation should be provided as 5% on Office Appliances, 10% on Machinery and 4% on Buildings.

Heat, light and power are to be distributed in the ratio of 8:1:1 among factory, office and distribution respectively.

Rates & taxes apply as 2/3rd to the factory and 1/3rd to office.

Depreciation on building to be distributed in the ratio of 8:1:1 among factory, office and distribution respectively

Prepare a Cost Sheet showing all important components and also a condensed P & L Account for the year.

**Solution:**

Particulars	Amount (₹)	Amount (₹)
<b>Direct Materials</b>		
Opening stock	1,40,000	
Add: Purchases	3,20,000	
Add: Freight	16,000	
Less: Returns	(4,800)	
Less: Closing Stock	(1,80,000)	2,91,200
Direct Labour	1,60,000	
Add: Accrued	8,000	1,68,000
<b>Prime Cost</b>		<b>4,59,200</b>

<b>Factory Overheads:</b>		
Indirect labour	18,000	
Accrued indirect labour	1,200	
Factory supervision	10,000	
Repairs & upkeep	14,000	
Heat, Light & power	52,000	
Rates & taxes	4,200	
Misc. Factory expenses	18,700	
Depreciation on plant & machinery	46,050	
Depreciation on buildings	6,400	
	1,70,550	
Add: Opening WIP	2,00,000	
Less: Closing WIP	(1,92,000)	1,78,550
Factory Cost		6,37,750
<b>Administration Overheads</b>		
Heat Light & power	6,500	
Rates & taxes	2,100	
Depreciation on buildings	800	
Depreciation on office appliances	870	
Office salaries	8,600	
	18,870	
Add: Opening FG stock	80,000	
Less: Closing FG Stock	(1,15,000)	(16,130)
Cost of Production of saleable units		6,21,620
<b>Selling &amp; Distribution overheads</b>		
Heat & light	6,500	
Depreciation on buildings	800	
Sales commission	33,600	
Sales travelling	11,000	
Sales promotion	22,500	
Distribution department expenses	18,000	92,400
Cost of Sales		7,14,020

Condensed P & L Account for the year ended 31-12-2012		
Sales Income	7,68,000	
Less: Returns	(14,000)	7,54,000
Cost of Sales as above		7,14,020
Interest on borrowings (2,000 + 2,000)		4,000
Net Profit		35,980

### Illustration 5

PR Ltd. manufactures and sells a typical brand of Tiffin Boxes under its own brand name. The installed capacity of the plant is 1,20,000 units per year distributable evenly over each month of calendar year. The Cost Accountant of the company has informed the following cost structure of the product, which is as follows:

Raw Material ₹ 20 per unit.

Direct Labour ₹ 12 per unit

Direct Expenses ₹ 2 per unit

Variable Overheads ₹ 16 per unit.

Fixed Overhead ₹ 3,00,000.

Semi-variable Overheads are as follows:

₹ 7,500 per month upto 50% capacity & Additional ₹ 2,500 per month for every additional 25% capacity utilization or part thereof.

The plant was operating at 50% capacity during the first seven months of the calendar year 2012, at 100% capacity in the remaining months of the year.

The selling price for the period from 1<sup>st</sup> Jan, 2012 to 31<sup>st</sup> July, 2012 was fixed at ₹ 69 per unit. The firm has been monitoring the profitability and revising the selling price to meet its annual profit target of ₹ 8,00,000. You are required to suggest the selling price per unit for the period from 1<sup>st</sup> August 2012 to 31<sup>st</sup> December 2012.

Prepare Cost Sheet clearly showing the total and per unit cost and also profit for the period.

1. from 1<sup>st</sup> Jan. to 31<sup>st</sup> July, 2012
2. from 1<sup>st</sup> Aug. to 31<sup>st</sup> Dec, 2012.

### Solution:

#### Cost Sheet for the period

₹

Particulars	50% capacity utilization – 35000 units, seven months	100% capacity utilization – 50000 units, Five months
	1 <sup>st</sup> Jan to 31 <sup>st</sup> July, 2012	1 <sup>st</sup> Aug to 31 <sup>st</sup> Dec, 2012
Raw Materials	7,00,000	10,00,000
Direct Labour	4,20,000	6,00,000
Direct Expenses	70,000	1,00,000
Variable overheads	5,60,000	8,00,000
Fixed Overheads	1,75,000	1,25,000
Semi-Variable Overheads	52,500	62,500
Total Costs	19,77,500	26,87,500
Profit	4,37,500	3,62,500
Sales	24,15,000	30,50,000
Selling Price Per Unit	69.00	61.00
Cost Per Unit	56.50	53.75

**Illustration 6**

X Ltd. Provides you the following figures for the year 2011-12:

Particulars	₹
Direct Material	3,20,000
Direct Wages	8,00,000
Production Overheads (25% variable)	4,80,000
Administration Overheads (75% Fixed)	1,60,000
Selling and Distribution Overheads (2/3 <sup>rd</sup> Fixed)	2,40,000
Sales @ ₹ 125 per unit	25,00,000

For the year 2012-13, it is estimated that:

- Output and sales quantity will increase by 20% by incurring additional Advertisement Expenses of ₹ 45,200.
- Material prices will go up 10%.
- Wage Rate will go up by 5% along with, increase in overall direct labour efficiency by 12%.
- Variable Overheads will increase by 5%.
- Fixed Production Overheads will increase by 33 1/3 %

**Required:**

- Calculate the Cost of Sales for the year 2011-2012 and 2012-2013.
- Find out the new selling price for the year 2012-2013.
  - If the same amount of profit is to be earned as in 2011-2012.
  - If the same percentage of profit to sales is to be earned as in 2011-2012.
  - If the existing percentage of profit to sales is to be increased by 25%.
  - If Profit per unit ₹ 10 is to be earned.

**Solution:****(a) Statement showing the Cost of Sales**

₹

	Particulars	For 20000 units	For 24000 units
A.	Direct Materials	3,20,000	4,22,400 [₹3,20,000 x 110% x 120%]
B.	Direct wages	8,00,000	9,00,000 [₹ 8,00,000 x (105/100) x (100/112) x 120%]
C.	Prime Cost	11,20,000	13,22,400
D.	Add: Production Overheads		
	Variable Production Overheads	1,20,000 [₹ 4,80,000 x 25%]	1,51,200 [₹1,20,000 x 105% x 120%]
	Fixed Production Overheads	3,60,000 [₹ 4,80,000 x 75%]	4,80,000 [₹ 3,60,000 x 133%]
E.	Works Cost (C + D)	16,00,000	19,53,600

F.	Add: Administration Overheads		
	Variable Admn. Overheads	40,000	50,400 [₹ 40,000 x 105% x 120%]
	Fixed Admn. Overheads	1,20,000	1,20,000
G.	Cost of Goods Produced	17,60,000	21,24,000
H.	Add: Selling and Distribution Overheads		
	Variable Selling & Distribution OHs	80,000	1,00,800 [₹ 80,000 x 105% x 120%]
	Fixed Selling & Distribution OHs	1,60,000	1,60,000
	Additional Advertisement Exp.		45,200
I.	Cost of Sales [G + H]	20,00,000	24,30,000

(b)

- (i) New Selling Price =  $(₹ 24,30,000 + ₹ 5,00,000) / 24,000 \text{ units} = ₹ 122.08$
- (ii) New Selling Price =  $(₹ 24,30,000 + 25\% \text{ or } ₹ 24,30,000) / 24,000 \text{ units} = ₹ 126.5625$
- (iii) New Selling Price =  $(₹ 24,30,000 + 1/3^{\text{rd}} \text{ or } ₹ 24,30,000) / 24,000 \text{ units} = ₹ 135$
- (iv) New Selling Price =  $(₹ 24,30,000 + (24,000 \times ₹ 10) / 24,000 \text{ units} = ₹ 111.25$

### Illustration 7

The following are the costing records for the year 2012 of a manufacturer:

Production 10,000 units; Cost of Raw Materials ₹ 2,00,000; Labour Cost ₹ 1,20,000; Factory Overheads ₹ 80,000; Office Overheads ₹ 40,000; Selling Expenses ₹ 10,000, Rate of Profit 25% on the Selling Price.

The manufacturer decided to produce 15,000 units in 2013. It is estimated that the cost of raw materials will increase by 20%, the labour cost will increase by 10%, 50% of the overhead charges are fixed and the other 50% are variable. The selling expenses per unit will be reduced by 20%. The rate of profit will remain the same.

Prepare a Cost Statement for the year 2013 showing the total profit and selling price per unit.

**Solution:**

### Statement of Cost & Profit (Cost Sheet) (Output 10,000 units)

Particulars	Cost per unit (in ₹)	Total Cost (in ₹)
Raw Materials	20	2,00,000
Labour	12	1,20,000
<b>PRIME COST</b>	<b>32</b>	<b>3,20,000</b>
Add: Factory Overhead	8	80,000
<b>WORKS COST</b>	<b>40</b>	<b>4,00,000</b>
Add: Office Overhead	4	40,000
<b>COST OF PRODUCTION</b>	<b>44</b>	<b>4,40,000</b>
Add: Selling Expenses	1	10,000
<b>COST OF SALES</b>	<b>45</b>	<b>4,50,000</b>
Add: Profit (25% on Selling Price or 33.33% on Cost of Sales)	15	1,50,000
<b>SELLING PRICE</b>	<b>60</b>	<b>6,00,000</b>

**Statement of Cost & Profit (Cost Sheet)**  
(Output 15,000 units)

Particulars	Cost per unit (in ₹)	Total Cost (in ₹)
Raw Materials (₹ 20 x 120% x 15,000)	24.00	3,60,000
Labour (₹ 12 x 110% x 15,000)	13.20	1,98,000
PRIME COST	37.20	5,58,000
Add: Factory Overhead (₹ 80,000 x 50% + ₹ 4 x 15,000)	6.67	1,00,000
WORKS COST	43.87	6,58,000
Add: Office Overhead (₹ 40,000 x 50% + ₹ 2 x 15,000)	3.33	50,000
COST OF PRODUCTION	47.20	7,08,000
Add: Selling Expenses (₹ 1 x 80% x 15,000)	0.80	12,000
COST OF SALES	48.00	7,20,000
Add: Profit (25% on Selling Price or 33.33% on Cost of Sales)	16.00	2,40,000
SELLING PRICE	64.00	9,60,000

**SELF EXAMINATION QUESTIONS:**

1. Give the specimen of Cost Sheet.
2. Give the proforma of Cost Sheet of:
  - a. Hotel Industry
  - b. Power House
  - c. Transport Service
  - d. Boiler House
3. How do you prepare Cost Sheet?

**PRACTICE PROBLEMS:**

4. Prakash Transport Company has been given a route of 20 km long to run a bus. The bus costs ₹12,50,000 with an estimated useful life of 5 years. It is insured @ 3% pa of the cost. Annual tax amounted to ₹25,000. The garage rent is ₹5,000 per month. Annual repairs cost is estimated as ₹50,000.

The driver is paid a salary of ₹7500 per month and the conductor is paid ₹5000 per month in addition to a 10% of takings as commission to be shared equally by them.

Office Stationery would ₹1000 pm and Office Salaries ₹10000 pm.

Diesel will cost @ ₹30 per liter and the bus would travel a distance of 5 km per liter. The bus will make 3 round trips carrying on an average 40 passengers on each trip. Assuming a profit of 15% on takings, calculate the fare to be charged from each passenger. The bus will operate for 25 days in a month.

**[Ans: Price per Passenger KM = ₹ 0.85]**

5. The City Pride Theatre has revealed the following estimates of their cinema hall:  
Salary 1 manager ₹8000 pm, 10 door keepers ₹2000 pm, 2 operators ₹4000 pm, 4 booking clerks ₹2500 pm



**Annual expenses:**

Electricity	₹1200000
Carbon	₹300000
Misc. expenses	₹150000
Advertising	₹750000 (it would earn income of ₹25000 on advertisements shown in the hall)
Hire of films	₹1500000 per film on 15 films
Administration expenses	₹80000

The premises cost ₹60 lacs and are to be depreciated over 15 years. Projector and other equipments cost ₹25 lacs and to be depreciated @ 25% pa.

The plan is to have 3 daily shows on all 360 days in a year. The capacity is 625 seats divided into

Lower class	250
Upper class	250 and
Balcony	125

20% of the seats are estimated to be vacant. The weightages to be given to the three classes are in the ratio of 1:2:3.

If the management wishes to earn a profit of 25% on gross proceeds, find out the rates to be charged for each class. Round off to nearest rupee.

**[Ans:**

Rates of the ticket per seat

Lower class ₹ 36.29; Upper class ₹ 72.57; Balcony ₹ 108.86.]





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# **Section B**

## **Financial Management**

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# Study Note - 3

## OVERVIEW OF FINANCIAL MANAGEMENT



### This Study Note includes

- 3.1 Objective of Financial Management
- 3.2 Key Decisions of Financial Management
- 3.3 Planing Environment
- 3.4 Functions of Financial Management
- 3.5 Sources of Finance
- 3.6 International Sources
- 3.7 Emerging Role of Finance Manager
- 3.8 Securities and Exchange Board of India Act. 1992
- 3.9 Future Value
- 3.10 Present Value

### INTRODUCTION

Finance is called "The science of money". It studies the principles and the methods of obtaining control of money from those who have saved it, and of administering it by those into whose control it passes. Finance is a branch of economics till 1890. Economics is defined as study of the efficient use of scarce resources. The decisions made by business firm in production, marketing, finance and personnel matters form the subject matters of economics. Finance is the process of conversion of accumulated funds to productive use. It is so intermingled with other economic forces that there is difficulty in appreciating the role of it plays.

Howard and Upton in his book introduction to Business Finance defined, "as that administrative area or set of administrative function in an organization which relate with the arrangement of cash and credit so that the organization may have the means to carry out its objectives as satisfactorily as possible".

In simple terms finance is defined as the activity concerned with the planning, raising, controlling and administering of the funds used in the business. Thus, finance is the activity concerned with the raising and administering of funds used in business.

#### Financial Management : Meaning

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

#### Definitions:

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

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

### 3.1 OBJECTIVE OF FINANCIAL MANAGEMENT

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

Every activity of an organization is reflected in its financial statements. Financial Management deals with activities which have financial implications. The very objective of Financial Management is to maximize the wealth of the shareholders by maximizing the value of the firm. This prime objective of Financial Management is reflected in the EPS (Earning per Share) and the market price of its shares.

The earlier objective of profit maximization is now replaced by wealth maximization. Since profit maximization is a limited one it cannot be the sole objective of a firm. The term profit is a vague phenomenon and if given undue importance problems may arise whereas wealth maximization on the other hand overcomes the drawbacks of profit maximization. Thus the objective of Financial Management is to trade off between risk and return. The objective of Financial Management is to make efficient use of economic resources mainly capital.

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

### **Profit Maximization versus Wealth Maximization**

Financial Management is basically concerned with procurement and use of funds. In the light of these, the main objectives of Financial Management are: -

1. Profit Maximization.
2. Wealth Maximization

#### **1. Profit maximization:**

Profit Maximization is the main objective of business because:

- (i) Profit acts as a measure of efficiency and
- (ii) It serves as a protection against risk.

Agreements in favour of Profit Maximization:

- (i) When profit earning is the main aim of business the ultimate objective should be profit maximization.
- (ii) Future is uncertain. A firm should earn more and more profit to meet the future contingencies.
- (iii) The main source of finance for growth of a business is profit. Hence, profit maximization is required.
- iv) Profit maximization is justified on the grounds of rationality as profits act as a measure of efficiency and economic prosperity.

Arguments against Profit Maximization:

- (i) It leads to exploitation of workers and consumers.
- (ii) It Ignores the risk factors associated with profit.
- (iii) Profit in itself is a vague concept and means differently to different people.
- (iv) It is narrow concept at the cost of social and moral obligations.

Thus, profit maximization as an objective of Financial Management has been considered inadequate.

#### **2. Wealth Maximization:**

Wealth Maximization is considered as the appropriate objective of an enterprise. When the firms maximizes the stock holder's wealth, the individual stockholder can use this wealth to maximize his individual utility. Wealth Maximization is the single substitute for a stock holder's utility.



### **A Stock holder's wealth is shown by:**

Stock holder's wealth = No. of shares owned x Current stock price per share

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

### **Arguments in favour of Wealth Maximization:**

- (i) Due to wealth maximization, the short term money lenders get their payments in time.
- (ii) The long time lenders too get a fixed rate of interest on their investments.
- (iii) The employees share in the wealth gets increased.
- (iv) The various resources are put to economical and efficient use.

### **Argument against Wealth Maximization:**

- (i) It is socially undesirable.
- (ii) It is not a descriptive idea.
- (iii) Only stock holders wealth maximization does not lead to firm's wealth maximization.
- (iv) The objective of wealth maximization is endangered when ownership and management are separated.

In spite of the arguments against wealth maximization, it is the most appropriate objective of a firm.

### **Scope of Financial Management:**

Financial Management today covers the entire gamut of activities and functions given below. The head of finance is considered to be important ally of the CEO in most organizations and performs a strategic role. His responsibilities include:

- (i) Estimating the total requirements of funds for a given period;
- (ii) Raising funds through various sources, both national and international, keeping in mind the cost effectiveness;
- (iii) Investing the funds in both long term as well as short term capital needs;
- (iv) Funding day-to-day working capital requirements of business;
- (v) Collecting on time from debtors and paying to creditors on time;
- (vi) Managing funds and treasury operations;
- (vii) Ensuring a satisfactory return to all the stake holders;
- (viii) Paying interest on borrowings;
- (ix) Repaying lenders on due dates;
- (x) Maximizing the wealth of the shareholders over the long term;
- (xi) Interfacing with the capital markets;
- (xii) Awareness to all the latest developments in the financial markets;
- (xiii) Increasing the firm's competitive financial strength in the market &
- (xiv) Adhering to the requirements of corporate governance.

The above aspects of Financial Management are covered in greater details under different chapters. A priori definitions of the scope of Financial Management fall into three groups. One view is that finance is concerned with cash. At the other extreme is the relatively narrow definition that Financial Management is concerned with raising and administering funds for an enterprise. The third approach is that it is an integral part of overall management rather than a staff specialty concerned with fund raising operations. In this connection, Ezra Solomon says that in this broader view, the central issue of

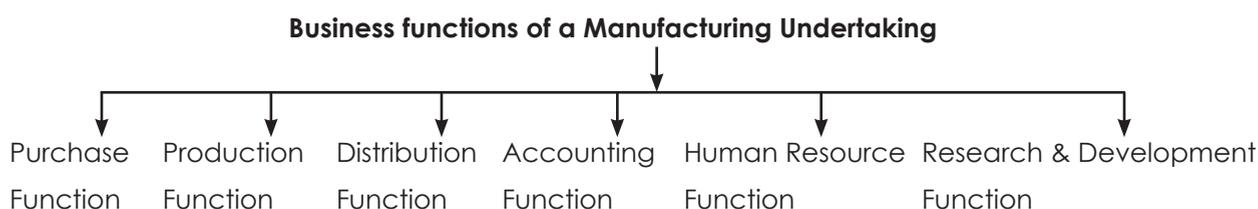
financial policy is the wise use of funds. One apparently straight forward approach is to define the scope of Financial Management as something which embraces those areas in which the finance officer or treasurer operates. The trouble with this empirical definition is that the responsibilities carried out by company treasurers vary quite widely from one organization to another.

**Financial Management plays two basic roles:**

- To participate in the process of putting funds to work within the business and to control their productivity; and
- To identify the need for funds and select sources from which they may be obtained.

**Relationship of finance with other business functions**

Business function means functional activities that an enterprise undertakes in achieving its desired objectives. These functions may be classified on the basis of its operational activities.



**1. Purchase Function:**

In this function Finance Manager plays a key role in providing finance. In order to minimize cost and exercise maximum control, various material management techniques such as economic order quantity (EOQ), determination of stock level, perpetual inventory system etc. are applied. The task of the Finance Manager is to arrange the availability of cash when the bills for purchase become due.

**2. Production Function**

Production function involves heavy investment in fixed assets and in working capital. Naturally, a tighter control by the Finance Manager on the investment in productive assets becomes necessary. It must be seen that there is neither over-capitalisation nor under-capitalisation. Cost-benefit criteria should be the prime guide in allocating funds and therefore finance and production manager should work in unison.

**3. Distribution Function**

The objective of distribution function is making available the goods to the end customer. As every aspect of distributor function involves cash outflow and every distributing activity is aimed at bringing about inflow of cash, both the functions are closely inter-related and hence should be carried out in close union.

**4. Accounting Function**

The efficiency of the whole organization can be greatly improved with correct recording of financial data. All the accounting tools and control devices, necessary for appraisal of finance policy can be correctly formulated if the accounting data are properly recorded. For example, the cost of raising funds, expected returns on the investment of such funds, liquidity position, forecasting of sales, etc. can be effectively carried out if the financial data so recorded are reliable. Hence, the relationship between accounting and finance is intimate and the Finance Manager has to depend heavily on the accuracy of the accounting data.

**5. Human Resource Function**

A sound HR policy includes proper wage structure, incentives schemes, promotional opportunity, human resource development and other fringe benefits provided to the employees. All these matters affect finance. But the finance manager should know that organization can afford to pay only what

it can bear. It means that expenditure incurred on HR Management and the expected return on such investment through labour productivity should be considered in framing a sound HR policy. Therefore, the relation between the finance and HR department should be intimate.

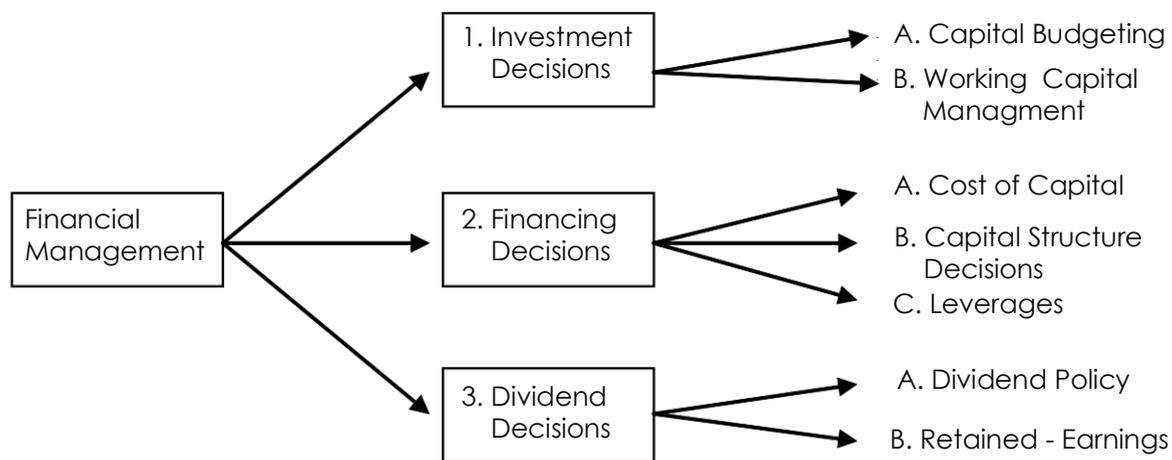
## 6. Research and Development Function

In the world of innovations a constant endeavour for improvement and sophistication of an existing product and introduction of newer varieties, the firm is bound to be gradually out marketed and out of existence. However, sometimes expenditure on R and D involves a heavier amount, disproportionate to the financial capacity of the firm. In such a case, it financially cripples the enterprise and the expenditure ultimately ends in a fiasco. On the other hand, cutting down of research expenditure blocks the scope of improvement and diversification of the product. Usually, this balance is struck out by joint efforts of Finance Manager and the person in charge of R and D.

### 3.2 KEY DECISIONS OF FINANCIAL MANAGEMENT

The modern approach to the Financial Management is concerned with the solution of major problems like investment financing and dividend decisions of the financial operations of a business enterprise. Thus, the functions of Financial Management can be broadly classified into three major decisions, namely:

- (a) Investment decisions.
- (b) Financing decisions.
- (c) Dividend decisions.



The functions of Financial Management are briefly discussed as under:

#### 1. Investment Decision:

The investment decision is concerned with the selection of assets in which funds will be invested by a firm. The asset of a business firm includes long term assets (fixed assets) and short term assets (current assets). Long term assets will yield a return over a period of time in future whereas short term assets are those assets which are easily convertible into cash within an accounting period i.e. a year. The long term investment decision is known as Capital Budgeting whereas the short term investment decision is identified as Working Capital Management. Capital Budgeting may be defined as long – term planning for making and financing proposed capital outlay. In other words Capital Budgeting means the long-range planning of allocation of funds among the various investment proposals. Another important element of Capital Budgeting decision is the analysis of risk and uncertainty. Since, the return on the investment proposals can be derived for a longer time in future, the Capital Budgeting decision should be evaluated in relation to the risk associated with it.

On the other hand, the Finance Manager is also responsible for the efficient management of current assets i.e. Working Capital Management. Working Capital constitutes an integral part of Financial Management. The Finance Manager has to determine the degree of liquidity that a firm should possess. There is a conflict between profitability and liquidity of a firm. Working Capital Management refers to a Trade – off between Liquidity (Risk) and Profitability. In sufficiency of funds in current assets results in –adequate liquidity and possessing of excessive funds in current assets reduces profits. Hence, the Finance Manager must achieve a proper trade – off between liquidity and profitability. In order to achieve this objective, the Finance Manager must equip himself with sound techniques of managing the current assets like cash, receivables and inventories etc.

## 2. Financing Decision

The second important decision is financing decision. The financing decision is concerned with capital – mix, (Financing – mix) or Capital Structure of a firm. The term Capital Structure refers to the proportion of debentures capital (debt) and equity share capital. Financing decision of a firm relates to the financing – mix. This must be decided taking into account the cost of capital, risk and return to the shareholders. Employment of debt capital implies a higher return to the share holders and also the financial risk. There is a conflict between return and risk in the financing decisions of a firm. So, the Finance Manager has to bring a trade – off between risk and return by maintaining a proper balance between debt capital and equity share capital. On the other hand, it is also the responsibility of the Finance Manager to determine an appropriate Capital Structure.

## 3. Dividend Decision

The third major decision is the Dividend Policy Decision. Dividend policy decisions are concerned with the distribution of profits of a firm to the shareholders. How much of the profits should be paid as dividend? i.e. dividend pay-out ratio. The decision will depend upon the preferences of the shareholder, investment opportunities available within the firm and the opportunities for future expansion of the firm. The dividend payout ratio is to be determined in the light of the objectives of maximizing the market value of the share. The dividend decisions must be analysed in relation to the financing decisions of the firm to determine the portion of retained earnings as a means of direct financing for the future expansions of the firm.

The above figure explains the bird's eye – view of Financial Management, particularly the functions of Financial Management. The three decision areas are inter related. So, the Finance Manager has to achieve an optimum combination of these functions so as to maximize wealth of shareholders and the market value of the firm. Since financing decisions of a firm are affecting other functional areas of management, it is the responsibility of the Finance Manager to see that the financial decisions must be geared to other functional areas of management like marketing, production, personnel, accounts and research and development etc.

### 3.3 PLANNING ENVIRONMENT

Financial planning involves analyzing the financial flows of a company, forecasting the consequences of various investment, financing and dividend decisions and weighing the effects of various alternatives. The aim of financial planning should be to match the needs of the company with those of the investors with a sensible gearing of short-term and long-term fixed interest securities. Financial planning helps to avoid waste by providing policies and procedures, which make possible a closer co-ordination between various functions of the business enterprise.

It may be summarized that financial planning should:-

- Determine the financial resources required in meeting the company's operating program.
- Forecast the extent to which these requirements will be met by internal generation of funds and to what extent they will be met from external sources.
- Develop the best plans to obtain the required external funds.
- Establish and maintain a system of financial control governing the allocation and use of funds.

- Formulate programs to provide the most effective profit-volume-cost relationship.
- Analyze the financial results of operation.
- Report the facts to the top management and make recommendations on future operations of the firm.

### 3.4 FUNCTIONS OF FINANCIAL MANAGEMENT

#### Determining Financial Needs

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



**Fig: Functional areas of Financial Management**

#### Determining Sources of Funds:

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

#### Financial Analysis

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

#### Optimal Capital Structure

The Finance Manager has to establish an optimum capital structure and ensure the maximum rate of return on investment. The ratio between equity and other liabilities carrying fixed charges has to be defined. In the process, he has to consider the operating and financial leverages of his firm. The operating

leverage exists because of operating expenses, while financial leverage exists because of the amount of debt involved in a firm's capital structure.

### **Cost-Volume-Profit Analysis**

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

### **Profit Planning and Control**

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

### **Fixed Assets Management**

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

### **Capital Budgeting**

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

### **Corporate Taxation**

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

### **Working Capital Management**

Working Capital is the excess of current assets over current liabilities. This is an important area in the Financial Management because it is compared to the nervous system of the human body. Current Assets consist of cash, inventory, receivables. Current Liabilities consist of payables and bank overdraft. A prudent Finance Manager has to formulate a policy in such a way that there is a balance between profitability and liquidity.

### **Dividend Policies**

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

## Acquisitions and Mergers

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

### 3.5 SOURCES OF FINANCE

Business firms need finance mainly for two purposes-

- (a) To fund the long term decisions.
- (b) To meet the Working Capital requirements.

The long term decisions of a firm involve setting up of the firm, expansion, diversification, modernisation and other similar capital expenditure decisions. All these involve huge investment, the benefits of which will be usually seen only in the long term. In addition to this, they are also irreversible in nature.

Working Capital is required to support the smooth functioning of the normal business operations of a company.

#### Finance needs of a Business

- (i) Long term financial needs – Required for a period exceeding 5-10 years. All fixed investments in plant, machinery, land, buildings are considered as long term financial needs.
- (ii) Medium term financial needs – Required for a period between 1 to 5 years. Identification of medium term financial needs is arbitrary. Sometimes, long term requirements for which long term funds cannot be arranged immediately may be financed from medium-term sources, thus generating medium-term financial needs.
- (iii) Short term financial needs – It is related to investment in current assets such as stock, debtors, cash etc. Investment in these assets is called Working Capital. The requirement of Working Capital depends upon a number of factors and may differ from industry to industry. They are usually required for a period upto one year.

#### Financial Sources of a Business can be classified as follows:

- (i) Long term sources e.g. shares, debentures, long term loan, etc.
- (ii) Medium term sources, e.g. debentures, public deposits, bank loan/overdraft.
- (iii) Short term sources e.g., trade credit, advance from commercial banks, advances from customers etc.

Following chart will give a birds eye view of various sources of finance:-

S.No.	Type of Funds	Owners Funds	Borrowed Funds
1.	Long Term	(a) Equity Share Capital	(a) Debentures/Bonds.
		(b) Preference Share Capital	(b) Term Loans from institution - Rupee Loan - Foreign Currency Loan
		(c) Retained earnings (Plough back of profits)	(c) Term loan from Banks
		(d) Capital Subsidy/Incentives	(d) Venture Capital Financing
			(e) Interest free sales tax loan

			(f) Asset/Debt securitization
			(g) Euro Equity Issues
			(h) New debt Instruments
2.	Medium Term	Preference Share Capital	(a) Debentures / Bonds
			(b) Public Deposits
			(c) Loans from Financial Institutions
			(d) Loan from Commercial Banks
			(e) Lease Financing
			(f) Hire Purchase / Instalment Financing Scheme.
			(g) Euro Debt Issue
			(h) New Debt Instruments
3.	Short Term		(a) Credit from trade and expense creditors.
			- Trade Credits
			- Advances from customers
			- Short term provisions
			(b) Bank Advances
			(c) Factoring
			(d) Commercial Papers
			(e) Public deposits
			(f) Inter Corporate deposits
			(g) Short term Unsecured Debentures.
			(h) Bridge Finance
			(i) Certificate of Deposit

### 1. Equity Share Capital

Equity Share Capital is a basic source of finance for any firm. It represents the ownership interest in the company. The characteristics of equity Share Capital are a direct consequence of its position in the company's control, income and assets. Equity Share Capital does not have any maturity and there is no compulsion to pay dividend. The Equity Share Capital provides funds, more or less, on a permanent basis. It also works as a base for creating the debt and loan capacity of the firm. The advantages and limitations of Equity Share Capital may be summarized as follows:

#### Advantages of Equity Share Financing:

- (i) It is a permanent source of funds.
- (ii) The new Equity Share Capital increases the corporate flexibility for the point of view of capital structure planning.
- (iii) Equity Share Capital does not involve any mandatory payments to shareholders.
- (iv) It may be possible to make further issue of share capital by using a right offering. In general, selling right shares involves no change in the relationship between ownership and control.

#### Limitations of Equity Share Financing:

- (i) Cost of capital is the highest of all sources.
- (ii) Equity Share Capital has a burden of Corporate Dividend Tax on the company.
- (iii) New issue of Equity Capital may reduce the EPS.

## 2. Preference Share Capital

The Preference Share Capital is also owner's capital but has a maturity period. In India, the preference shares must be redeemed within a maximum period of 20 years from the date of issue. The rate of dividend payable on preference shares is also fixed. As against the equity share capital, the preference shares have two references: (i) Preference with respect to payment of dividend, and (ii) Preference with reference to repayment of capital in case of liquidation of company.

However, the Preference Share Capital represents an ownership interest and not a liability of the company. The preference shareholders have the right to receive dividends in priority over the equity shareholders. Indeed, it is this preference which distinguishes preference shares from equity shares. A dividend need not necessarily be paid on either type of shares. However, if the directors want to pay equity dividend, then the full dividend due on the preference shares must be paid first. Failure to meet commitment of preference dividend is not a ground for liquidation. The advantages and disadvantages of the Preference Share Capital are as follows:

### Advantages of Preference Share Financing:

- (i) The preference shares carry limited voting right though they are a part of the capital.
- (ii) The cost of capital of preference shares is less than that of equity shares.
- (iii) The preference share financing may also provide a hedge against inflation.
- (iv) A company does not face liquidation or other legal proceedings if it fails to pay the preference dividends.

### Limitations of Preference Share Financing:

- (i) The cost of capital of preference shares is higher than cost of debt.
- (ii) Non-payment of dividend may adversely affect the value of the firm.
- (iii) The compulsory redemption of preference shares after 20 years will entail a substantial cash outflow from the company.

## 3. Debentures

A bond or a debenture is the basic debt instrument which may be issued by a borrowing company for a price which may be less than, equal to or more than the face value. A debenture also carries a promise by the company to make interest payments to the debenture-holders of specified amount, at specified time and also to repay the principal amount at the end of a specified period. Since the debt instruments are issued keeping in view the need and cash flow profile of the company as well as the investor, there have been a variety of debt instruments being issued by companies in practice. In all these instruments, the basic feature of being in the nature of a loan is not dispensed with and, therefore, these instruments have some or the other common features as follows:

- (i) **Credit Instrument.** A debenture-holder is a creditor of the company and is entitled to receive payments of interest and the principal and enjoys some other rights.
- (ii) **Interest Rate.** In most of the cases, the debt securities promise a rate of interest payable periodically to the debt holders. The rate of interest is also denoted as coupon rate.
- (iii) **Collateral.** Debt issue may or may not be secured and, therefore, debentures or other such securities may be called secured debentures or unsecured debentures.
- (iv) **Maturity Date.** All debt instruments have a fixed maturity date, when these will be repaid or redeemed in the manner specified.
- (v) **Voting Rights.** As the debt holders are creditors of the company, they do not have any voting right in normal situations.

**(vi) Face Value.** Every debt instrument has a face value as well as a maturity value.

**(vii) Priority in Liquidation.** In case of liquidation of the company, the claim of the debt holders is settled in priority over all shareholders and, generally, other unsecured creditors also.

In practice, different types of debentures have been issued. These are:

**(a) On the basis of redemption:**

- (i) Redeemable debentures
- (ii) Irredeemable debentures

**(b) On the basis of security**

- (i) Secured debentures
- (ii) Un-secured debentures

**(c) On the basis of conversion**

- (i) Convertible debentures
- (ii) Non-convertible debentures

**(d) On the basis of registration**

- (i) Registered debentures
- (ii) Bearer debentures

#### **4. Lease Financing**

Leasing is an arrangement that provides a firm with the use and control over assets without buying and owning the same. It is a form of renting assets. Lease is a contract between the owner of asset (lessor) and the user of the asset called the lessee, where by the lessor gives the right to use the asset to the lease over an agreed period of time for a consideration called the lease rental. The contract is regulated by the terms and conditions of the agreement. The lessee pays the lease rent periodically to the lessor as regular fixed payments over a period of time.

##### **Types of Leasing**

There are two basic kinds of leases:

1. Operating or Service Lease
2. Financial Lease.

##### **Operating or Service Lease**

An Operating Lease is usually characterized by the following features:

- (i) It is a short term lease. The lease period in such a contract is less than the useful life of asset.
- (ii) The lease is usually cancellable at short- notice by the lessee.
- (iii) As the period of an operating lease less than the useful life of the asset, it does not necessarily amortize the original cost of the asset. The lessor has to make further leases or sell the asset to recover his cost of investment and expected rate of return.
- (iv) The lessee usually has the option of renewing the lease after the expiry of lease period.
- (v) The lessor is generally responsible for maintenance, insurance and taxes of the asset.
- (v) As it is a short term cancellable lease, it implies higher risk to the lessor but higher lease rentals to the lessee.



Operating or service leasing is common to the equipments which require expert technical staff for maintenance and are exposed to technological developments, e.g. ; computers, vehicles, data processing equipments, communications systems, etc.

Operating lessors usually limit their activities to field and engage themselves in the purchase of large number of similar types of machines or equipment. They are able to offer attractive terms to their customers because savings in maintenance costs.

### **Financial Lease**

A lease is classified as Financial Lease if it ensures the lessor for amortization of the entire cost of investment plus the expected return on capital outlay during the terms of the lease. Such a lease is usually for a longer period and non cancellable. Financial Leases are commonly used for leasing land, building, machinery and fixed equipments, etc.

A Financial Lease is usually characterized by the following features:

- (i) The present value of the total lease rentals payable during the period of the lease exceeds or is equal substantially the whole of the fair value of the leased asset. It implies that within the lease period, the lessor recovers his investment in the asset along with an acceptable rate of return.
- (ii) As compared to Operating Lease, a Financial Lease is for a longer period of time.
- (iii) It is usually non cancellable by the lessee prior to its expiration date.
- (iv) The lessee is generally responsible for the maintenance, insurance and services of the asset. However, the terms of lease agreement, in some cases may require the lessor to maintain and service the asset. Such an arrangement is called "maintenance or gross lease". But usually in an Operating Lease, it is lessee who has to pay for maintenance and service costs and such a lease is known as "net lease".
- (v) A Financial Lease usually provides the lessee an option of renewing the lease for further period at a normal rent.

## **5. Term Loans**

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

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

## **3.6 INTERNATIONAL SOURCES**

### **A. Depository Receipts (DR)**

A DR means any instrument in the form of a depository receipt or certificate created by the Overseas Depository Bank outside India and issued to the non-resident investors against the issue of ordinary shares. A Depository Receipt is a negotiable instrument evidencing a fixed number of equity shares of the issuing company generally denominated in US dollars. DRs are commonly used by those companies which sell their securities in international market and expand their shareholdings abroad. These securities are listed and traded in International Stock Exchanges. These can be either American Depository Receipt (ADR) or Global Depository Receipt (GDR). ADRs are issued in case the funds are raised through retail market in United States. In case of GDR issue, the invitation to participate in the issue cannot be extended to retail US investors. As the DRs are issued in overseas capital markets, the funds to the issuer are available in foreign currency, generally in US \$.

### **Global Depository Receipt (GDR)**

A GDR is a negotiable instrument, basically a bearer instrument which is traded freely in the international market either through the stock exchange or over the counter or among Qualified International Buyers (QIB).

It is denominated in US Dollars and represents shares issued in the local currency.

#### **Characteristics**

1. The shares underlying the GDR do not carry voting rights.
2. The instruments are freely traded in the international market.
3. The investors earn fixed income by way of dividend.
4. GDRS can be converted into underlying shares, depository/ custodian banks reducing the issue.

#### **The market of GDR: the GDR operates in the following way**

1. An Indian company issues ordinary equity shares.
2. These shares are deposited with a custodian bank (mostly domestic bank)
3. The custodian bank establishes a link with a depository bank overseas.
4. The depository bank, in turn issues depository receipts in dollars.
5. Funds are raised when the foreign entities purchase those depository receipts at an agreed price.
6. The dividends on such issues are paid by the issuing company to the depository bank in local currency.
7. The depository bank converts the dividends into US Dollars at the ruling exchange rate and distributes it among the GDR holders.

#### **Advantages of GDR**

1. The Indian companies are able to tap global equity market to raise currency.
2. The exchange risk borne by the investors as payment of the dividend is made in local currency.
3. The voting rights are vested only with depository.

### **American Depository Receipt (ADR)**

The depository receipt in the US market is called ADR. ADRs are those which are issued and listed in any of the stock exchanges of US. It is an investment in the stock of non- US corporation trading in the US stock exchange.

#### **Characteristics**

1. The ADRs may or may not have voting rights.
2. The ADRs are issued in accordance with the provisions laid by SEC, USA.
3. The ADRs are bearer negotiable instrument and the holder can sell it in the market.
4. The ADRs once sold can be re- issued.

The operation of ADR- similar to that of GDR-

#### **Advantages**

1. The ADRs are an easy cost effective way for individuals to hold and own shares in a foreign country.

2. They save considerable money by reducing administration cost and avoiding foreign taxes on each transaction.

### **B. Foreign Currency Convertible Bonds (FCCBs)**

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

FCCBs have been popular with issuers. Local debt markets can be restrictive in nature with comparatively short maturities and high interest rates. On the other hand, straight equity-issue may cause a dilution in earnings, and certainly a dilution in control, which many shareholders, especially major family shareholders, would find unacceptable. Thus, the low coupon security which defers shareholders dilution for several years can be alternative to an issuer. Foreign investors also prefer FCCBs because of the Dollar denominated servicing, the conversion option and the arbitrage opportunities presented by conversion of the FCCBs into equity at a discount on prevailing Indian market price.

### **C. External Commercial Borrowings (ECB)**

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

### **D. Other Sources**

In addition to the sources discussed above, there are some sources which may be availed by a promoter on casual basis. Some of these are:

- (a) **Deferred Credit.** Supplier of plant and equipment may provide a credit facility and the payment may be made over number of years. Interest on delayed payment is payable at agreed terms and conditions.
- (b) **Bills Discounting.** In this scheme, a bill is raised by the seller of equipment, which is accepted by the buyer/ promoter of the project. The seller realizes the sales proceeds by getting the bill discounted by a commercial bank which, in turn gets the bill rediscounted by IDBI.
- (c) **Seed Capital Assistance.** At the time of availing loan from financial institutions, the promoters have to contribute seed capital in the project. In case, the promoters do not have seed capital, they can procure the seed capital from 'Seed Capital Assistance Schemes'. Two such schemes are:
  - (i) **Risk Capital Foundation Scheme.** The scheme was promoted by IFCI to provide seed capital upto ₹ 40 lakhs to the promoters.
  - (ii) **Seed Capital Assistance Scheme.** Under this scheme, seed capital for smaller projects is provided upto ₹ 15 lakhs by IDBI directly or through other financial institutions.

### **Short Term Sources of Finance/ Working Capital Margin**

A project requires working capital margin to take up day-to-day operations. The working capital amount is divided into two parts – (a) Permanent Working Capital, and (b) Temporary Working Capital. The Permanent Working Capital should be financed from long-term sources and Temporary Working Capital should be financed from short term sources. Some of the short-term sources are:

### **(i) Trade Credit**

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

### **(ii) Accrued Expenses**

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

### **(iii) Commercial Papers**

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

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

#### **Issue of Commercial Papers in India**

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

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

### **(iv) Inter-corporate Deposits (ICDs)**

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

### **(v) Short-term Unsecured Debentures**

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

### **(vi) Bank Credit**

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

#### **Types of Bank Credit**

In India, banks may give financial assistance in different shapes and forms. The usual form of bank credit is as follows:

1. Overdraft.
2. Cash Credit.
3. Bills Purchased and Bills Discounting.
4. Letter of Credit.
5. Working Capital Term Loan.
6. Funded Interest Term Loan.

#### **Venture Capital:**

Venture Capital is a form of equity financing especially designed for funding high risk and high reward projects.

There is a common perception that Venture Capital is a means of financing high technology projects. However, Venture Capital is investment of long term financial made in:

1. Ventures promoted by technically or professionally qualified but unproven entrepreneurs, or
2. Ventures seeking to harness commercially unproven technology, or
3. High risk ventures.

The term 'Venture Capital' represents financial investment in a highly risky project with the objective of earning a high rate of return.

## **Modes of Finance by Venture Capitalists**

### **1. Equity**

Most of the venture capital funds provide financial support to entrepreneurs in the form of equity by financing 49% of the total equity. This is to ensure that the ownership and overall control remains with the entrepreneur. Since there is a great uncertainty about the generation of cash inflows in the initial years, equity financing is the safest mode of financing. A debt instrument on the other hand requires periodical servicing of debt.

### **2 Conditional Loan**

From a venture capitalist point of view, equity is an unsecured instrument hence a less preferable option than a secured debt instrument. A conditional loan usually involves either no interest at all or a coupon payment at nominal rate. In addition, a royalty at agreed rates payable to the lender on the sales turnover. As the units pick up in sales levels, the interest rate are increased and royalty amounts are decreased.

### **3 Convertible Loans**

The convertible loan is subordinate to all other loans which may be converted into equity if interest payments are not made within agreed time limit.

## **Other Financial Services**

### **1. Hire Purchase System**

Hire Purchase means a transaction where goods are purchased and sold on the terms that (i) payment will be made in instalments, (ii) the possession of the goods is given to the buyer immediately, (iii) the property (ownership) in the goods remains with the vendor till the last instalment is paid (iv) the seller can repossess the goods in case of default in payment of any instalment, and (v) each instalment is treated as hire charges till the last instalment is paid.

The main characteristics of a Hire Purchase agreement are as below:

- (a) The payment is to be made by the hirer (buyer) to the hiree, usually the vendor, in instalments over a specified period of time.
- (b) The possession of the goods is transferred to the buyer immediately.
- (c) The property in the goods remains with the vendor (hiree) till the last instalment is paid. The ownership passes to the buyer (hirer) when he pays all instalments.
- (d) The hiree or the vendor can reposes the goods in case of default and treat the amount received by way of instalments as hire charged for that period.
- (e) The instalments in Hire Purchase include interest as well as repayment of principal.
- (f) Usually, the hire charges interest on flat rate.

### **2. Forfeiting**

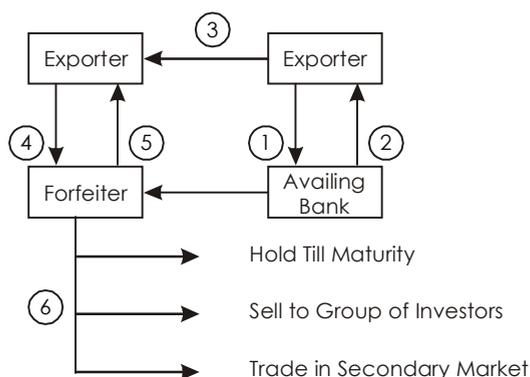
The term "a forfait" in French means, "relinquish a right". It refers to the exporter relinquishing his right to a receivable due at a future date in exchange for immediate cash payment, at an agreed discount, passing all risks and responsibilities for collecting the debt to the forfeiter.

It is the discounting of international trade receivable on a 100% "Without recourse" basis. "Without recourse" means the client gets full credit protection and all the components of service, i.e., short-term finance, administration of sales ledger are available to the client.

Forfeiting transforms the supplier's credit granted to the importer into cash transaction for the exporter protecting him completely from all the risks associated with selling overseas on credit. It effectively transforms a credit sale into a cash sale.

## Procedure

- The exporter sells the goods to the importer on a deferred payment basis spread over 3-5 years.
- The importer draws a series of promissory notes in favour of the exporter for the payments to be made inclusive of interest charges.
- Such promissory notes are availed or guaranteed by a reputed international bank which can also be the importer's banker. (it is endorsed on the promissory note by the guaranteeing bank that it covers any default of payment of the buyer).
- The exporter now sells the availed notes to a forfeiter (which may be the exporter's banker) at a discount without recourse.
- The forfeiter may hold these notes till maturity or sell them to group of investors interested in taking up such high-yielding unsecured paper.



## Graphical representation of Forfeiting

- 1 = Promissory notes sent for availing to the importer's banker
- 2 = Availed notes returned to the importer
- 3 = Availed notes sent to exporter
- 4 = Availed notes sold at a discount to a forfeiter on a non - recourse basis
- 5 = Exporter obtains finance
- 6 = Forfeiter holds the notes till maturity or sells the short-term paper either to a group of investors or to investors in the secondary market.

## 3. Bill Discounting

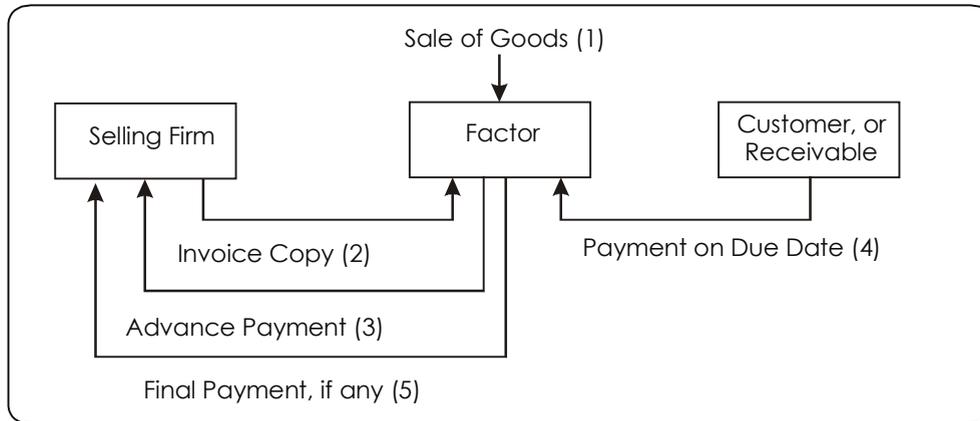
Generally, a trade bill arises out of a genuine credit trade transaction. The supplier of goods draws a bill on the purchaser for the invoice price of the goods sold on credit. It is drawn for a short period of 3 to 6 months and in some cases for 9 months. The buyer of goods accepts the same and binds himself liable to pay the amount on the due date. In such a case, the supplier of goods has to wait for the expiry of the bill to get back the cost of the goods sold. It involves locking up of his working capital which is very much needed for the smooth running of the business or for carrying on the normal production process. It is where the Commercial Banks enter into as a financier.

The Commercial Banks provide immediate cash by discounting genuine trade bills. They deduct a certain charge as discount charges from the amount of the bill and the balance is credited to the customer's account and thus, the customer is able to enjoy credit facilities against the discounting of bills. Of course, this discount charges include interest for the unexpired period of the bill plus some service charges. Bill financing is the most liquid one from the banker's point of view since, in time of emergencies, they can

take those bills to the Reserve Bank of India for rediscounting purposes. Infact, it was viewed primarily as a scheme of accommodation for banks. Now, the situation is completely changed. To-day it is viewed as a kind of loan backed by the security of bills.

#### 4. Factoring

Factoring may be defined as the relationship between the seller of goods and a financial firm, called the factor, whereby the latter purchases the receivables of the former and also administer the receivable of the former. Factoring involves sale of receivable of a firm to another firm under an already existing agreement between the firm and the factor.



Graphical representation of factoring

#### Modus Operandi

A factor provides finance to his client upto a certain percentage of the unpaid invoices which represent the sale of goods or services to approved customers. The modus operandi of the factoring scheme is as follows.

- There should be a factoring arrangement (invoice purchasing arrangement) between the client (which sells goods and services to trade customers on credit) and the factor, which is the financing organization.
- Whenever the client sells goods to trade customers on credit, he prepares invoices in the usual way.
- The goods are sent to the buyers without raising a bill of exchange but accompanied by an invoice.
- The debt due by the purchaser to the client is assigned to the factor by advising the trade customers, to pay the amount due to the client, to the factor.
- The client hands over the invoices to the factor under cover of a schedule of offer along with the copies of invoices and receipted delivery challans or copies of R/R or L/R.
- The factor makes an immediate payment upto 80% of the assigned invoices and the balance 20% will be paid on realization of the debt.

#### Basic Types of Factoring

##### (i) Full Service Factoring

Under this type, a factor provides all kinds of services discussed above. Thus, a factor provides finance, administers the sales ledger, collects the debts at his risk and renders consultancy service. This type of

factoring is a standard one. If the debtors fail to repay the debts, the entire responsibility falls on the shoulders of the factor since he assumes the credit risk also. He cannot pass on this responsibility to his client and, hence, this type of Factoring is also called 'Without Recourse' Factoring.

### **(ii) With Recourse Factoring or Pure Factoring**

As the very name suggests, under this type, the factor does not assume the credit risk. In other words, if the debtors do not repay their dues in time and if their debts are outstanding beyond a fixed period, say 60 to 90 days from the due date, such debts are automatically assigned back to the client. The client has to take up the work of collection of overdue account by himself. If the client wants the factor to go on with the collection work of overdue accounts, the client has to pay extra charges called 'Refactoring Charges'.

### **Benefits of Factoring**

The benefits of factoring can be summarized as follows:

#### **(i) Better Cash Flows**

The seller can offer credit to the customers, within the terms approved by the factor, and can receive prompt payments as soon as, or shortly after invoicing. This may be cheaper than financing by means of bank credit. The factoring is an alternative source of financing and can be availed if the firm expects a liquidity problem on a regular basis. In fact, the factoring ensures a definite pattern of cash inflows from the credit sales.

#### **(ii) Better Assets Management**

The security for such financial assistance is the receivable itself and, therefore, the assets will remain available as security for other borrowings.

#### **(iii) Better Working Capital Management**

Since the finance available from factoring moves directly with the level of the receivables, the problem of additional working capital required to match the sales growth does not come at all. However, a close interaction among working capital components implies that efficient management of one component can have positive benefits on other components.

#### **(iv) Better Credit Administration**

The debt management services which factors provide relieve the seller of the burden of credit administration and the seller can concentrate on the cost of staff and office space. In other words, it enables the seller to concentrate on developing his business.

#### **(v) Better Evaluation:**

The debt management service may include formal or informal advice on credit standing. Factors hold large amounts of information about the trading histories of firms. This can be valuable to those who are using factoring services and can thereby avoid doing business with customers having bad payment record.

#### **(vi) Better Risk Management**

In case of non-recourse factoring, the seller will have the advantages of repositioning the risk of customers not properly paying due bills. This will cost more than with recourse factoring and thereby allows the seller to escape the potentially dire consequences of customer's default.

### **Factoring vs Bill Discounting**

Factoring differs from discounting in many respects. They are:

- (i) Factoring is a broader term covering the entire trade debts of a client whereas discounting covers only those trade debts which are backed by Account Receivables.

- (ii) Under factoring, the factor purchases the trade debt and thus becomes a holder for value. But, under discounting the financier acts simply as an agent of his customer and he does not become the owner. In other words, discounting is a kind of advance against bills whereas factoring is an outright purchase of trade debts.
- (iii) The factors may extend credit without any recourse to the client in the event of non-payment by customers. But, discounting is always made with recourse to the client.
- (iv) Account Receivables under discount are subject to rediscounting whereas it is not possible under factoring.
- (v) Factoring involves purchase and collection of debts, management of sales ledger, assumption of credit risk, provision of finance and rendering of consultancy services. But, discounting involves simply the provision of finance alone.
- (vi) Bill discounting finance is a specific one in the sense that it is based on an individual bill arising out of an individual transaction only. On the other hand, factoring is based on the 'whole turnover' i.e., a bulk finance is provided against a number of unpaid invoices.
- (vii) Under discounting, the drawee is always aware of the bank's charge on receivables. But, under undisclosed factoring everything is kept highly confidential.
- (viii) Bill financing through discounting requires registration of charges with the Registrar of Companies. Infact, factoring does not require such registration.
- (ix) Discounting is always a kind of "in-balance sheet financing". That is, both the amount of receivables and bank credit are shown in the balance sheet itself due to its 'with recourse' nature. But, factoring is always "off-balance sheet financing".

### **Factoring vs Forfeiting**

Both Factoring and Forfeiting are used as tools of financing. But there are some differences:

- (i) Factoring is always used as a tool for short term financing whereas Forfeiting is for medium term financing at a fixed rate of interest.
- (ii) Factoring is generally employed to finance both the domestic and export business. But, Forfeiting is invariably employed in export business only.
- (iii) The central theme of Factoring is the purchase of the invoice of the client whereas it is only the purchase of the export bill under Forfeiting.
- (iv) Factoring is much broader in the sense it includes the administration of the sales ledger, assumption of credit risk, recovery of debts and rendering of consultancy services. On the other hand, Forfeiting mainly concentrates on financing aspects only and that too in respect of a particular export bill.
- (v) Under Factoring, the client is able to get only 80% of the total invoice as 'credit facility' whereas the 100% of the value of the export bill (of course deducting service charges) is given as credit under forfeiting.
- (vi) Forfeiting is done without recourse to the client whereas it may or may not be so under Factoring.
- (vii) The bills under Forfeiting may be held by the forfeiter till the due date or they can be sold in the secondary market or to any investor for cash. Such a possibility does not exist under Factoring.
- (viii) Forfeiting is a specific one in the sense that it is based on a single export bill arising out of an individual transaction only. But Factoring is based on the "whole turnover" i.e., a bulk finance is provided against a number of unpaid invoices.

## 5. Securitisation

Securitisation of debt or asset refers to the process of liquidating the illiquid and long term assets like loans and receivables of financial institutions like banks by issuing marketable securities against them. In other words, debt securitization is a method of recycling of funds. It is a process whereby loans and other receivables are underwritten and sold in form of asset. It is thus a process of transforming the assets of a lending institution into negotiable instrument for generation of funds.

**Process of debt securitization:** The process of debt securitization is as follows: -

- (i) The loans are segregated into relatively homogeneous pools.
- (ii) The basis of pool is the type of credit, maturity pattern, interest rate, risk etc.
- (iii) The asset pools are then transferred to a trustee.
- (iv) The trustee then issues securities which are purchased by investors.
- (v) Such securities (asset pool) are sold on the undertaking without recourse to seller.

In this way we see that conversion of debts to securities is known as Debt Securitization.

The main advantages of securitisation are as follows :-

- (i) It converts the debt into securities.
- (ii) It converts the non-liquid asset into liquid ones.
- (iii) The assets are shifted from the Balance Sheet, giving the borrower an opportunity of off balance sheet funding.
- (iv) It thus helps in better balance sheet management.
- (v) It enhances the borrower's credit rating.
- (vi) It opens up new investment avenues
- (vii) The securities are tied up in definite assets.

### 3.7 EMERGING ROLE OF FINANCE MANAGER

The traditional role of the Finance Manager is to confine to the raising of funds in order to meet operating requirements of the business. This traditional approach has been criticized by modern scholars on the following grounds. It was prevalent till the mid-1950s.

- (i) The traditional approach of raising funds alone is too narrow and thus it is outsider-looking-in approach.
- (ii) It viewed finance as a staff specialty.
- (iii) It has little concern how the funds are utilized.
- (iv) It over-emphasized episodic events and non-recurring problems like the securities and its markets, incorporation, merger, consolidation, reorganization, recapitalization and liquidation etc.
- (v) It ignored the importance of Working Capital Management.
- (vi) It concentrated on corporate finance only and ignored the financial problems of sole trader and partnership firms.
- (vii) Traditional approach concentrated on the problems of long-term financing and ignored the problems of short-term financing.

There was a change from traditional approach to the modern concept of finance function since the mid-1950s. The industrialization, technological innovations and inventions and a change in economic

and environment factors since the mid-1950s necessitated the efficient and effective utilization of financial resources. Since then, finance has been viewed as an integral part of the management. The Finance Manager is, therefore, concerned with all financial activities of planning, raising, allocating and controlling the funds in an efficient manner. In addition, profit planning is another important function of the Finance Manager. This can be done by decision making in respect of the following areas:

- (i) Investment decisions for obtaining maximum profitability after taking the time value of the money into account.
  - (ii) Financing decisions through a balanced capital structure of Debt-Equity Ratio, sources of finance, EBIT/EPS computations and Interest Coverage Ratio etc.
  - (iii) Dividend decisions, issue of Bonus Shares and retention of profits with objective of maximization of market value of the equity share.
  - (iv) Best utilization of fixed assets.
  - (v) Efficient Working Capital Management (inventory, debtors, cash marketable securities and current liabilities).
  - (vi) Taking the cost of capital, risk, return and control aspects into account.
  - (vii) Tax administration and tax planning.
  - (viii) Pricing, volume of output, product-mix and cost-volume-profit analysis (CVP Analysis).
  - (ix) Cost control.
10. Stock Market: Analyse the trends in the stock market and their impact on the price of Company's share and share buy-back.

### **Compliance of Regulatory Requirements in Formulation of Financial Strategies**

The principal elements of this regulatory framework are:-

- (i) Companies Act.
- (ii) Securities and Exchange Board of India Guidelines.
- (iii) Foreign Exchange Management Act

### **Provision of the Companies Act, 1956**

The Companies Act, 1956, as amended up to date covers both the financial and non-financial aspects of the working of the corporate sector. It aims at developing integrated relationship between promoters, investors and company management.

This act seeks to:-

- (i) Ensure a minimum standard of business integrity and conduct in the promotion and management of companies.
- (ii) Elicit full and fair disclosure of all reasonable information relating to the affairs of the company.
- (iii) Promote effective participation and control by shareholders and protect their legitimate interests.
- (iv) Ensure proper performance of duties by the company management.
- (v) Empower the government to intervene and investigate the affairs of companies whether they are managed in a manner prejudicial to the interest of the shareholders or the public.

It contains specific provision to regulate:-

The issue of capital and matters incidental thereto, viz., content and format of prospectus.

- (i) Capital structure of companies.

- (iii) Dividend distribution.
- (iii) Inter-corporate investment.
- (vi) Matters regarding shareholders' meetings and the format of annual accounts.
- (vii) Procedure for the allotment of shares and the issue certificates.
- (vii) Issue of shares at premium or discount.
- (viii) Voting rights of shareholders.

Some of the important company law provisions pertaining to Financial Management are:

- (i) A company can issue only two kinds of shares: Equity Shares and Preference Shares.
- (ii) Additional to the public shares has to be offered to existing equity shareholders in proportion to the shares held by them unless the company decides otherwise by passing a special resolution, or by passing an ordinary resolution and securing the permission of the Central Government.
- (iii) Share capital issue cannot be made publicly unless a prospectus, giving prescribed information about the company, is furnished.
- (iv) Debenture carrying voting rights cannot be issued.
- (v) The board of directors of a company or a subsidiary thereof shall not, except with the consent of the company in a general meeting, borrow money which, together with those already borrowed by the company (apart from temporary loans obtained from the company's bankers in the ordinary courses of business), exceeds the aggregate of the paid-up capital of the company and its free reserves.
- (vi) A company can by up to 10 % of the subscribed capital of another corporate body, provide that the aggregate of investment made in all other corporate bodies does not exceed 30 % of the subscribed capital of the investing company.
- (vii) Dividends are payable only out of profits after setting aside a certain percentage towards reserves.
- (viii) A company is required to prepare its financial statements (Profit and Loss Account and Balance Sheet) in a certain manner and format and get the same audited by a Chartered Accountant.
- (ix) A public company is required to get its audited financial statements approved by its shareholders. (The financial statements along with the Directors' Report, Auditors' Report, and annexure to the financial statements as prescribed by the Company's Act constitute the Annual Report of the company).

All equity shareholders have a voting power, but now companies have been allowed to issue non-voting shares. Earlier the law did not permit companies to repurchase their own shares, but now they have been allowed to do so a limited extent. The Companies Act is administered by the Department of Company Affairs and the Company Law Board of the ministry of Law and Justice and Company Affairs of the Union Government.

### 3.8 SECURITIES AND EXCHANGE BOARD OF INDIA ACT, 1992

#### Objectives, Functions and Powers of SEBI

The overall objective of the SEBI, as enshrined in the preamble of the SEBI Act, 1992 is "to protect the interests of investors in securities and to promote the development of, and to regulate the securities market and for matters connected therewith or incidental thereto".

To carry out its objectives, the SEBI performs the following functions:-

- (i) Regulate the business in stock exchanges and other securities markets;

- (ii) Registering and regulating the working of stock brokers, sub-brokers, share transfer agents, bankers to an issue, merchant bankers, underwriters, portfolio managers, investment advisor and such other intermediaries who be associated with the securities market in any manner;
- (iii) Registering and regulating the working of depositories, custodians of securities, FIIIS, credit rating schemes, including mutual funds;
- (iv) Promoting and regulating Self-Regulatory Organisations (SROs);
- (v) Prohibiting fraudulent and unfair trade practices relating to the securities market;
- (vi) Prohibiting investors' education and training of intermediaries in securities market;
- (vii) Prohibiting substantial acquisition of shares and takeovers of companies;
- (viii) Regulating substantial acquisition of shares and takeovers of companies;
- (ix) Calling for information from, undertaking inspection, conducting inquiries and audits of the stock exchanges and intermediaries and self-regulatory organizations in the securities market;
- (x) Performing such functions and exercising such powers under the Securities Contract (Regulation) Act, 1956 as may be delegated to it by the Central Government;
- (xi) Levying fees or other charges for carrying out its work;
- (xii) Conducting research for the above purposes;
- (xiii) Performing such other functions that may be prescribed ;
- (xiv) Powers to call for periodical return from any recognized stock exchange.

### **Regulatory Requirements in Formulation of Financial Strategies**

The two major regulatory authorities are the Reserve Bank of India (RBI) and the Securities Exchange Board of India (SEBI). The regulations in the Companies Act, Income Tax Act etc. are more for governance and compliance than for strategy. RBI mainly regulates the commercial banks which in turn may influence the policies of a company. Some of the situations a Finance Manager has to face, which requires regulatory compliance are:

#### **1. Raising finance through IPO or SPO:**

IPO refers to Initial Public Offering; the first time a company comes to public to raise money. SPO refers to Seasonal Public Offering, the second and subsequent time a company raises money from the public directly. There are regulatory guidelines prescribed by SEBI regarding the entire process of going public which includes disclosure to public regarding the potential use of the cash, financial projections and percentage of shares offered to various stakeholders etc. Similarly, every time a company wants to access the capital market, either for raising finance through debt or equity, these regulatory compliances have to be met where Finance Manager will play a key role in providing the necessary information both at the time of raising resources and also at regular intervals subsequently thereafter.

#### **2. Capital Structure Changes**

Today, companies are permitted to buy their own shares. The Finance Manager, some times, for strategic reasons, decides to reduce the equity capital. This is technically known as Capital Reduction, which again requires regulatory compliances prescribed by SEBI and Companies Act.

#### **3. Credit Rating**

Whenever a company wants to raise money through debt, or through a new instrument, the instrument has to be rated by a credit rating agency like CRISIL, ICRA etc. as per the SEBI guidelines. Similarly, a company also has to be rated. The whole exercise of initiating the rating process providing the relevant information and answering the queries of the rating agencies will be the responsibility of the CFO.

#### 4. Foreign Exchange Transactions

A company needs foreign exchange for a variety of reasons like importing equipment, setting up of foreign offices, travel of sales and other company employees etc. Similarly, a company may receive remittances of foreign exchange for exports made. In either of these situations, the rules and regulations relating to foreign exchange transactions needs to be complied with by the Finance Manager, on behalf of the organization. It involves some filing of returns in the prescribed format.

#### 5. Derivative Transactions

Whenever a company uses derivatives for hedging, there are accounting and disclosure requirements to be complied with as per Companies Act & GAAP Accounting, Accounting Standards of ICAI and the International Accounting Standards. For example, Hedge Accounting has to be maintained and Profits/Losses due to Hedging should be reported.

#### Foreign Exchange Management Act (FEMA)

While obtaining finance from foreign sources, Finance Manager must keep in mind the provisions relating to FEMA must be observed. A special attention must be made in dealing with the Current Account, Capital Account and Fixed Assets purchase transactions. A strict adherence to the provisions of Section 3 to 8 of the FEMA is mandatory. Similarly while doing international trade (import or export) regulations relating to Customs Act also to be adhered.

In addition to the above mentioned Acts other legislations like Income Tax Act, Excise Act, VAT and Industrial Development and Regulation Act etc., to be adhered.

#### Role of Treasury Function

With significant developments that have taken place in the financial markets in the recent years affecting volatility in exchange rates and accentuating liquidity constraints, corporate have started paying closer attention to the treasury and foreign exchange (forex) management. Corporate treasury function is playing a pivotal role in financial risk management; exposure management and the use of hedging strategies are now all seen as essential requirements.

The concept of corporate treasury is defined through a comparison of traditional and emergent roles. The Management Accountants' main task in cementing the treasury's strategic role are:

- (a) to facilitate communications and understanding of strategic possibilities;
- (b) to aid implementation through the use of diagnostics; and
- (c) the development of gap and sustaining strategies.

These emerging strategies are linked by one fundamental objective i.e., to attract and retain competitively sought-after investor capital or, in other words, increase shareholder wealth. In a world where investor capital has more choice and mobility than ever before, the key to corporate survival and growth lies in organizational change initiatives that will contribute directly to the economic value of the firm and its ability to satisfy the financial return requirements of its investors. Increasingly, treasury and treasury management practices are being aligned with and integrated into, the business strategies of organizations. It should not be surprising to see corporate treasury and treasury strategies involved in organizational change.

Therefore, while ensuring the effective management of all forms of risks, treasury managers must also be able to use and apply financial products in order to maximize profit. With the ever-increasing range and complexity of financial instruments available, treasury managers must constantly update their skills in order to effectively undertake their crucial duties.

### Scope of Treasury Management Function

In today's context, the scope of treasury management function is quite vast, and it continues to expand, as can be seen from the following listing. A treasury manager should be able to understand and appreciate the links between business strategy, organization and finance/ treasury.

1. Cash and Liquidity Management:
  - (a) Cash flow dynamics, cash flow forecasting, cash flow valuations
  - (b) Short-term funding investments
  - (c) Cash Management: transactions, pooling and netting
  - (d) Working Capital Management
  - (e) Using Debt Instruments
2. Foreign Exchange Risk Management
  - (a) International Economics and International Finance
  - (b) International Financial Markets and Instruments
  - (c) Foreign Exchange: Swaps and Forwards
  - (d) Vanilla and Exotic Foreign Exchange Options
3. Financial Risk Management:
  - (a) Interest and Currency Risks
  - (b) Interest Rates: Forwards, Futures and Options
  - (c) Interest Rate Swaps and applications
  - (d) Managing Currency Risks with Forward, Futures, Options and Swaps.
4. Macroeconomic Policy Environment:
  - (a) Understanding of macroeconomic policies
  - (b) Understanding of how macroeconomic policies affect prices and costs in the economy
  - (c) Current scenario and future outlook for India and globally
5. Other aspects in Treasury Management:
  - (a) Role in accounting policy formation eg. Forex Transactions, Mutual Fund Investments, etc.
  - (b) Formation of Policies and Processes (Investment, Forex Management, Accounting, etc.,).
  - (c) Accounting Policies on recognition of Treasury Transactions.
  - (d) Accounting Standards on various Foreign Exchange techniques under US and Indian GAAP.
  - (e) Taxation issues, eg. Withholding tax on interest paid on overseas borrowings, treatment of capital gains/loss on investments, etc.

### CONTEMPORARY DEVELOPMENTS

#### WTO:

In 1947, 23 countries signed the General Agreement on Tariffs and Trade (GATT) in Geneva. To join GATT, countries must adhere to Most Favored Nation (MFN) clause, which requires that if a country grants a tariff reduction to one country; it must grant the same concession to all other countries. The new organization, known as the World Trade Organization (WTO), has replaced the GATT since the Uruguay Round Accord became effective on January 1, 1995. Today, WTO's 135 members account for more



than 95% of world trade. The five major functions of WTO are:

- (i) Administering its trade agreements.
- (ii) Being a forum for trade negotiations.
- (iii) Monitoring national trade policies.
- (iv) Providing technical assistance and training for developing countries.
- (v) Cooperating with other international organizations.

Under the WTO, there is a powerful dispute-resolution system, with three-person arbitration panel. Some of the major features of WTO and GATT are:

- (i) World Trade Organization (WTO), was formed in 1995, head quartered at Geneva, Switzerland.
- (ii) It has 152 member states.
- (iii) It is an international organization designed to supervise and liberalize international trade.
- (iv) It succeeds the General Agreement on Tariffs and Trade.
- (v) It deals with the rules of trade between nations at a global level.
- (vi) It is responsible for negotiating and implementing new trade agreements, and is in charge of policing member countries' adherence to all the WTO agreements, signed by the bulk of the world's trading nations and ratified in their parliaments.
- (vii) Most of the WTO's current work comes from the 1986-94 negotiations called the Uruguay Round, and earlier negotiations under the GATT. The organization is currently the host to new negotiations, under the Doha Development Agenda (DDA) launched in 2001.
- (viii) Governed by a Ministerial Conference, which meets every two years; a General Council, which implements the conference's policy decisions and is responsible for day-to-day administration; and a director-general, who is appointed by the Ministerial Conference

### **The General Agreement on Tariffs and Trade (GATT)**

GATT was a treaty, not an organization. Main objective of GATT was the reduction of barriers to international trade through the reduction of tariff barriers, quantitative restrictions and subsidies on trade through a series of agreements. It is the outcome of the failure of negotiating governments to create the International Trade Organization (ITO).

The Bretton Woods Conference had introduced the idea for an organization to regulate trade as part of a larger plan for economic recovery after World War II. As governments negotiated the ITO, 15 negotiating states began parallel negotiations for the GATT as a way to tariff reductions. Once the ITO failed in 1950, only the GATT agreement was left.

The functions of the GATT were taken over by the World Trade Organization which was established during the final round of negotiations in early 1990s.

### **Trade Related Investment Measures (TRIMS)**

TRIMs are the rules a country applies to the domestic regulations to promote foreign investment, often as part of an industrial policy.

- (i) It is one of the four principal legal agreements of the WTO trade treaty.
- (ii) It enables international firms to operate more easily within foreign markets.
- (iii) In the late 1980's, there was a significant increase in foreign direct investment throughout the world. However, some of the countries receiving foreign investment imposed numerous restrictions on that investment designed to protect and foster domestic industries, and to prevent the outflow of foreign exchange reserves.

- (iv) Examples of these restrictions include local content requirements (which require that locally-produced goods be purchased or used), manufacturing requirements (which require the domestic manufacturing of certain components), trade balancing requirements, domestic sales requirements, technology transfer requirements, export performance requirements (which require the export of a specified percentage of production volume), local equity restrictions, foreign exchange restrictions, remittance restrictions, licensing requirements, and employment restrictions. These measures can also be used in connection with fiscal incentives. Some of these investment measures distort trade in violation of GATT Article III and XI, and are therefore prohibited.

### **Trade Related Aspects of Intellectual Property Rights (TRIPS)**

TRIPS is an international agreement administered for the first time by the World Trade Organization (WTO) into the international trading system. It sets down minimum standards for many forms of intellectual property (IP) regulation. Till date, it remains the most comprehensive international agreement on intellectual property. It was negotiated at the end of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) in 1994.

TRIPS contains requirements that nations' laws must meet for: copyright rights, including the rights of performers, producers of sound recordings and broadcasting organizations; geographical indications, including appellations of origin; industrial designs; integrated circuit layout-designs; patents; monopolies for the developers of new plant varieties; trademarks; trade dress; and undisclosed or confidential information. TRIPS also specify enforcement procedures, remedies, and dispute resolution procedures.

In 2001, developing countries were concerned that developed countries were insisting on an overly-narrow reading of TRIPS, initiated a round of talks that resulted in the Doha Declaration: a WTO statement that clarifies the scope of TRIPS; stating for example that TRIPS can and should be interpreted in light of the goal "to promote access to medicines for all."

### **Securities and Exchange Board of India (SEBI)**

The burgeoning growth of the stock markets in India has necessitated the establishment of a separate regulating agency for the securities market. Accordingly, Indian Government has passed the Securities & Exchange Board of India Act, 1992 to provide the establishment of the Securities & Exchange Board of India on the lines of Securities Exchange Commission of USA to protect the interests of investors in securities and to promote the development of and to regulate the securities market. The main features of SEBI are as follows:

- (i) SEBI is an autonomous body created by the Government of India in 1988 and given statutory form in 1992 with the SEBI Act 1992.
- (ii) Its Head office is in Mumbai and has regional offices in Chennai, Kolkata, and Delhi.
- (iii) SEBI is the regulator of Securities markets in India.
- (iv) SEBI has to be responsive to the needs of three groups, which constitute the market:
  - the issuers of securities.
  - the investors.
  - the market intermediaries.
- (v) SEBI has three functions rolled into one body quasi-legislative, quasi-judicial and quasi-executive.
- (vi) It drafts regulations in its legislative capacity, it conducts investigation and enforcement action in its executive function and it passes rulings and orders in its judicial capacity.
- (vii) Though this makes it very powerful, there is an appeal process to create accountability. There is a Securities Appellate Tribunal which is a three member body.
- (viii) A second appeal lies directly to the Supreme Court.



### **SEBI's functions also include:**

- (i) Promoting investors' education,
- (ii) Training of intermediaries of securities markets,
- (iii) Prohibiting fraudulent and unfair trade practices relating to dealings in securities,
- (iv) Prohibiting insider trading in securities,
- (v) Regulating substantial acquisition of shares and take-overs of companies etc.

In pursuance of its powers SEBI has formulated guidelines and regulations relating to:

- (i) Merchant bankers,
- (ii) Bankers to an issue,
- (iii) Registrars to issue,
- (iv) Share transfer agents,
- (v) Debentures trustees,
- (vi) Underwriters,
- (vii) FIs,
- (viii) Insider trading,
- (ix) Registration of brokers,
- (x) Guidelines of portfolio management services,
- (xi) Capital adequacy guidelines,
- (xii) Guidelines for mutual funds,
- (xiii) Guidelines for asset management companies,
- (xiv) Guidelines relating to disclosure and investor protection,
- (xv) Book building,
- (xvi) Substantial acquisition of shares and takeovers,
- (xvii) Depositories and participants etc.

Students may go through the relevant websites for latest information on SEBI.

### **Time Value of Money**

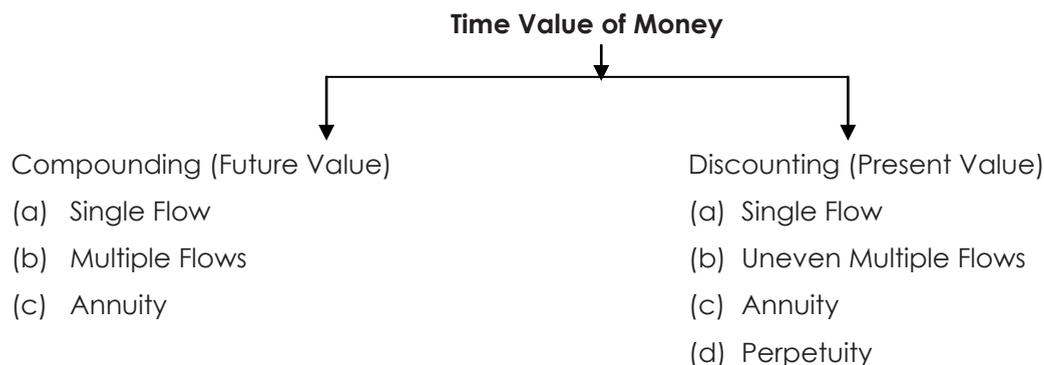
Money has time value. A rupee today is more valuable than a rupee a year hence. Why? There are several reasons:

- Individuals, in general, prefer current consumption to future consumption.
- Capital can be employed productively to generate positive returns. An investment of one rupee today would grow to  $(1+r)$  a year hence ( $r$  is the rate of return earned on the investment).
- In an inflationary period a rupee today represents a greater real Purchasing Power than a rupee a year hence.

Money of the financial problems involves cash flows occurring at different points of the time. For evaluating such cash flows an explicit consideration of the Time Value of money is required. This chapter discusses the methods for dealing with the time value of money. These methods have application in various areas of financial analysis.

**Methods of Time Value of Money:**

- 1. Compounding:** We find the Future Values (FV) of all the cash flows at the end of the time period at a given rate of interest.
- 2. Discounting:** We determine the Time Value of money at time “O” by comparing the initial outflow with the sum of the Present Values (PV) of the future inflows at a given rate of interest.



**3.9 FUTURE VALUE**

**A) Future value of a Single Flow**

Suppose you have ₹ 1,000 today and you deposit it with a financial institution, This pays 10 percent interest compounded annually, for a period of 3 years. The deposit would grow as follows:

First year	:	Principal at the beginning	₹ 1,000
		Interest for the year (₹ 1,000 × 0.10)	<u>100</u>
		Principal at the end	<u>1,100</u>
Second year	:	Principal at the beginning	₹ 1,100
		Interest for the year (₹ 1,100 × 0.10)	<u>110</u>
		Principal at the end	<u>1,210</u>
Third year	:	Principal at the beginning	₹ 1,210
		Interest for the year (₹ 1,210 × 0.10)	<u>121</u>
		Principle at the end	<u>1,331</u>

*Formula:* The general formula for the value of single flow as:

$$S = p (1+i)^n$$

Where  
 S = Future value n years hence,  
 p = Amount invested today,  
 i = Interest rate per period, and  
 n = Number of periods of investments.

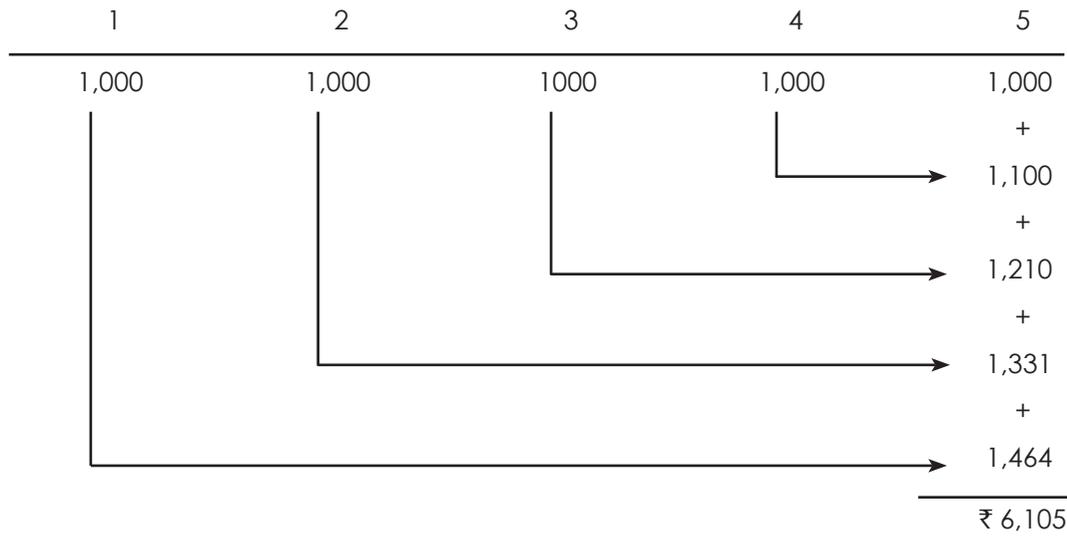
**B) Future value of an Annuity**

An annuity is a series of periodic cash flows (payments or receipts) of equal amounts. The premium of a life insurance policy, for example, is an annuity. When the cash flows occur at the end of each period the annuity is called a regular annuity or a deferred annuity. When the cash flows occurs at the beginning of each period the annuity is called an annuity due. Our discussion here will focus on a regular annuity –the formula of course, can be applied, with some modification, to an annuity due.



Suppose you deposit ₹ 1,000 in a bank for 5 years and your deposit earn a compounded interest rate of 10 percent. What will be the value of this series of deposits (an annuity) at the end of 5 years? Assuming that each deposit occurs at the end of the year, the future value of this annuity will be:

The time line for this annuity is shown:



Value of annuity is given by the following formula:

$$S_n = R \left[ \frac{(1+i)^n - 1}{i} \right]$$

Where  $S_n$  = Future value of an annuity which has a duration of n periods

R = Constant periodical payment,

i = Interest rate per period, and

n = Duration of annuity.

### 3.10 PRESENT VALUE

#### A) Present value of a Single Flow

Suppose some one promise to give you ₹ 1,000 three years hence. What is the present value of this amount if the interest rate is 10 percent? The present value can be calculated by discounting ₹ 1,000, to the present point of time, as follows:

Value of three years hence	= ₹ 1,000
Value two years hence	= ₹ 1,000 $\left( \frac{1}{1+0.10} \right)$
Value one year hence	= ₹ 1,000 $\times \frac{1}{(1+0.10)^2}$
Value now (present value)	= ₹ 1,000 $\times \frac{1}{(1+0.10)^3}$

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

$$S = p(1+i)^n$$

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

$$p = S \times \frac{1}{(1+i)^n} = S \times \frac{1}{(1+i)^n}$$

$\frac{1}{(1+i)^n}$  in above equation called the discounting factor or the present value interest (PVIF<sub>i,n</sub>), the value of PVIF<sub>i,n</sub> for several combinations of i and n.

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

$$₹ 1,000 \times \text{PVIF}_{10\%,6} = ₹ 1,000 \times 0.5645 = ₹ 564.5$$

**Example** find the present value of ₹ 1000 receivable 20 years hence if the discount rate is 8 percent. We obtain the answer as follows:

$$\begin{aligned} ₹ 1,000 \times \left(\frac{1}{1.08}\right)^{20} &= ₹ 1,000 \times \left(\frac{1}{1.08}\right)^{10} \times \left(\frac{1}{1.08}\right)^{10} \\ &= ₹ 1,000 \times \text{PVIF}_{8\%,10} \times \text{PVIF}_{8\%,10} \\ &= ₹ (1,000 \times 0.463 \times 0.463) \\ &= ₹ 214 \end{aligned}$$

### B) Present Value of an Annuity

Suppose you expect to receive ₹ 1000 annually for 3 years – each receipt occurring at the end of the year. What is the present value of this stream of benefits if the discount rate is 10 percent? The present value of this annuity is simply the sum of the present values of all the in flows of this annuity:

$$\begin{aligned} ₹ \left[ 1,000 \times \frac{1}{(1.10)} + 1,000 \times \frac{1}{(1.10)^2} + 1,000 \times \frac{1}{(1.10)^3} \right] \\ = ₹ 1,000 \times 0.9091 + ₹ 1,000 \times 0.8264 + ₹ 1,000 \times 0.7513 \\ = ₹ 2,486.70 \end{aligned}$$

**Formula** in general terms the present value of an annuity may be expressed as:

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

S = Present value of an annuity

A = Amount of each instalment

i = Interest rate per period

n = Number of periods.

Where  $p_n$  = present value of an annuity which has a duration of n periods,

R = constants periodic flow, and

i = interest (discount) rate.

### Period required for doubling the amount:

A common question which arises among the investors is that how much period will it take for the amount invested to be doubled at a given rate of interest.

For the explanation of this, **Rule of "72"**, is to be applied. It is a short cut way. Under this rule, the period within which the amount will be doubled is obtained by **dividing 72 by the rate of interest**.

For instance, if the rate of interest is 6%, Then its double period is  $72/6 = 12$  years.

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

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

Then the doubling period for the above eg. = 11.85 years

### Illustration 1

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

#### Solution:

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

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

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

Where A = Annual Payment

i = Interest Rate

n = No. of years

$$8,000 \left[ \frac{(1+0.10)^5}{0.10} \right]$$

$$= 8,000 \times 6.1051 = ₹ 48,841$$

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

### Illustration No. 2

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

**Solution:**

Amount Invested = ₹ 75,000

Rate of Interest = 8%

No. of Compounds =  $2 \times 5 = 10$  times

Rate of Interest for half year =  $\frac{8}{2} = 4\%$

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

Where

p = Principle Amount

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

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

$$= 75,000 (1+4\%)^{10}$$

$$= 75,000 \times 1.4802$$

$$= ₹ 1,11,015$$

Compound Value = 1,11,015

Compound Interest = Compound Value – Principle Amount

$$= ₹ 1,11,015 - ₹ 75,000$$

$$= ₹ 36,015.$$

**SELF EXAMINATION QUESTIONS**

1. Define Financial Management and state its objectives.
2. What is the scope of Financial Management?
3. Explain the functions of Financial Management.
4. Briefly explain the Short Term Sources of Finance?
5. What are the various Long Term Sources of Finance?
6. Explain the scope of Treasury Functions.
7. What are the various methods of computing Time Value of Money?
8. Write short notes on:
  - a) Operating Lease Vs. Financial Lease.
  - b) Factoring Vs. Bill Discounting.
  - c) Factoring Vs. Forfeiting
  - d) Venture Capital
  - e) Global Depository Receipts (GDR)
  - f) Commercial Paper
  - g) WTO
  - h) TRIMS & TRIPS

# Study Note - 4

## TOOLS FOR FINANCIAL ANALYSIS AND PLANNING



### This Study Note includes

- 4.1 Funds flow Statement
- 4.2 Cash Flow Statement
- 4.3 Ration Analysis
- 4.4 Identification of Information Required to Assess Financial Performance

### 4.1 FUNDS FLOW STATEMENT

The Balance Sheet provides only a static view of the business. It is a statement of assets and liabilities on a particular date. It does not show the movement of funds. In business concerns, funds flow from different sources and similarly funds are invested in various sources of investment. It is a continuous process. The study and control of this funds flow process is the main objective of Financial Management to assess the soundness and solvency of a business., financing and investing activities over the related period. Like the Balance Sheet, even the Profit and Loss Account does not depict the changes that have taken place in financial condition of a business concern between two dates. Hence there is a need to prepare an additional statement to know the changes in assets, liabilities and owners' equity between dates of two Balance Sheets. Such a statement is called Funds Flow Statement or Statement of Sources and Uses of funds or where come and where gone statement.

The Funds Flow Statement, which is also known as the Statement of Changes in financial position, is yet another tool of analysis of financial statements.

#### 4.1.1 Meaning and concepts of funds

Funds Flow Statement is a widely used tool in the hands of financial executives for analysing the financial performance of a business concern. Funds keep on moving in a business which itself is based on a going concern concept.

The term Funds has a variety of meanings.

- (a) **In a narrow sense:** In a narrow sense fund means only cash. Funds Flow Statement prepared on this basis is called as Cash Flow Statement. In this type of statement only in flow and outflow of cash is taken into account.
- (b) **In a broader sense:** In a broader sense the term fund refers to money value in whatever form it may exist. Here funds mean all financial resources in the form of men, materials, money, machinery etc.
- (c) **Popular sense:** In a popular sense the term funds means Working Capital i.e., the excess of Current Assets over Current Liabilities. When the funds move inwards or outwards they cause a flow or rotation of funds. Here the word fund means Net Working Capital. In short, if funds mean working capital, then the statement prepared on the basis is called Funds Flow Statement.

Funds Flow Statement gives detailed analysis of changes in distribution of resources between two Balance Sheet dates. This statement is widely used by the financial analysts and credit granting institutions and Finance Managers in performing their jobs. Thus, Funds, Flow Statement, in general is able to present

that information which either is not available or not readily apparent from an analysis of other financial statements.

**Definitions:**

A statement of sources and application of funds is a technical device designed to analyse the changes in the financial condition of a business enterprise between two dates.

**- Foulke**

Funds Flow Statement describes the sources from which additional funds were derived and the use to which these sources were put.

**- Anthony**

**4.1.2 Significance of funds flow statement**

It is very useful tool in the Financial Managers analytical kit. It provides a summary of management decisions on financing activities of the firm and investment policy. The following are the advantages of Funds Flow Statement.

- (i) Analysis of financial operations:** The Funds Flow Statement reveals the net affect of various transactions on the operational and financial position of the business concern. It determines the financial consequences of business operations. This statement discloses the causes for changes in the assets and liabilities between two different points of time. It highlights the effect of these changes on the liquidity position of the company.
- (ii) Financial policies:** Funds Flow Statement guides the management in formulating the financial policies such as dividend, reserve etc.
- (iii) Control device:** It serves as a measure of control to the management. If actual figures are compared with budgeted projected figures, management can take remedial action if there are my deviations.
- (iv) Evaluation of firm's financing:** Funds Flow Statement helps in evaluating the firm's financing. It shows how the funds were obtained from various sources and used in the past. Based on this, the financial manager can take corrective action.
- (v) Acts as a future guide:** Funds Flow Statement acts as a guide for future, to the management. It helps the management to know various problems it is going to face in near future for want of funds.
- (vi) Appraising the use of working capital:** Funds Flow Statement helps the management in knowing how effectively the working capital put into use.
- (vii) Reveals financial soundness:** Funds Flow Statement reveals the financial soundness of the business to the creditors, banks, financial institutions.
- (viii) Changes in working capital:** Funds Flow Statement highlights the changes in working capital. This helps the management in framing its investing policy.
- (ix) Assessing the degree of risk:** Funds Flow Statement helps the bankers, creditors, financial institutions in assessing the degree of risk involved in granting the credit to the business concern.
- (x) Net results:** This statement reveals the net results of operations during the year in terms of cash.

**4.1.3 Limitations of Funds Flow Statement**

The following are the important limitations of Funds Flow Statement

- i. Funds Flow Statement is not a substitute of Income Statement or a Balance Sheet. It furnished only some additional information as regards changes in Working Capital.
- ii. This statement lacks originality. It is simply rearrangement of data appearing in account books.

- iii. It indicates only the past changes. It can not reveal continuous changes.
- iv. When both the aspects of the transaction are current, they are not considered.
- v. When both the aspects of the transaction are non-current, even then they are not included in funds flow statement.
- vi. Some Management Accountants are of the opinion that this statement is not ideal tool for financial analysis.
- vii. Funds Flow Statement is historic in nature. Hence this projected funds flow statement cannot be prepared with much accuracy.

#### 4.1.4 Sources of Funds:

- i. Issue of share capital.
- ii. Funds from business operations
- iii. Issue of debentures of long term loans.
- iv. Sale of fixed assets or long term investments.
- v. Non-trading income.
- vi. Decrease in working capital.
- vii. Any other increase in liability and decrease in asset.

#### 4.1.5 Application of Funds:

- i. Redemption of preference share capital.
- ii. Redemption of debentures.
- iii. Repayment of long-term loans.
- iv. Purchase of fixed assets or long term investments.
- v. Payment of dividends and tax.
- vi. Any other non-trading payment.
- vii. Funds lost through business operations.
- viii. Increase in working capital.
- ix. Any other decrease in liability and increase in asset.

## 4.2 CASH FLOW STATEMENT

Cash Flow Statement reveals the causes of changes in cash position of business concern between two dates of Balance Sheets. According to Accounting Standard - 3 (Revised) an enterprise should prepare a Cash Flow Statement and should present it for each period with financial statements prepared. AS-3 (Revised) has also given the meaning of the words cash, cash equivalent and cash flows.

- i. **Cash:** This includes cash on hand and demand deposits with banks.
- ii. **Cash equivalents:** This includes purely short term and highly liquid investments which are readily convertible into cash and which are subject to an insignificant risk of changes in value. Therefore an investment normally qualifies as a cash equivalent only when it has a short maturity, of say three months or less.
- iii. **Cash flows:** This includes inflows and outflows of cash and cash equivalents. If the effect of transaction results in the increase of cash and its equivalents, it is called an inflow (source) and if it results in the decrease of total cash, it is known as outflow (use of cash).

### 4.2.1 Classification of Cash Flows

According to AS-3 (Revised) cash flows are classified into three main categories:

- A. Cash flows from Operating Activities.
- B. Cash flows from Investing Activities.
- C. Cash flows from Financing Activities.

**A. Cash flows from Operating Activities:** Operating activities are the principal revenue-producing activities of the enterprise and other activities that are not investing or financing activities.

The amount of cash flows arising from operating activities is a key indicator of the extent to which the operations of the enterprise have generated sufficient cash flows to maintain the operating capability of the enterprise, pay dividends, repay loans, and make new investments without recourse to external sources of financing.

Cash flows from operating activities are primarily derived from the principal revenue-producing activities of the enterprise. The following are the important operating activities:-

- (i) Cash receipts from the sale of goods and the rendering of services.
- (ii) Cash receipts from royalties, fees, commissions and other revenue.
- (iii) Cash payments to suppliers for goods and services.
- (iv) Cash payments to and on behalf of employees.
- (v) Cash receipts and cash payments of an insurance enterprise for premiums and claims, annuities and other policy benefits,
- (vi) Cash payments or refunds of income taxes unless they can be specifically identified with financing and investing activities,
- (vii) Cash receipts and payments relating in future contracts, forward contracts, option contracts and swap contracts when the contracts are held for dealing or trading purposes.
- (viii) Some transactions such as the sale of an item of plant, may give rise to a gain or loss which is included in the determination of net profit or loss. However, the cash flows relating to such transactions are cash flows from investing activities.

An enterprise may hold securities and loans for dealing or trading purposes, in which case they are similar to inventory acquired specifically for sale. Therefore, cash flows arising from the purchase and sale of dealing or trading activities are classified as operating activities. Similarly cash advances and loans made by financial enterprises are usually classified as operating activities since they relate by the main revenue producing activity of that enterprise.

**B. Cash flows from Investing Activities:** Investing activities are the acquisition and disposal of long-term assets and other investments not included in cash equivalents. The separate disclosure of cash flows arising from investing activities is important because the cash flows represent the extent to which expenditures have been made for resources intended to generate future income and cash flows.

**Examples of cash flows arising from Investing Activities are:**

- (i) Cash payments to acquire fixed assets (including intangibles). These payments include those relating to capitalised research & development costs and self constructed fixed assets.
- (ii) Cash receipts from disposal of fixed assets (including intangibles).
- (iii) Cash payments to acquire shares, warrants, or debt instruments of other enterprises and interests in joint ventures.

- (iv) Cash receipts from disposal of shares, warrants, or debt instruments of other enterprises and interests in joint venture.
- (v) Cash advances and loans made to third parties (other than advances and loans made by a financial enterprise).
- (vi) Cash receipts from the repayment of advances and loans made to third parties (other than advances and loans of a financial enterprise).
- (vii) Cash payments for future contracts, forward contracts, option contracts, and swap contracts except when the contracts are held for dealing or trading purposes or the payments are classified as financing activities and
- (viii) Cash receipts from future contracts, forward contracts, option contracts and swap contracts except when the contracts are held for dealing or trading purpose, or the receipts are classified as financing activities.

When a contract is accounted for as a hedge of an identifiable position, the cash flows of the contract are classified in the same manner as the cash flows of the position being hedged.

**C. Cash flows from financing activities:** Financing activities are activities that result in changes in the size and composition of the owners capital (including Preference Share Capital in the case of a company) and borrowing of the enterprise.

The separate disclosure of cash flows arising from financing activities is important because it is useful in predicting claims on future cash flows by providers of funds (both capital and borrowing) to the enterprise.

**Examples of cash flows arising from financing activities are:**

- (i) Cash proceeds from issuing shares or other similar instruments.
- (ii) Cash proceeds from issuing debentures loans, notes, bonds and other short-or long-term borrowings and
- (iii) Cash repayments of amounts borrowed such as redemption of debentures, bonds, preference shares.

**Treatment of some typical items:** AS - 3 (Revised) has also provided for the treatment of cash flows from some peculiar items as discussed below :

**(a) Extraordinary Items:** The cash flows associated with extraordinary items should be classified as arising from operating, investing or financing activities as appropriate and separately disclosed in the Cash Flows Statement to enable users to understand their nature and effect on the present and future cash flows of the enterprise.

**(b) Interest and Dividends:** Cash flows from interest and dividends received and paid should be disclosed separately. Further, the total amount of interest paid during the period should be disclosed in the Cash Flow Statement whether it has been recognised as an expense in the statement of profit and loss or capitalised. The treatment of interest and dividends received and paid depends upon the nature of the enterprise. For this purpose, the enterprises are classified as (i) Financial enterprises, and (ii) Other enterprises.

- (i) Financial enterprises:** In the case of financial enterprises, cash flows arising from interest paid and interest and dividend received should be classified as cash flows arising from operating activities.
- (ii) Other enterprises:** In the case of other enterprises, cash flows arising from interest paid should be classified as cash flows from **financing activities** while interest and dividends received should be classified as cash flows from **investing activities**. Dividends paid should be classified as cash flows from financing activities.

**(c) Taxes on income:** Cash flows arising from taxes on income should be separately disclosed and should be classified as cash flows from operating activities unless they can be specifically identified with financing and investing activities.

**(d) Acquisitions and disposals of subsidiaries and other business units :** The aggregate cash flows arising from acquisitions and from disposals of subsidiaries or other business units should be presented separately and classified as investing activities. An enterprise should disclose, in aggregate in respect of both acquisition and disposal of subsidiaries or other business units during the period each of the following:

- (i) The total purchase or disposal consideration and
- (ii) The portion of the purchase or disposal consideration discharged by means of cash and cash equivalents.

The separate presentation of the cash flow effects of acquisitions and disposals of subsidiaries and other business units as single line items helps to distinguish those cash flows from other cash flows. The cash flow effects of disposals are not deducted from those of acquisitions.

**(e) Foreign currency cash flows:** Cash flows arising from transactions in a foreign currency should be recorded in an enterprise's reporting currency by applying to the foreign currency amount the exchange rate between the reporting currency and the foreign currency at the date of the cash flow. The effect of changes in exchange rates on cash and cash equivalents held in a foreign currency should be reported as a separate part of the reconciliation of the changes in cash and cash equivalents during the period.

Unrealised gains and losses arising from changes in foreign exchange rates are not cash flows. However, the effect of exchange rate changes on cash and cash equivalents held or due in a foreign currency is reported in the Cash Flow Statement in order to reconcile cash and cash equivalents at the beginning and at the end of the period. This amount is presented separately from cash flows from operating investing and financing activities and includes the difference, if any had those cash flows been reported at the end of period exchange rates.

**(f) Non-cash transactions:** Many investing and financing activities do not have a direct impact on current cash flows although they do affect the capital and asset structure of an enterprise. Examples of non-cash transactions are :

- (i) The acquisition of assets by assuming directly related activities.
- (ii) The acquisition of an enterprise by means of issue of shares; and
- (iii) The conversion of debt to equity.

Investing and financing transactions that do not require the use of cash or cash equivalents should be excluded from a Cash Flow Statement. Such transactions should be disclosed elsewhere in the financial statements in a way that provides all the relevant information about these investing and financing activities.

#### **4.2.2 Methods of Calculating Cash flows (Used in) Operating Activities**

There are two methods of reporting cash flows from operating activities namely (1) Direct Method and (2) Indirect Method.

**A. The Direct Method:** Under the direct method, cash receipts (inflows) from operating revenues and cash payments (outflows) for operating expenses are calculated to arrive at cash flows from operating activities. The difference between the cash receipts and cash payments is the net cash flow provided by (or used in) operating activities. The following are the examples of cash receipts and cash payments (called cash flows) resulting from operating activities :

- (a) Cash receipts from the sale of goods and the rendering of services.



- (b) Cash receipts from royalties, fees commissions and other revenues
- (c) Cash payment to suppliers for goods and services
- (d) Cash payment to and on behalf of employees.
- (e) Cash receipts and cash payment of an insurance enterprise for premiums and claims annuities and other policy benefits.
- (f) Cash payments or refund of income taxes unless they can be specifically identified with financing and investing activities. and
- (g) Cash receipts and payments relating to future contracts, forward contracts, option contracts and swap contracts when the contracts are held for dealing or trading purposes. The formation about major classes of gross cash receipts and gross cash payments may be obtained either:
  - (a) From accounting records of the enterprise; or
  - (b) By adjusting sales, cost of sales (interest and similar income and interest expense and similar charges for a financial enterprise) and other items in the statement of profit and loss for;
- (i) Changes during the period in inventories and operating receivables and payables,
- (ii) Other non-cash items, and
- (iii) Other items for which the cash effects are investing or financing cash flows.

**Format of Cash Flow Statement:** AS-3 (Revised) has not provided any specific format for preparing a Cash Flows Statement. The Cash Flow Statement should report cash flows during the period classified by operating, investing and financing activities; a widely used format of Cash Flow Statement is given below:

**Cash Flow Statement (for the year ended.....)**

Particulars	₹	₹
<b>Cash Flows from Operating activities</b>		
Cash receipts from customers	xxx	
Cash paid to suppliers and employees	(xxx)	
Cash generated from operations	xxx	
Income tax paid	(xx)	
Cash flow before extraordinary items	xxx	
Extraordinary items	xxx	
Net cash from (used in) Operating activities		xxx
(Or)		
Net profit before tax and extraordinary items	xxx	
Adjustments for non-cash and non-operating items (List of individual items such as depreciation, foreign exchange loss, loss on sale of fixed assets, interest income, dividend income, interest expense etc.)	xxx	
Operating profit before working capital changes	xxx	
Adjustments for changes in current assets and current liabilities (List of individual items)	xxx	
Cash generated from (used in) operations before tax	xxx	
Income tax paid	xxx	
Cash flow before extraordinary items	xxx	
Extraordinary items (such as refund of tax)	xxx	
Net Cash from (used in) Operating activities		xxx

Particulars	₹	₹
<b>Cash Flows from investing activities</b>		
Individual items of cash inflows and outflows from financing activities	xxx	
(such as purchase/sale of fixed assets, purchase or sale of investments, interest received, dividend received etc.)	xxx	
Net cash from (used in) investing activities		xxx
<b>Cash Flows from Financing Activities</b>		
Individual items of cash inflows and outflows from financing activities	xxx	
(such as) proceeds from issue of shares, long-term borrowings, repayments of long-term borrowings, interest paid, dividend paid etc.)	xxx	xxx
Net increase (decrease) in cash and cash equivalents		xxx
Cash and cash equivalents at the beginning of the period		xxx
Cash and cash equivalents at the end of the period		xxx

**B. The Indirect Method:** Under the indirect method, the net cash flow from operating activities is determined by adjusting net profit or loss for the effect of :

- Non-cash items such as depreciation, provisions, deferred taxes, and unrealised foreign exchange gains and losses;
- Changes during the period in inventories and operating receivables and payables.
- All other items for which the cash effects are investing or financing cash flows.

The indirect method is also called reconciliation method as it involves reconciliation of net profit or loss as given in the Profit and Loss Account and the net cash flow from operating activities as shown in the Cash Flow Statement. In other words, net profit or losses adjusted for non-cash and non-operating items which may have been debited or credited to Profit and Loss Account as follows.

#### Calculation of Cash Flow from Operating Activities

Particulars	₹	₹
Net profit before tax and extraordinary items		xxx
Add : Non-cash and non-operating items which have already been debited to P.L. Account		
(a) Depreciation	xxx	
(b) Transfer to reserves and provisions	xxx	
(c) Good will written off	xxx	
(d) Preliminary expenses written off	xxx	
(e) Other intangible assets written off such as discount or loss on issue of shares / debentures, underwriting commission etc.	xxx	
(f) Loss on sale or disposal of fixed assets	xxx	
(g) Loss on sale of investments	xxx	
(h) Foreign exchange loss	xxx	xxx
Less : Non-cash and non-operating items which have already been credited to P.L. Account		xxx
(a) Gain on sale of fixed assets	xxx	
(b) Profit on sale of investments	xxx	
(c) Income from interest or dividends on investments	xxx	
(d) Appreciation	xxx	
(e) Reserves written back	xxx	
(f) Foreign exchange gain	xxx	xxx

Particulars	₹	₹
		XXX
Operating Profit Before Working Capital Changes		
Adjustments for changes in current operating assets and liabilities:		
Add : Decrease in Accounts of Current Operating Assets (except cash and cash equivalents) such as :		
Decrease in trade debts	XXX	
Decrease in bills receivables	XXX	
Decrease in inventories / stock-in-trade	XXX	
Decrease in prepaid expenses etc.	XXX	
Add : Increase in accounts of current operating liabilities (except Bank overdraft) such as :		
Increase in creditors	XXX	
Increase in bills payable	XXX	
Increase in outstanding expenses	XXX	XXX
		XXXX
Less : Increase in accounts of current operating assets (as stated above)		XXX
		XXX
Less : Decrease in accounts of current operating liabilities (as stated above)		XXX
Cash generated from (used in) operations before tax		XXX
Less : Income tax paid		XXX
Cash flows before extraordinary items		XXX
Add / Less : Extraordinary items if any		XXX
Net cash flow from (used in) operating activities		XXX

#### 4.2.3 Need of Preparing Cash Flow Statement

Cash Flow Statement shows the changes in cash position between two Balance Sheet dates. It provides the details in respect of cash generated through operating, investing and financial activities and utilised for operating, investing and financial activities. The transactions which increase the cash position of the business are known as Inflows of cash (ex : Sale of current and fixed assets, Issue of shares and debentures etc.) The transactions which decrease the cash position are known as outflows (ex : Purchase of Current and Fixed Assets, redemption of Debentures, and Preference Shares and other long term debts). Cash Flow Statement concentrates on transactions that have a direct impact on cash. This statement depicts factors responsible for such inflow and outflow of cash.

- (i). Cash Flow Statement reveals the causes of changes in cash balances between two Balance Sheet dates.
- (ii). This statement helps the management to evaluate its ability to meet its obligations i.e., payment to creditors, the payment of bank loan, payment of interest, taxes, dividend etc.
- (iii). It throws light on causes for poor liquidity in spite of good profits and excessive liquidity in spite of heavy losses.
- (iv). It helps the management in understanding the past behaviour of cash cycle and in controlling the use of cash in future.
- (vi). Cash Flow Statements helps the management in planning repayment of loans, replacement of assets etc.
- (vii). This statement is helpful in short-term financial decisions relating to liquidity.
- (viii). This statement helps the management in preparing the cash budgets properly.

- (ix). This statement helps the financial institution who lends advances to business concerns in estimating their repaying capacities.
- ix. Since a Cash Flow Statement is based on the cash basis of accounting it is very useful in evaluation of cash position of a firm.
- x. Cash Flow Statement discloses the complete story of cash movement. The increase in, or decrease of cash and the reason therefore can be known.
- xi. Cash Flow Statement provides information of all activities such as operating, investing, and financing activities separately.
- xii. Since Cash Flow Statement provides information regarding the sources and utilisation of cash during a particular period, it is easy for the management to plan carefully for the cash requirements in the future, for the purpose of redeeming long-term liabilities or / and replacing some fixed assets.
- xiii. A projected Cash Flow Statement reveals the future cash position of a concern. Through this Cash Flow Statement the firm can know how much cash it can generate and how much cash will be needed to make various payments.
- xiv. Cash Flow Statement prepared according the AS-3 (Revised) is more suitable for making comparison than the funds flow statements as there is no standard formats used for the same.

#### 4.2.4 Limitations of Cash Flow Statement

Cash Flow Statement suffers from the following limitations.

- (i). A Cash Flow Statement only reveals the inflow and outflow of cash. The cash balance disclosed by the Cash Flow Statement may not represent the real liquid position of the concern.
- (ii). Cash Flow Statement is not suitable for judging the profitability of a firm as non-cash changes are ignored while calculating cash flows from operating activities.
- (iii). Cash Flow Statement is not a substitute for Income Statement or Funds Flow Statement. Each of them has a separate function to perform. Net Cash Flow disclosed by Cash Flow Statement does not necessarily be the net income of the business, because net income is determined by taking into account both cash and non-cash items.
- (iv). Cash Flow Statement is based on cash accounting. It ignores the basic accounting concept of a accrual basis.
- (v). Cash Flow Statement reveals the movement of cash only. In preparation it ignores most liquid current assets (ex: Sundry debtors, Bills Receivable etc.)
- (vi). It is difficult to precisely define the term cash. There are controversies among accountants over a number of near cash items like cheques, stamps, postal orders etc., to be included in cash.
- (vii). Cash Flow Statement does not give a complete picture of financial position of the concern.

#### 4.2.5 Differences between Funds Flow Statement and Cash Flow Statement

The following are the main differences between a Funds Flow Statement and a Cash Flow Statement:-

Funds Flow Statement	Cash Flow Statement
1. Funds Flow Statement reveals the change in working capital between two Balance Sheet dates	Cash Flow Statement reveals the changes in cash position between two balance sheet dates.
2. Funds Flow Statement is based on accounting	Cash Flow Statement is based on cash basis of accounting
3. In the case of Funds Flow Statement a schedule of changes in working capital is prepared.	No such schedule of changes in working capital is prepared for a Cash Flow Statement.



<b>Funds Flow Statement</b>	<b>Cash Flow Statement</b>
4. Funds Flow Statement is useful in planning, Intermediate and long term financing.	Cash Flow Statement as a tool of financial analysis is more useful for short-term analysis and cash planning.
5. Funds Flow Statement deals with all components of working capital.	Cash Flow Statement deals only with cash and cash equivalents.
6. Funds Flow Statement reveals the sources and application of funds. The difference represents net increase or decrease in working capital.	Cash Flow Statement is prepared by taking into consideration the inflows and outflows in terms of operating, investing and financing activities. The net difference represents the net increase or decrease in cash and cash equivalents.

## PROBLEMS

### Illustration 1

From the following Balance Sheet of KEROX Ltd., Prepare Funds Flow Statement for 2013.

₹ '000					
<b>Liabilities</b>	<b>31-3-12</b>	<b>31-3-13</b>	<b>Assets</b>	<b>31-3-12</b>	<b>31-3-13</b>
Equity Share Capital	150	200	Goodwill	50	40
9% Redeemable Preference Share capital	75	50	Land & Buildings	100	85
Capital Reserve	—	10	Plant & Machinery	40	100
General Reserve	20	25	Investments	10	15
Profit & Loss Account	15	24	Sundry Debtors	70	85
Proposed Dividend	21	25	Stock	39	55
Sundry Creditors	13	24	Bills Receivable	10	15
Bills Payable	10	8	Cash in hand	7	5
Liability for Expenses	15	18	Cash at bank	5	4
Provision for tax	20	25	Preliminary Exp.	8	5
	<b>339</b>	<b>409</b>		<b>339</b>	<b>409</b>

Additional information:

1. A part of land was sold out in 2013, and the profit was credited to Capital Reserve.
2. A machine has been sold for ₹ 5,000 (written down value of the machinery was ₹ 6,000). Depreciation of ₹ 5,000 was charged on plant in 2013.
3. An interim dividend of ₹ 10,000 has been paid in 2013.
4. An Amount of ₹ 1,000 has been received as dividend on investment in 2013.

**Solution:**

### Funds flow Statement

<b>Sources</b>	<b>(₹ '000)</b>	<b>Application</b>	<b>(₹ '000)</b>
Funds from Operation	67	Investment Purchased	5
Sale proceed of Plant	5	Increase in Working Capital	16
Sale proceed of Land	25	Purchase of Plant & Machinery	71
Issue of Equity Share Capital	50	Redemption of Preference Share Capital	25
Dividend on Investments received	1	Proposed Dividend for last year	21
		Interim dividend paid	10
	<b>148</b>		<b>148</b>

**Working Note 1:****1. Calculation of changes in Working Capital:**

	Amount (₹) in '000	
	31-3-12	31-3-13
Current Asset		
Debtors	70	85
Stock	39	55
B/R	10	15
Cash in hand	7	5
Cash at bank	5	4
<b>A: Total Current Assets</b>	<b>131</b>	<b>164</b>

	Amount (₹) in '000	
	31-3-12	31-3-13
Current Liabilities		
Creditors	13	24
B/P	10	8
Liabilities for exp.	15	18
Provision for Tax	20	25
<b>B: Total Current Liabilities</b>	<b>58</b>	<b>75</b>
<b>Working capital (A-B)</b>	<b>73</b>	<b>89</b>

Increase in working capital  $89 - 73 = 16$

**2. Calculation of Fixed assets purchase during the year**

**Dr.** **Cr.**  
**Plant and Machinery A/c**

Particulars	(₹ '000)	Particulars	(₹ '000)
To Balance b/d	40	By Bank – sale proceeds	5
To Bank – Purchases (Bal. fig.)	71	By P & L-Loss	1
		By Depreciation	5
		By Balance C/f	100
	111		111

**Dr.** **Cr.**  
**Land and Building A/c**

Particulars	(₹ '000)	Particulars	(₹ '000)
To Balance b/d	100	By Bank (Bal. fig.)	25
To Profit-Transfer to C/R	10	By balance c/f	85
	110		110

**3. Calculation of Funds from Operation**

**Dr.** **Cr.**  
**P& L Adjustment A/c**

Particulars	(₹ '000)	Particulars	(₹ '000)
To Depreciation	5	By balance b/d	15
To Loss on sale of machinery	1	By Dividend Received	1
To Interim Dividend	10		
To Transfer to G/R	5		
To Proposed Dividend	25		
To Goodwill written off	10		
To Preliminary exp. written off	3		
To Closing balance	24	Funds from Operation (Bal. fig.)	67
	83		83

**Illustration 2**

The Balance Sheets of A, B, & C Co. Ltd. as at the end of 2011 and 2012 are given below:

LIABILITIES	2011(₹)	2012(₹)	ASSETS	2011(₹)	2012(₹)
Share Capital	1,00,000	1,50,000	Freehold land	1,00,000	1,00,000
Share premium	-	5,000	Plant at cost	1,04,000	1,00,000
General Reserve	50,000	60,000	Furniture at cost	7,000	9,000



Profit & Loss Account	10,000	17,000	Investments	60,000	80,000
6% Debentures	70,000	50,000	Debtors	30,000	70,000
Provision for Depreciation on Plant	50,000	56,000	Stock	60,000	65,000
Provision for Dep. on Furniture	5,000	6,000	Cash	30,000	45,000
Provision for taxation	20,000	30,000			
Sundry Creditors	86,000	95,000			
	3,91,000	4,69,000		3,91,000	4,69,000

A plant purchased for ₹ 4,000 (Depreciation ₹ 2,000) was sold for Cash for ₹ 800 on September 30, 2012. On June 30, 2012 an item of furniture was purchased for ₹ 2,000. These were the only transactions concerning fixed assets during 2012. A dividend of 22½ % on original shares was paid. You are required to prepare funds Flow Statement and verify the results by preparing a schedule of changes in Working Capital.

### Solution:

#### Calculation of changes in Working Capital

Current Asset	2011	2012	Current Liabilities	2011	2012
Debtors	30,000	70,000	Creditors	86,000	95,000
Stock	60,000	65,000	Provision for Tax	20,000	30,000
Cash	30,000	45,000	<b>B: Total Current Liabilities</b>	<b>1,06,000</b>	<b>1,25,000</b>
<b>A: Total Current Assets</b>	<b>1,20,000</b>	<b>1,80,000</b>	<b>Working capital (A-B)</b>	<b>14,000</b>	<b>55,000</b>

Increase in working capital ₹ 55,000 – ₹ 14,000 = ₹ 41,000

#### Funds flow Statement

Sources	Amount (₹)	Application	Amount (₹)
Funds from Operation	49,700	Investment Purchased	20,000
Sale proceed of plant	800	Increase in Working Capital	41,000
Issue of Equity Share Capital with premium	55,000	Dividend paid	22,500
		Purchase of furniture	2,000
		Redemption of Debentures	20,000
	1,05,500		1,05,500

### Working Note

#### 1. Calculation of Depreciation provide during the year

##### Provision for depreciation on plant

	(₹)
Opening Balance	50,000
Less: Depreciation on plant sold	2,000
	48,000
Depreciation provided during the year (b/f)	8,000
Depreciation at the end	56,000

Total Depreciation provided during the year	
On Plant (as above)	8,000
On Furniture (6,000-5,000)	1,000
Total depreciation provided during the year	9,000

Dr.		Investment A/c		Cr.	
Particulars	Amount (₹)	Particulars	Amount (₹)		
To Balance b/d	60,000				
To Bank – purchases (Bal. Fig)	20,000	By Balance c/f	80,000		
	80,000		80,000		

Dr.		P & L Adjustment A/c		Cr.	
Particulars	Amount (₹)	Particulars	Amount (₹)		
To Depreciation	9,000	By Balance b/d	10,000		
To Transfer to G/R	10,000				
To Loss on Sale of Plant	1,200				
To Dividend (1,00,000 x 22.5%)	22,500				
To Balance c/f	17,000	By Funds from Operation (Bal Fig)	49,700		
	59,700		59,700		

**Illustration 3**

From the Balance Sheet of A Ltd., Make out:

A Statement of changes in the Working Capital.

B. Funds Flow Statement.

**BALANCE SHEET**

	31st March			31st March	
	2012 (₹)	2013 (₹)		2012 (₹)	2013 (₹)
<b>LIABILITIES</b>			<b>ASSETS</b>		
Equity Share Capital:	3,00,000	4,00,000	Goodwill	1,15,000	90,000
8% Preference share capital	1,50,000	1,00,000	Land & Buildings	2,00,000	1,70,000
P & L A/c	30,000	48,000	Plant	80,000	2,00,000
General Reserve	40,000	70,000	Debtors	1,60,000	2,00,000
Proposed Dividend	42,000	50,000	Stock	77,000	1,09,000
Creditors	55,000	83,000	Bills Receivable	20,000	30,000
Bills Payable	20,000	16,000	Cash in hand	15,000	10,000
Provision for Taxation	40,000	50,000	Cash at Bank	10,000	8,000
	6,77,000	8,17,000		6,77,000	8,17,000

Following is the additional information available.

- Depreciation of ₹ 10,000 and ₹ 20,000 have been charged on Plant and Land and Buildings respectively in 2013.
- Interim dividend of ₹ 20,000 has been paid in 2013.
- Income tax of ₹ 35,000 has been paid in 2013.

**Solution:****A. Calculation of changes in Working Capital:**

	₹	
Current Asset	2012	2013
Debtors	1,60,000	2,00,000
Stock	77,000	1,09,000
B/R	20,000	30,000
Cash in hand	15,000	10,000
Cash at Bank	10,000	8,000
<b>A: Total Current Assets</b>	<b>2,82,000</b>	<b>3,57,000</b>



Current Liabilities	2012	2013
Creditors	55,000	83,000
B/P	20,000	16,000
B: Total Current Liabilities	75,000	99,000
Working capital (A-B)	2,07,000	2,58,000

Increase in working capital ₹ 2,58,000 – ₹ 2,07,000 = ₹ 51,000

### B. Funds flow Statement

Sources		Application	
Funds from Operation	2,30,000	Purchases of Plant	1,30,000
Sale proceed of Land & Building	10,000	Increase in Working Capital	51,000
Issue of Equity Share Capital	1,00,000	Tax Paid	35,000
		Redemption of Preference Share Capital	50,000
		Proposed Dividend	42,000
		Interim Dividend paid	20,000
		Preference Dividend paid	12,000
	3,40,000		3,40,000

#### Working Note

#### Dr. 1. Land & Buildings A/c Cr.

Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance b/d	2,00,000	By Depreciation provided	20,000
		By Bank – sale proceeds (b/f)	10,000
		By Balance c/f	1,70,000
	2,00,000		2,00,000

#### Dr. 2. Plant A/c Cr.

To Balance b/d	80,000	By Depreciation provided	10,000
To Bank (b/f)	1,30,000	By Balance c/f	2,00,000
	2,10,000		2,10,000

#### Dr. 3. Provision for Tax A/c Cr.

To Bank – paid	35,000	By Balance b/d	40,000
To balance c/f	50,000	By P & L A/c –provided	45,000
	85,000		85,000

#### Dr. 4. P & L Adjustment A/c Cr.

To Depreciation	30,000	By Balance b/d	30,000
To Preference Dividend (1,50,000 x 8%)	12,000		
To Transfer to G/R	30,000		
To Provision for Tax	45,000		
To Proposed Dividend	50,000		
To Goodwill written off	25,000		
To Interim Dividend	20,000		
To Balance C/f	48,000	By Funds from Operation (b/f)	2,30,000
	2,60,000		2,60,000

**Illustration 4**

From the following figures, prepare a statement showing the changes in the Working Capital and Funds Flow Statement during the year 2012.

<b>ASSETS:</b>	<b>Dec.31, 2011</b>	<b>Dec.31, 2012</b>
Fixed Assets (net) ₹	5,10,000	6,20,000
Investments	30,000	80,000
Current Assets	2,40,000	3,75,000
Discount on debentures	10,000	5,000
	7,90,000	10,80,000
<b>Liabilities:</b>		
Equity share capital	3,00,000	3,50,000
Preference share capital	2,00,000	1,00,000
Debentures	1,00,000	2,00,000
Reserves	1,10,000	2,70,000
Provision for doubtful debts	10,000	15,000
Current Liabilities	70,000	1,45,000
	7,90,000	10,80,000

You are informed that during the year:

- A machine costing ₹ 70,000 book value ₹ 40,000 was disposed of for ₹ 25,000.
- Preference share redemption was carried out at a premium of 5% and
- Dividend at 15% was paid on equity shares for the year 2011.

**Further:**

- The provision for depreciation stood at ₹ 1,50,000 on 31.12.11 and at ₹ 1,90,000 on 31.12.12; and
- Stock which was valued at ₹ 90,000 as on 31.12.11; was written up to its cost, ₹ 1,00,000 for preparing Profit and Loss account for the year 2012.

**Solution:****Funds Flow Statement**

<b>Sources</b>	<b>Amount (₹)</b>	<b>Applications</b>	<b>Amount (₹)</b>
Sale of Fixed Assets	25,000	Increase in Working Capital	50,000
Funds from Operation	2,95,000	Purchase of Fixed Assets	2,20,000
Issue of shares	50,000	Purchase of Investments	50,000
Debentures	1,00,000	Redemption of Preference Shares	1,05,000
		Dividend paid	45,000
	4,70,000		4,70,000

**Working note****1. Changes in Working Capital**

	<b>2011</b>	<b>2012</b>
Current Assets	2,40,000	3,75,000
(+) Stock under valued	10,000	
	2,50,000	3,75,000
Current Liabilities	70,000	1,45,000
Net Working Capital	1,80,000	2,30,000
Increase in Working Capital	50,000	



## Working note No.

### 2. Depreciation

	(₹)
Opening Provision	1,50,000
(-) Provided on sale of asset	30,000
	<u>1,20,000</u>
(+) Provided during the year (b/f)	70,000
Closing provision	<u>1,90,000</u>

## Working note No.

### 3. Purchase & sale of Fixed Assets

	(₹)
Opening (2012)	5,10,000
(-) Provided on sale of asset	40,000
(-) Sold	4,70,000
(-) Depreciation provided	70,000
	<u>4,00,000</u>
(+) Purchases (b/f)	2,20,000
Closing 2012	<u>6,20,000</u>

#### P&L Adjustment A/c

Particulars	Amount (₹)	Particulars	Amount (₹)
To Depreciation	70,000	By Balance b/d (110000+10000)	1,20,000
To Loss on Sale of Fixed Assets	15,000	By Funds from Operations	2,95,000
To Loss on Redemption of Shares	5,000	By Funds from Operations (Bal. figure)	
To Discount written off	5,000		
To Provision for Doubtful debt	5,000		
To Dividend	45,000		
To Balance c/d	2,70,000		
	<u>4,15,000</u>		<u>4,15,000</u>

### Illustration 5

The directors of Chintamani Ltd. present you with the Balance Sheets as on 30th June, 2011 and 2012 and ask you to prepare statements which will show them what has happened to the money which came into the business during the year 2012.

	(₹)	(₹)
<b>Liabilities:</b>	<b>30.6.11</b>	<b>30.6.12</b>
Authorised Capital 15,000 shares of ₹ 100 each	15,00,000	15,00,000
Paid up capital	10,00,000	14,00,000
Debentures (2012)	4,00,000	-----
General Reserve	60,000	40,000
P & L Appropriation A/c	36,000	38,000
Provision for the purpose of final dividends	78,000	72,000
Sundry Trade Creditors	76,000	1,12,000
Bank Overdraft	69,260	1,29,780
Bills Payable	40,000	38,000
Loans on Mortgage	-	5,60,000
	<b>17,59,260</b>	<b>23,89,780</b>

<b>Assets</b>		
Land & Freehold Buildings	9,00,000	9,76,000
Machinery and Plant	1,44,000	5,94,000
Fixtures and Fittings	6,000	5,500
Cash in hand	1,560	1,280
Sundry Debtors	1,25,600	1,04,400
Bills Receivable	7,600	6,400
Stock	2,44,000	2,38,000
Prepayments	4,500	6,200
Share in other companies	80,000	2,34,000
Goodwill	2,40,000	2,20,000
Preliminary expenses	6,000	4,000
	<b>17,59,260</b>	<b>23,89,780</b>

You are given the following additional information:

- Depreciation has been charged (i) on Freehold Buildings @ 2½% p.a. on cost ₹ 10,00,000. (ii) on Machinery and Plant ₹ 32,000 (iii) on Fixtures and Fittings @5% on cost, ₹ 10,000. No depreciation has been written off on newly acquired Building and Plant and Machinery.
- A piece of land costing ₹ 1,00,000 was sold in 2012 for ₹ 2,50,000. The sale proceeds was credited to Land and Buildings.
- Shares in other companies were purchased and dividends amounting to ₹ 6,000 declared out of profits made prior to purchase has received and used to write down the investment (shares).
- Goodwill has been written down against General Reserve.
- The proposed dividend for the year ended 30th June 2011 was paid and, in additions, an interim dividend, ₹ 52,000 was paid.

#### **Solution:**

#### **Funds Flow Statement**

<b>Sources</b>	<b>Amount (₹)</b>	<b>Applications</b>	<b>Amount (₹)</b>
Decrease in Working capital	1,21,500	urchase of land and building	2,01,000
Sale proceed of land	2,50,000	Purchase of plant and machinery	4,82,000
Dividend received	6,000	Purchase of shares	1,60,000
Issue of shares	4,00,000	Redemption of debentures	4,00,000
Loan	5,60,000	Dividends for 2011 paid	78,000
Funds from operations	35,500	Interim dividend paid	52,000
	<b>13,73,000</b>		<b>13,73,000</b>



## Working Note

### 1. Changes in working capital

	2011	2012
<b>Current Assets</b>		
Cash	1,560	1,280
Debtors	1,25,600	1,04,400
Bills Receivable	7,600	6,400
Prepaid	4,500	6,200
Stock	2,44,000	2,38,000
	3,83,260	3,56,280
<b>Current liabilities</b>		
Creditors	76,000	1,12,000
Overdraft	69,260	1,29,780
Bills Payable	40,000	38,000
	1,85,260	2,79,780
Working Capital	1,98,000	76,500
Decrease in working capital		1,21,500

### Working note No. 2: Depreciation

On Buildings	25,000
On Plant & Machinery	32,000
On Furniture & Fittings	500
	<u>57,500</u>

### 3. Purchase or sale of Fixed Assets / Investments:

<b>Land and buildings:</b>	₹
WDV (2012)	9,00,000
(-) Depreciation	<u>25,000</u>
	8,75,000
(-) Land sold	<u>2,50,000</u>
	6,25,000
(+) Purchases (b/f)	<u>2,01,000</u>
	8,26,000
(+) Profit on sale	<u>1,50,000</u>
WDV (2012)	<u>9,76,000</u>
<b>Plant &amp; machinery:</b>	
WDV (2011)	1,44,000
(-) Depreciation	<u>32,000</u>
	1,12,000
(+) Purchase (b/f)	<u>4,82,000</u>
WDV (2012)	<u>5,94,000</u>

<b>Investments:</b>	₹
WDV (2011)	80,000
(-) Dividend in capital nature	<u>6,000</u>
	74,000
(+) Purchases (b/f)	<u>1,60,000</u>
WDV (2012)	<u>2,34,000</u>

#### 4. P & L Adjustment A/c

Particulars	Amount (₹)	Particulars	Amount (₹)
To depreciation	57,500	By Balance b/d	36,000
To dividend proposed	72,000	By Profit on sale of Land	1,50,000
To preliminary expenses written off	2,000	By funds from operation (bal figure)	35,500
To interim dividend	52,000		
To balance c/d	38,000		
	<u>2,21,500</u>		<u>2,21,500</u>

#### Illustration 6

The following is the Balance Sheets of the Andhra Industrial Corporation Ltd. as on 31st December 2011 and 2012.

#### BALANCE SHEET

	(₹)	
	2011	2012
<b>Assets:</b>		
<b>Fixed Assets:</b> Property	1,48,500	1,44,250
Machinery	1,12,950	1,26,200
Goodwill	----	10,000
<b>Current Assets:</b> Stock	1,10,000	92,000
Trade Debtors	86,160	69,430
Cash at Bank	1,500	11,000
Pre-payments	3,370	1,000
	<b>4,62,480</b>	<b>4,53,880</b>
<b>Liabilities:</b>		
Shareholders funds: Paid up Capital	2,20,000	2,70,000
Reserves	30,000	40,000
Profit and Loss Account	39,690	41,220
<b>Current Liabilities:</b> Creditors	39,000	41,660
Bills Payable	33,790	11,000
Bank Overdraft	60,000	–
Provision for taxation	40,000	50,000
	<b>4,62,480</b>	<b>4,53,880</b>

During the year ended 31st December, 2012, a dividend of ₹ 26,000 was paid and assets of another company were purchased for ₹ 50,000 payable in fully paid-up shares. Such assets purchased were:

Stock ₹ 21,640; Machinery ₹ 18,360; and Goodwill ₹ 10,000. In addition Plant at a cost of ₹ 5,650 was purchased during the year; depreciation on Property ₹ 4,250; on Machinery ₹ 10,760. Income tax during the year amounting to ₹ 28,770 was charged to provision for taxation. Net profit for the year before tax was ₹ 76,300.



Prepare Funds Flow Statement for the year 2012.

**Solution:**

**Funds Flow Statement**

Sources	Amount (₹)	Applications	Amount (₹)
Issue of shares for stock	21,640	Increase in working capital	52,530
Funds from operation	91,310	Purchase of machinery	5,650
		Tax paid	28,770
		Dividend paid	26,000
	<b>1,12,950</b>		<b>1,12,950</b>

**Working Note**

**Provision for Tax A/c**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Cash paid	28,770	By balance b/d	40,000
To Balance c/d	50,000	By P&L A/c (b/f)	38,770
	<b>78,770</b>		<b>78,770</b>

**Verification of P & L A/c Balance**

	(₹)	(₹)
Opening P & L a/c		39,690
(+) net profit as per P & L a/c	76,300	
(-) provision for tax	38,770	
	<b>37,530</b>	
(-) dividend	26,000	
(-) transfer to reserve	10,000	
Retained		1,530
Profit at the end of the year		<b>41,220</b>

**Changes in Working Capital**

	(₹)	
	Opening	Closing
<b><u>Current assets :</u></b>		
Stock	1,10,000	92,000
Debtors	86,160	69,430
Cash	1,500	11,000
Pre-Payment	3,370	1,000
	<b>2,01,030</b>	<b>1,73,430</b>
<b><u>Current liabilities</u></b>		
Creditors	39,000	41,660
Bills payable	33,790	11,000
Overdraft	60,000	
	<b>1,32,790</b>	<b>52,660</b>
Net Working Capital	<b>68,240</b>	<b>1,20,770</b>
Increase in Working Capital	<b>52,530</b>	

**4. Depreciation provided during the year**

On Property	4,250
On machinery	10,760
	<u>15,010</u>

**5. Purchase/sale of Fixed Assets**

	Property	Machinery
WDV opening	1,48,500	1,12,950
(-) Depreciation	4,250	10,760
	1,44,250	1,02,190
(+) Purchases	Nil	18,360 (by issue of shares) 5,650 (by cash)
WDV at the end	1,44,250	1,26,200

**Dr. P & L Adjustment A/c Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Depreciation	15,010	By Balance b/d	39,690
To Dividend	26,000	By Funds from Operations(b/f)	91,310
To Transfer to reserve	10,000		
To Provision for tax	38,770		
To Balance c/d	41,220		
	<u>1,31,000</u>		<u>1,31,000</u>

**Illustration 7**

The following is the Balance Sheet of Gama Limited for the year ending March 31, 2011 and March 31, 2011;

**Balance Sheet as on March, 31**

Particulars	2011 ₹	2012 ₹
<b>Capital and Liabilities</b>		
Share Capital	6,75,000	7,87,500
General Reserves	2,25,000	2,81,250
Capital Reserve (Profit on Sale of Investment)	--	11,250
Profit & Loss Account	1,12,500	2,25,000
15% Debentures	3,37,500	2,25,000
Accrued Expenses	11,250	13,500
Creditors	1,80,000	2,81,250
Provision for Dividends	33,750	38,250
Provision for Taxation	78,750	85,500
<b>Total</b>	<b>16,53,750</b>	<b>19,48,500</b>



<b>Assets</b>		
Fixed Assets	11,25,000	13,50,000
Less: Accumulated depreciation	2,25,000	2,81,250
Net Fixed Assets	9,00,000	10,68,750
Long – Term Investments (at cost)	2,02,500	2,02,500
Stock (at cost)	2,25,000	3,03,750
Debtors (net of provision for doubtful debts of ₹ 45,000 and ₹ 56,250 respectively for 2011 and 2012 respectively)	2,53,125	2,75,625
Bills receivables	45,000	73,125
Prepaid Expenses	11,250	13,500
Miscellaneous Expenditure	16,875	11,250
<b>Total</b>	<b>16,53,750</b>	<b>19,48,500</b>

**Additional Information:**

1. During the year 2011-12, fixed assets with a net book value of ₹ 11,250 (accumulated depreciation, ₹ 33,750) was sold for ₹ 9,000.
2. During the year 2011-12, Investments costing ₹ 90,000 were sold, and also Investments costing ₹ 90,000 were purchased.
3. Debentures were retired at a Premium of 10%.
4. Tax of ₹ 61,875 was paid for 2010-11.
5. During the year 2011-12, bad debts of ₹ 15,750 were written off against the provision for Doubtful Debt account.
6. The proposed dividend for 2003-04 was paid in 2011-12.

**Required:**

Prepare a Funds Flow Statement (Statement of changes in Financial Position on working capital basis) for the year ended March 31, 2012.

**Solution:**

**In the books of Gama Ltd.  
Fund Flow Statement  
For the year ended March 31, 2012**

<b>Sources of Fund</b>	<b>Amount (₹)</b>	<b>Application of Funds</b>	<b>Amount (₹)</b>
Increase in Share Capital	1,12,500	Debenture Redemption	1,12,500
Sale of Assets	9,000	Redemption Premium	11,250
Fund from operation	3,84,750	Tax paid	61,875
		Dividend paid	33,750
		Increase in WC	28,125
Sale of Investment	1,01,250	Purchase of fixed assets	2,70,000
		Purchase of investment	90,000
	<b>6,07,500</b>		<b>6,07,500</b>

**Working Notes:****Statement showing funds from Operations**

Particulars	Amount (₹)	Amount (₹)
Net Profit [2,25,000 – 1,12,500]		1,12,500
Add: Transfer to General Reserve	56,250	
Loss on sale of fixed assets	2,250	
Premium on Redemption of Debentures	11,250	
Provision for Tax	68,625	
Provision for Dividend	38,250	
Depreciation	90,000	
Misc. exp. w/off	5,625	2,72,250
Funds from Operation		3,84,750

**Statement showing changes in Working Capital**

Particulars	(₹)	
	2011	2012
<b>Current Assets</b>		
Stock	2,25,000	3,03,750
Debtors	2,53,125	2,75,625
Bills Receivables	45,000	73,125
Prepaid Expenses	11,250	13,500
<b>Total Current Assets (A)</b>	5,34,375	6,66,000
<b>Current Liabilities</b>		
Accrued Expenses	11,250	13,500
Creditors	1,80,000	2,81,250
Total Current Liabilities	1,91,250	2,94,750
Working Capital (A) – (B)	3,43,125	3,43,125
<b>Increase in Working Capital</b>		28,125

**Dr.** **Cr.** **Provision for Doubtful Debt A/c**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Bad Debts	15,750	By Balance b/d	45,000
To Balance c/d	56,250	By P & L A/c	27,000
	<b>72,000</b>		<b>72,000</b>

**Dr.** **Cr.** **Provision for Dividends**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Div. paid	33,750	By Balance b/d	33,750
To Balance c/d	38,250	By P & L A/c	38,250
	<b>72,000</b>		<b>72,000</b>

**Dr.** **Cr.** **Provision for Tax**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Tax paid	61,875	By Balance b/d	78,750
To Balance c/d	85,500	By P & L A/c	68,625
	<b>1,47,375</b>		<b>1,47,375</b>



Dr.		Accumulated Depreciation A/c		Cr.	
Particulars	Amount (₹)	Particulars	Amount (₹)		
To Asset sold	33,750	By Balance b/d	2,25,000		
To Balance c/d	2,81,250	By P & L A/c	90,000		
	<b>3,15,000</b>		<b>3,15,000</b>		

Dr.		Fixed Assets A/c		Cr.	
Particulars	Amount (₹)	Particulars	Amount (₹)		
To Balance b/d	11,25,000	By Account Depreciation	33,750		
To Bank	2,70,000	By Bank	9,000		
		By P & L	2,250		
		By Balance c/d	13,50,000		
	<b>13,95,000</b>		<b>13,95,000</b>		

### Illustration 8

From the information contained in Income Statement and Balance Sheet of 'A' Ltd, prepare Cash Flow Statement.

### Income Statement for the year ended March 31, 2012

		(₹)
Net Sales	(A)	2,52,00,000
Less:		
Cash cost of sales		1,98,00,000
Depreciation		6,00,000
Salaries and Wages		24,00,000
Operating Expenses		8,00,000
Provision for Taxation		8,80,000
	(B)	2,44,80,000
Net Operating Profit (A – B)		7,20,000
Non-recurring Income – Profits on sale of equipment		1,20,000
		8,40,000
Retained earnings and Profits brought forward		15,18,000
		23,58,000
Dividends declared and paid during the year		7,20,000
Profit and Loss A/c balance as on March 31, 2012		16,38,000

### Balance Sheet as on (₹)

Assets	March 31 2011	March 31 2012
<b>Fixed Assets:</b>		
Land	4,80,000	9,60,000
Buildings and Equipment	36,00,000	57,60,000
<b>Current Assets:</b>		
Cash	6,00,000	7,20,000
Debtors	16,80,000	18,60,000
Stock	26,40,000	9,60,000
Advances	78,000	90,000
	<b>90,78,000</b>	<b>1,03,50,000</b>

**Balance Sheet as on**

(₹)

<b>Liabilities and Equity</b>	<b>March 31 2011</b>	<b>March 31 2012</b>
Share Capital	36,00,000	44,40,000
Surplus in Profit and Loss A/c	15,18,000	16,38,000
Sundry Creditors	24,00,000	23,40,000
Outstanding Expenses	2,40,000	4,80,000
Income – Tax payable	1,20,000	1,32,000
Accumulated Depreciation on Buildings and Equipment	12,00,000	13,20,000
	<b>90,78,000</b>	<b>1,03,50,000</b>

The original cost of equipment sold during the year 2011-12 was ₹ 7,20,000.

**Solution:****Working Notes:****1. Cash receipt from customers:**

(₹)

Sales revenue	2,52,00,000
Add: Debtor at beginning	16,80,000
	2,68,80,000
Less: Debtor at the end	18,60,000
Total cash receipt from customer	2,50,20,000

**2. Income tax paid:**

(₹)

Tax payable at beginning	1,20,000
Add: Provision for taxation	8,80,000
	10,00,000
Less: Tax payable at the end	1,32,000
Tax paid during the year	8,68,000

**3. Cash paid to supplier & employee**

(₹)

Cost of goods sold		1,98,00,000
Add: Operating expenses		8,00,000
Salary and wages		24,00,000
		<b>2,30,00,000</b>
Add: Creditor at the beginning	24,00,000	
Stock at the end	9,60,000	
Advance at the end	90,000	
Outstanding exp. at the beginning	2,40,000	36,90,000
		<b>2,66,90,000</b>
Less: Creditors at the end	23,40,000	
Stock at the beginning	26,40,000	
Advance at the beginning	78,000	
Outstanding expenses at the end	4,80,000	55,38,000
Total Cash Paid		<b>2,11,52,000</b>



**4. Accumulated depreciation on equipment sold** (₹)

Accumulated depreciation at beginning	12,00,000
Add: Depreciation for the year	6,00,000
	<b>18,00,000</b>
Less: Accumulated depreciation at the end	13,20,000
Accumulated depreciation on equipment sold	<b>4,80,000</b>

**5. Sale price of equipment** (₹)

Cost Price	7,20,000
Less: Accumulated depreciation	4,80,000
	<b>2,40,000</b>
Add: Profit on sale	1,20,000
Sale price	<b>3,60,000</b>

**6. Purchase of building and equipments:** (₹)

Opening balance	36,00,000
Less: Cost of equipment sold	7,20,000
	<b>28,80,000</b>
Balance at end	57,60,000
Purchase during the year	<b>28,80,000</b>

**Cash Flow Statement of A Ltd. for the year ended 31st March 2012**

	₹	₹
<b>(A) Cash flow from Operating Activity:</b>		
Cash receipt from customers	2,50,20,000	
Less: Cash paid to supplier & employees	<u>2,11,52,000</u>	
Cash generated from operation	38,68,000	
Less: Income tax paid	<u>(8,68,000)</u>	
Net cash from operating activity		30,00,000
<b>(B) Cash flow from Investing Activity:</b>		
Purchase of land	(4,80,000)	
Purchase of building & equipment	(28,80,000)	
Sale of equipment	3,60,000	
Net cash used in financing activity		(30,00,000)
<b>(C) Cash flow from Financing Activity:</b>		
Issue of share capital	8,40,000	
Dividends paid	(7,20,000)	
Net cash from financing activity		1,20,000
Net increase in cash & cash equivalent		1,20,000
Cash & Cash equivalent at beginning		6,00,000
Cash & Cash equivalent at the end		7,20,000

**Illustration 9**

The Balance Sheet of JK Limited as on 31st March, 2011 and 31st March, 2012 are given below:

**Balance Sheet as on**

(₹ '000')

<b>Liabilities</b>	<b>31.03.11</b>	<b>31.03.12</b>	<b>Assets</b>	<b>31.03.11</b>	<b>31.03.12</b>
Share Capital	1,440	1,920	Fixed Assets	3,840	4,560
Capital Reserve	--	48	Less: Depreciation	1,104	1,392
General Reserve	816	960	Net Fixed Asset	2,736	3,168
Profit and Loss A/c	288	360	Investment	480	384
9% Debenture	960	672	Cash	210	312
Current Liabilities	576	624	Other Current Assets		
Proposed Dividend	144	174	(including Stock)	1,134	1,272
Provision for Tax	432	408	Preliminary Expenses	96	48
Unpaid Dividend	--	18			
	<b>4,656</b>	<b>5,184</b>		<b>4,656</b>	<b>5,184</b>

**Additional Information:**

1. During the year 2011-2012, Fixed Assets with a book value of ₹ 2,40,000 (accumulated depreciation ₹ 84,000) was sold for ₹ 1,20,000.
2. Provided ₹ 4,20,000 as depreciation.
3. Some investments are sold at a profit of ₹ 48,000 and profit was credited to Capital Reserve.
4. It decided that stocks be valued at cost, whereas previously the practice was to value stock at cost less 10 per cent. The stock was ₹ 2,59,200 as on 31.03.11. The stock as on 31.03.12 was correctly valued at ₹ 3,60,000.
5. It decided to write off Fixed Assets costing ₹ 60,000 on which depreciation amounting to ₹ 48,000 has been provided.
6. Debentures are redeemed at ₹ 105.

**Required:**

Prepare a Cash Flow Statement.



**Solution:**

**Cash Flow Statement (as on 31st March, 2012)**

	₹	₹	₹
<b>1. Cash flows from Operating Activities</b>			
Profit and Loss A/c			
3,60,000 – (2,88,000 + 28,800)			43,200
Adjustments:			
Increase in General Reserve	1,44,000		
Depreciation	4,20,000		
Provision for Tax	4,08,000		
Loss on Sale of Machine	36,000		
Premium on Redemption of debenture	14,400		
Proposed Dividend	1,74,000		
Preliminary Exp written off	48,000		
Fixed Asseets written off	12,000		
Funds from operation			12,56,400
Increase in Sundry Creditors			48,000
Increase in Current Assets			
12,72,000 – (11,34,000 + 28,800)			(1,09,200)
Cash before Tax			12,38,400
Tax paid			4,32,000
Net Cash from operating activities			8,06,400
<b>2. Cash from Investing Activities</b>			
Purchase of fixed assets		(10,20,000)	
Sale of Investment		1,44,000	
Sale of Fixed Assets		1,20,000	(7,56,000)
<b>3. Cash from Financing Activities</b>			
Issue of Share Capital		4,80,000	
Redemption of Debenture		(3,02,400)	
Dividend paid		(1,26,000)	51,600
Net increase in Cash and Cash equivalents			1,02,000
Opening Cash and Cash equivalents			2,10,000
Closing Cash			3,12,000

**Working Notes:**

Dr.		Fixed Assets Account		Cr.	
Particulars	Amount (₹)	Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance b/d	27,36,000	By Cash	1,20,000		
To Purchases (balancing figure)	10,20,000	By Loss on sales	36,000		
		By Depreciation	4,20,000		
		By Assets written off	12,000		
		By Balance c/d	31,68,000		
	37,56,000				37,56,000

Dr.		Depreciation Account		Cr.	
Particulars	Amount (₹)	Particulars	Amount (₹)		
To Fixed Assets (on sales)	84,000	By Balance b/d	11,04,000		
To Fixed Assets w/o	48,000	By Profit and Loss A/c	4,20,000		
To Balance c/d	13,92,000				
	15,24,000				15,24,000

**Illustration 10**

Balance Sheets of a company as on 31st March, 2011 and 2012 were as follows:

Liabilities	31.03.11	31.03.12	Assets	31.03.11	31.03.12
Equity share capital	10,00,000	10,00,000	Good will	1,00,000	80,000
8% Pref. Share capital	2,00,000	3,00,000	Land and Building	7,00,000	6,50,000
General Reserve	1,20,000	1,45,000	Plant and Machinery	6,00,000	6,60,000
Securities Premium	--	25,000	Investments		
Profit & Loss A/c.	2,10,000	3,00,000	(non trading)	2,40,000	2,20,000
11% Debentures	5,00,000	3,00,000	Stock	4,00,000	3,85,000
Creditors	1,85,000	2,15,000	Debtors	2,88,000	4,15,000
Provision for tax	80,000	1,05,000	Cash and Bank	88,000	93,000
Proposed Dividend	1,36,000	1,44,000	Prepaid Expenses	15,000	11,000
			Premium on Redemption of debenture		
				--	20,000
	<b>24,31,000</b>	<b>25,34,000</b>		<b>24,31,000</b>	<b>25,34,000</b>

**Additional Information:**

- Investments were sold during the year at a profit of ₹ 15,000.
- During the year an old machine costing ₹ 80,000 was sold for ₹ 36,000. Its written down value was ₹ 45,000.
- Depreciation charged on Plant and Machinery @ 20% on the opening balance.
- There was no purchase or sale of Land and Building.
- Provision for tax made during the year was ₹ 96,000.
- Preference shares were issued for consideration of cash during the year.

You are required to prepare:

- Cash Flow Statement as per AS-3.
- Schedule of changes in Working Capital.



**Solution:**

**a. Cash Flow Statement as per AS-3.**

**Cash Flow Statement  
for the year ending 31st March, 2012**

	Particulars	(₹).	(₹)
<b>A</b>	<b>Cash flow from Operating Activities</b>		
	Profit and Loss A/c as on 31.3.2012		3,00,000
	Less: Profit and Loss A/c as on 31.3.2011		2,10,000
			90,000
	Add: Transfer to General Reserve	25,000	
	Provision for Tax	96,000	
	Proposed Dividend	1,44,000	2,65,000
	Profit before Tax		3,55,000
	Adjustment for Depreciation		
	Land and Building	50,000	
	Plant and Machinery	1,20,000	1,70,000
	Profit on Sale of Investments		(15,000)
	Loss on Sale of Plant and Machinery		9,000
	Goodwill written off		20,000
	Interest on Debenture		33,000
	Operating Profit before Working Capital changes		5,72,000
	Adjustment for Working Capital changes:		
	Decrease in Prepaid Expenses		4,000
	Decrease in Stock		15,000
	Increase in Debtors		(1,27,000)
	Increase in Creditors		30,000
	Cash generated from Operations		4,94,000
	Income tax paid		(71,000)
	<b>Net Cash Inflow from Operating Activities (a)</b>		<b>4,23,000</b>
<b>B</b>	<b>Cash flow from Investing Activities</b>		
	Sale of Investment		35,000
	Sale of Plant and Machinery		36,000
	Purchase of Plant and Machinery		(2,25,000)
	<b>Net Cash Outflow from Investing Activities (b)</b>		<b>(1,54,000)</b>
<b>C</b>	<b>Cash flow from Financing Activities</b>		
	Issue of Preference Shares		1,00,000
	Premium received on issue of securities		25,000
	Redemption of Debentures at a premium		(2,20,000)
	Dividend paid		(1,36,000)
	Interest paid to Debenture holders		(33,000)
	<b>Net Cash outflow from Financing Activities (c)</b>		<b>(2,64,000)</b>
	Net increase in Cash and Cash Equivalents during the year (a+b+c)		5,000
	Cash and Cash Equivalents at the beginning of the year		88,000
	Cash and Cash Equivalents at the end of the year.		93,000

**Working Notes:**

**Dr.** **Provision for the Tax Account** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Bank (paid)	71,000	By Balance b/d	80,000
To Balance c/d	1,05,000	By Profit and Loss A/c	96,000
	<b>1,76,000</b>		<b>1,76,000</b>

**Dr.** **Investment Account** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance b/d	2,40,000	By balance (bal fig)	35,000
To profit and loss (profit on sale)	15,000	By balance c/d	2,20,000
	<b>2,55,000</b>		<b>2,55,000</b>

**Dr.** **Plant and Machinery Account** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance b/d	6,00,000	By Bank (sale)	36,000
To Bank A/c (Purchase)	2,25,000	By Profit and Loss A/c (loss on sale)	9,000
		By Depreciation	1,20,000
		By Balance c/d	6,60,000
	<b>8,25,000</b>		<b>8,25,000</b>

**Note:**

In this question, the date of redemption of debentures is not mentioned. So, it is assumed that the debentures are redeemed at the beginning of the year.

**b. Schedule of change in Working Capital**

Particulars	31 March 2011 (₹)	31 March 2012 (₹)	Changes in Working Capital	
			Increase (₹)	Decrease (₹)
<b>Current Assets</b>				
Stock	4,00,000	3,85,000	--	15,000
Debtors	2,88,000	4,15,000	1,27,000	--
Prepaid Expenses	15,000	11,000	--	4,000
Cash and Bank	88,000	93,000	5,000	--
<b>Total (A)</b>	<b>7,91,000</b>	<b>9,04,000</b>		
<b>Current Liabilities</b>				
Creditors	1,85,000	2,15,000	--	30,000
<b>Total (B)</b>	<b>1,85,000</b>	<b>2,15,000</b>		
Working Capital (A-B)	6,06,000	6,89,000		
Increase in Working Capital	83,000	--	--	83,000
	<b>6,89,000</b>	<b>6,89,000</b>	<b>1,32,000</b>	<b>1,32,000</b>



### Illustration 11

The Balance Sheets of a company as on 31st March, 2011 and 2012 are given below:

₹

Liabilities	31.03.11	31.03.12	Assets	31.03.11	31.03.12
Equity Share Capital	14,40,000	19,20,000	Fixed Assets	38,40,000	45,60,000
Capital Reserve	--	48,000	Less: Depreciation	(11,04,000)	(13,92,000)
General Reserve	8,16,000	9,60,000		27,36,000	31,68,000
Profit & Loss A/c	2,88,000	3,60,000	Investment	4,80,000	3,84,000
9% Debentures	9,60,000	6,72,000	Sundry Debtors	12,00,000	14,00,000
Sundry Creditors	5,50,000	5,90,000	Stock	1,40,000	1,84,000
Bills Payable	26,000	34,000	Cash in hand	4,000	--
Proposed Dividend	1,44,000	1,72,800	Preliminary Expenses	96,000	48,000
Provision for tax	4,32,000	4,08,000			
Unpaid dividend	--	19,200			
	46,56,000	51,84,000		46,56,000	51,84,000

#### Additional Information:

During the year ended 31st March, 2012 the company:

1. Sold a machine for ₹ 1,20,000; the cost of machine was ₹ 2,40,000 and depreciation provided on it was ₹ 84,000.
2. Provided ₹ 4,20,000 as depreciation on fixed assets.
3. Sold some investment and profit credited to capital reserve.
4. Redeemed 30% of the debenture @ 105.
5. Decided to write off fixed assets costing ₹ 60,000 on which depreciation amounting to ₹ 48,000 has been provided.

You are required to prepare Cash Flow Statement as per AS-3.

**Solution:****Cash Flow Statement for the year ending 31st March, 2012**

	Particulars	(₹)	(₹)
<b>A</b>	<b>Cash Flows from Operating Activities</b>		
	Profit and Loss A/c (3,60,000 – 2,88,000)		72,000
	Adjustments:		
	Increase in General Reserve	1,44,000	
	Depreciation	4,20,000	
	Provision for Tax	4,08,000	
	Loss on Sale of Machine	36,000	
	Premium on Redemption of Debentures	14,400	
	Proposed Dividend	1,72,800	
	Preliminary Expenses written off	48,000	
	Fixed Assets written off	12,000	
	Interest on Debentures	60,480	13,15,680
	Funds from Operations		13,87,680
	Increase in Sundry Creditors	40,000	
	Increase in Bills Payable	8,000	
		48,000	
	Increase in Sundry Debtors	(2,00,000)	
	Increase in Stock	(44,000)	(1,96,000)
	Cash before tax		11,91,680
	Less: Tax paid		4,32,000
	<b>Cash in flows from Operating Activities</b>		<b>7,59,680</b>
<b>B</b>	<b>Cash in flows from Investing Activities</b>		
	Purchase of Fixed Assets	(10,20,000)	
	Sale of Investment	1,44,000	
	Sale of Fixed Assets	1,20,000	
	<b>Cash out flows from Investing Activities</b>		<b>(7,56,000)</b>
<b>C</b>	<b>Cash Flows from Financing Activities</b>		
	Issue of share capital	4,80,000	
	Redemption of Debentures	(3,02,400)	
	Dividend Paid (1,44,000 – 19,200)	(1,24,800)	
	Interest on Debentures	(60,480)	
	Cash outflow from Financing Activities		(7,680)
	Net Increase in Cash and Cash Equivalents		(4,000)
	Cash and Cash Equivalents at the beginning of the year		4,000
	Cash and Cash Equivalents at the end of the year		Nil

- It is presumed that the 30 percent debentures have been redeemed at the beginning of the year.



Dr.

**Fixed Assets Account**

Cr.

Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance b/d	27,36,000	By Cash	1,20,000
To Purchases (balance figure)	10,20,000	By Loss on sales	36,000
		By Depreciation	4,20,000
		By Assets written off	12,000
		By Balance c/d	31,68,000
	<b>37,56,000</b>		<b>37,56,000</b>

**Illustration No.12**

The summarized Balance Sheet of XYZ Limited as at 31st March, 2011 and 2012 are given below:

Liabilities	2010 (₹)	2011 (₹)	Assets	2011 (₹)	2012 (₹)
Preference share capital	4,00,000	2,00,000	Plant and Machinery	7,00,000	8,20,000
Equity share capital	4,00,000	6,60,000	Long term investment	3,20,000	4,00,000
Share Premium A/c	40,000	30,000	Goodwill	--	30,000
Capital Redemption Reserve	--	1,00,000	Current Assets	9,10,000	11,41,000
General Reserve	2,00,000	1,20,000	Short term investment (less than 2 months)	50,000	84,000
P & L A/c	1,30,000	1,75,000	Cash and Bank	1,00,000	80,000
Current Liabilities	6,40,000	9,00,000	Preliminary Expenses	40,000	20,000
Proposed Dividend	1,60,000	2,10,000			
Provision for tax	1,50,000	1,80,000			
	<b>21,20,000</b>	<b>25,75,000</b>		<b>21,20,000</b>	<b>25,75,000</b>

**Additional Information:**

During the year 2012 the company:

1. Preference share capital was redeemed at a premium of 10% partly out of proceeds issue of 10,000 equity shares of ₹ 10 each issued at 10% premium and partly out of profits otherwise available for dividends.
2. The company purchased plant and machinery for ₹ 95,000. It also acquired another company stock ₹ 25,000 and plant and machinery ₹ 1,05,000 and paid ₹ 1,60,000 in Equity share capital for the acquisition.
3. Foreign exchange loss of ₹ 1,600 represents loss in value of short term investment.
4. The company paid tax of ₹ 1,40,000.

You are required to prepare Cash Flow Statement.

**Solution:**

**Cash Flow Statement as per AS 3 for the year ending 31st March, 2011**

	Particulars	(₹).	(₹).
<b>A</b>	<b>Cash flow from Operating Activities</b>		
	Profit before tax (2,75,000 + 1,70,000)	4,45,000	
	Add: Depreciation on machinery	80,000	
	Foreign exchange loss	1,600	
	Preliminary expenses written off	20,000	
	Cash flow before working capital adjustment	5,46,600	
	Add: Stock acquired from other company	25,000	
	Increase in Current Liabilities	2,60,000	
	Less: Increase in Current Assets	(2,31,000)	
	Cash flow before tax paid	6,00,600	
	Less: Tax paid	(1,40,000)	
	Cash flow from operating activities		4,60,600
<b>B</b>	<b>Cash flow from Investing Activities</b>		
	Purchase of Machinery	(95,000)	
	Purchase of Investment	(80,000)	(1,75,000)
<b>C</b>	<b>Cash flow from Financing Activities</b>		
	Issue of shares at premium	1,10,000	
	Payment of Dividend	(1,60,000)	
	Redemption of preference shares at premium	(2,20,000)	(2,70,000)
	Net increase/decrease in cash and cash equivalent (a+b+c)		15,600
	Cash and cash equivalent at the beginning of the year		1,50,000
	Cash and cash equivalent at the end of the year		1,65,600

**Working Notes:**

**Dr. Plant and Machinery Account Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance b/d	7,00,000	By Depreciation (balancing figure)	80,000
To Bank A/c	95,000	By Balance c/f	8,20,000
To acquired from other	1,05,000		
	<b>9,00,000</b>		<b>9,00,000</b>

**Dr. Provision for Tax Account Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Bank	1,40,000	By Balance b/d	1,50,000
To Balance c/f	1,80,000	By P & L	1,70,000
	<b>3,20,000</b>		<b>3,20,000</b>

Dr.

**Profit for the year 2012**

Cr.

Particulars	Amount (₹)
P & L Account (1,75,000 – 1,30,000)	45,000
Transfer to general reserve (1,20,000 + 1,00,000 for Redemption – Opening 2,00,000)	20,000
Proposed dividend	2,10,000
<b>Net profit</b>	<b>2,75,000</b>

**4. Cash and Cash Equivalent**

Opening balance + Short term investment = 1,00,000 + 50,000 = ₹ 1,50,000.

Closing balance = Closing cash + Short term investment + Foreign exchange loss  
 = 80,000 + 84,000 + 1,600 = ₹ 1,65,600

**4.3 RATIO ANALYSIS**

Ratio analysis is the process of determining and interpreting numerical relationships based on financial statements. A ratio is a statistical yard stick that provides a measure of the relationship between variables or figures. This relationship can be expressed as percent (cost of goods sold as a percent of sales) or as a quotient (current assets as a certain number of times the current liabilities).

As ratios are simple to calculate and easy to understand there is a tendency to employ them profusely. While such statistical calculations stimulate thinking and develop understanding there is a danger of accumulation of a mass of data that obscures rather than clarifies relationships. The financial analyst has to steer a careful course. His experience and objectives of analysis help him in determining which of the ratios are more meaningful in a given situation.

The Parties Interested : The persons interested in the analysis of financial statements can be grouped under three heads:

(i) Owners or investors; (ii) Creditors; and (iii) Financial executives. Although all these three groups are interested in the financial conditions and operating results of an enterprise the primary information that each seeks to obtain from these statements is to serve. Investors desire a primary basis for estimating earning capacity. Creditors (trade and financial) are concerned primarily with liquidity and ability to pay interest and redeem loan within a specific period. Management is interested in evolving analytical tools that will measure costs, efficiency, liquidity and profitability with a view to making intelligent decisions.

**4.3.1 Significance:**

- (i) Commercial bankers and trade creditors and the institutional lenders are mostly concerned with the ability of a borrowing enterprise to meet its financial obligations timely. As a result they are most interested in ratios like the current ratio, acid test ratio, turnover of receivables, inventory turnover, coverage of interest by level of earnings, etc.
- (ii) Long-term creditors would be interested in the working capital position of the borrower as an indication of ability to pay interest and principle in case earnings decline. So, they are interested in the ratios of total debt to equity, net worth to total assets, long-term debt to equity, long term debt to net working capital, fixed assets to networth, fixed assets to long term debt, fixed debt to capitalization etc. The number of times fixed charges are covered by earnings before interest and taxes will be of particular interest for such long-term creditors.
- (iii) Investors in shares are primarily interested in per share ratio like earnings per share, book value per share, market price per share, dividends per share, etc. They would also be interested in knowing the capitalization rate (E/P Ratio = Earnings per share/ Price per share ratio) which is the reciprocal of P/E Ratio (Price/ Earnings ratio) and also the dividend yield, i.e.; D/P Ratio.

### 4.3.2 Advantages of Ratio Analysis

Ratio Analysis is (useful) relevant in assessing the performance of a firm in respect of the following purposes:

- (i) **To measure the liquidity position:** The purpose of ratio analysis to measure the liquidity position of a firm. Whether the firm is able to meet its current obligations when they become due or not? A firm can be said to be liquid, if it has sufficient liquid funds to pay the interest charges on short-term debt within a year. The liquidity ratio are useful in credit analysis by banks and other financial institutions.
- (ii) **To know the solvency position:** Ratio analysis is helpful for assessing the long-term financial liability of the firm. The long term solvency is measured through the leverage, and profitability ratios. These ratios reveal the strengths and weaknesses of a firm in respect of the solvency position. The leverage ratios indicates the proportion of various sources of finance in the firms capital structure, particularly the ratio of debt and equity share capital.
- (iii) **Operating efficiency or turnover of the firm:** The ratios are helpful in measuring the operating efficiency or the turnover of the firm. These ratios indicate the efficiency in utilizing the assets of the firm such as fixed assets turnover ratio, total resources turnover ratio etc.
- (iv) **To assess the profitability position of the firm:** The ratios are useful to assess and measure the profitability of the firm in respect of sales and the investments. These ratios are concerned about the over –all profitability of the firm.
- (v) **Inter - firm and intra – firm comparison:** Ratios are not only reflects the financial position of a firm, but also serves as a tool for remedial actions. This is made possible only due to inter-firm comparison. This would demonstrate the relative position of the firm vis-à-vis its competitors ₹ If there is any variance in the ratios either with the industry average or with, those of competitors, the firm has to identify the reasons and would take remedial measures.
- (vi) **Trend Analysis:** The trend analysis of ratios indicates whether the financial position of a firm is improving or deteriorating over the yea ₹ The significance of a trend analysis of ratio lies in the fact that the analysis can know the direction of movement whether the movement is favourable or unfavourable.

Thus, ratio analysis is considered better than a mere comparison of figures in carrying out an over – all appraisal of a company’s business.

### 4.3.3 Standards for Comparison:

For making a proper use of ratios, it is essential to have fixed standards for comparison. A ratio by itself has very little meaning unless it is compared to some appropriate standard. Selection of proper standards of comparison is most important element in ratio analysis. The four most common standards used in ratio analysis in Financial Management are : absolute, historical, horizontal and budgeted.

**Absolute :** Absolute standards are those which become generally recognized as being desirable regardless of the type of company, the time, stage of business cycle and the objectives of the analyst.

**Historical :** Historical (also known as internal) standards involves comparing a company’s own past performance as a standard for the present or future. But this standard may not provide a sound basis for judgment as the historical figure may not have represented an acceptable standard. It is also called as intra firm comparison.

**Horizontal :** In case of horizontal (external) standards, one company is compared with another or with the average of other companies of the same nature. It is also called as inter-firm comparison.



**Budgeted :** The budgeted standard is arrived at after preparing the budget for a period. Ratio developed from actual performance are compared to the planned ratios in the budget in order to examine the degree of accomplishment of the anticipated targets of the firm.

#### 4.3.4 Limitations of Ratio Analysis:

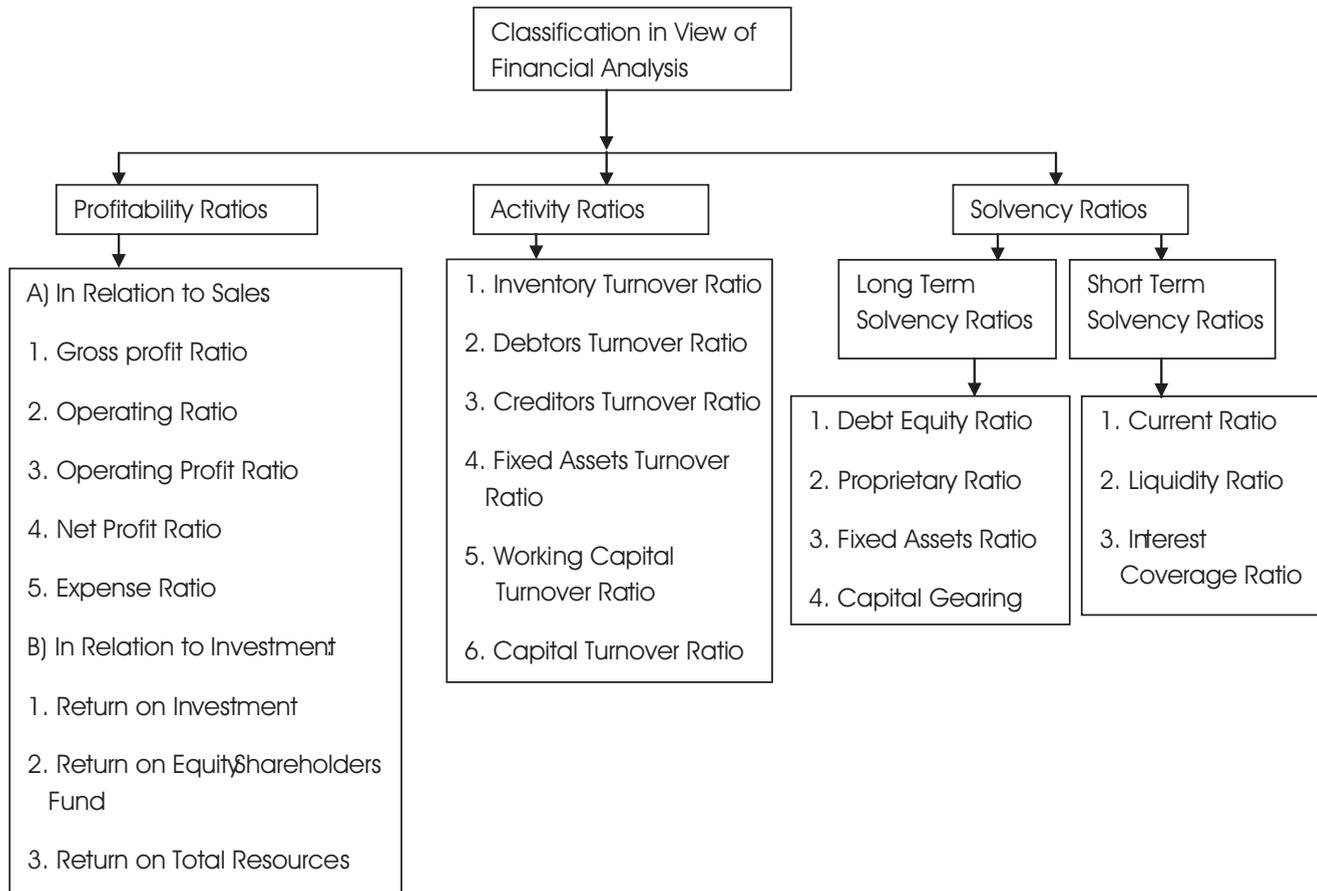
- (i) It is always a challenging job to find an adequate standard. The conclusions drawn from the ratios can be no better than the standards against which they are compared.
- (ii) It is difficult to evaluate the differences in the factors that affect the company's performance in a particular year as compared with that of another year and that of another company. The task becomes more difficult when comparison is made of one company with another when they are of substantially different size, age and diversified products.
- (iii) While making comparisons of ratios, due allowance should be made for changes in price level. A change in price level can seriously affect the validity of comparisons of ratios computed for different time periods and particularly in case of ratios whose numerator and denominator are expressed in different units of currency.
- (iv) Comparisons are also become difficult due to differences in definition. The terms like gross profit, operating profit, net profit etc. have not got precise definitions and there is considerable diversity in practice as to how they should be measured.
- (v) A Balance Sheet may fail to reflect the average or typical situation, as it is prepared as of one moment of time. It ignores short-term fluctuations in assets and equities that may occur within the period covered by the two Balance Sheet dates.
- (vi) Various differences are found among the accounting methods used by different companies which variously affect the comparability of financial statements. Methods of recording and valuing assets, write-offs, costs, expenses etc differ from company to company.
- (vii) As ratios are simple to calculate and easy to understand, there is a tendency to over-employ them. While such statistical approach stimulates thinking, it is also likely to lead to the accumulation of a mass of data; if due care is not taken, that might obscure rather than clarify relationships.

#### 4.3.4 Window Dressing:

The term window dressing means manipulation of accounts in a way so as to conceal vital facts and present the financial statements in a way to show a better position than what it actually is. On account of such a situation, presence of a particular ratio may not be a definite indicator of good or bad management. For example, a high stock turnover ratio is generally considered to be an indication of operational efficiency of the business. But this might have been achieved by unwarranted price reductions or failure to maintain proper stock of goods.

Similarly, the current ratio may be improved just before the Balance Sheet date by postponing replenishment of inventory. For example, if a company has got current assets of ₹ 4,000 and current liabilities of ₹ 2,000 the current ratio is 2, which is quite satisfactory. In case the company purchases goods of ₹ 2,000 on credit, the current assets would go up to ₹ 6,000 and current liabilities to ₹ 4,000. Thus reducing the current ratio to 1.5. The company may, therefore, postpone the purchases for the early next year so that its current ratio continues to remain at 2 on the Balance Sheet date. Similarly, in order to improve the current ratio, the company may pay off certain pressing current liabilities before the Balance Sheet date. For example, if in the above case the company pays current liabilities of ₹ 1,000, the current liabilities would stand reduced to ₹ 1,000, current assets would stand reduced to ₹ 3,000 but the current ratio would go up to 3.

**4.3.6 Classification of Ratios:**



**4.3.6.1 Profitability Ratios**

These ratios give an indication of the efficiency with which the operations of business are carried on. The following are the important profitability ratios:

**(i) Overall Profitability Ratio:**

This is also called as Return on Investment (ROI) or Return on Capital Employed (ROCE) ratio. It indicates the percentage of return on the total capital employed in the business. It is calculated as follows:

$$ROI = \text{Operating Profit} / \text{Capital Employed}$$

The term 'Operating Profit' means "profit before interest and tax while the term 'capital employed' refer to the sum-total of long-term funds employed in the business.

**Significance.** ROI measures the profit which a firm earns by investing a unit of capital. It is desirable to ascertain this periodically. The profit being the net result of all operations, ROI, expresses all efficiencies or inefficiencies of a business collectively. Thus, it is a dependable measure for judging the overall efficiency or inefficiency of the business.

**(ii) Price Earning Ratio (P/E Ratio):**

This ratio indicates the number of times the earning per share is covered by its market price. It is calculated as follows:

$$P/E \text{ Ratio} = \frac{\text{Market Price Per Equity Share}}{\text{Earning Per Share}}$$



For example, if the market price of an equity share is ₹ 20 and earning per share is ₹ 5, the price earning ratio will be 4 (i.e.,  $20 \div 5$ ). This means for every one rupee of earning people are prepared to pay ₹ 4. In other words, the rate of return expected by the investors is 25%

**Significance.** P/E Ratio helps the investors in deciding whether to buy or not to buy the shares of a company at a particular price. For Instance, in the example given, if the EPS falls to ₹ 3, the market price of the share should be ₹ 12 (i.e.  $3 \times 4$ ). In case the market price of the share is ₹ 15, it will not be advisable to purchase the company's shares at that price.

### (iii) Gross Profit Ratio (GPR):

This ratio expresses the relationship between Gross Profit and Net Sales. It can be computed as follows:

$$\text{GPR} = \frac{\text{Gross Profit}}{\text{Net Sales (i.e. Sales less returns)}} \times 100$$

**Significance.** The ratio indicates the overall limit within which a business must manage its operating expenses. It also helps in ascertaining whether the average percentage of mark-up on the goods is maintained.

### (iv) Net Profit Ratio(NPR):

The ratio indicates net margin earned on a sale of ₹ 100. It is calculated as follows:

$$\text{NPR} = \frac{\text{Net Profit}}{\text{Net Sales}} \times 100$$

**Significance.** The ratio helps in determining the efficiency with which the affairs of a business are being managed. Constant increase in the above ratio year after year is a definite indication of improving conditions of the business.

### (v) Operating Ratio:

This ratio is a complementary of net profit ratio. In case the net profit ratio is 20%, the operating ratio will be 80%. It is calculated as follows:

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

Operating cost includes cost of direct materials, direct labour, direct expenses and all overheads. Financial charges such as interest, provision for taxation, etc. are not to be included in operating cost.

**Significance.** The ratio is the test of the operational efficiency with which the business has carried on. The operating ratio should be low enough to leave a portion of sales for giving a fair return to the investor.

### (vi) Fixed Charges Cover Ratio (FCCR):

The ratio indicates the number of times the fixed financial charges are covered by income before interest and tax. This ratio is calculated as follows:

$$\text{FCCR} = \frac{\text{Income before Interest and Tax}}{\text{Interest}}$$

**Significance:** The ratio is significant from the lender's point of view. It indicates whether the business would earn sufficient profits to pay periodically the interest charges. Higher the ratio, better it is.

### (vii) Pay-out Ratio:

The ratio indicates what proportion of earning per share has been used for paying dividend. It can be calculated as follows:

$$\text{Pay-Out Ratio} = \frac{\text{Dividend per equity share}}{\text{Earning per equity share}}$$

**Significance:** The ratio is an indicator of the amount of earnings that have ploughed back in the business. The lower the pay-out ratio, the higher will be the amount of earnings ploughed back in the business. A lower pay-out ratio means a stronger financial position of the company.

#### (viii) Dividend Yield Ratio (DVR):

The ratio is calculated by comparing the rate of dividend per share with its market value. It is calculated as follows:

$$\text{DVR} = \frac{\text{Dividend Per Share}}{\text{Market Price Per Share}} \times 100$$

**Significance:** The ratio helps an intending investor in knowing the effective return he is going to get on his investment. For example, if the market price of a share is ₹ 25, paid-up value is ₹ 10 and dividend rate is 20%. The dividend yield ratio is 8% (i.e.  $100 \times 2/25$ ). The intending investor can now decide whether it will be advisable for him to go for purchasing the shares of the company or not at the price prevailing in the market.

#### (ix) Return on Shareholders funds or Return on Net Worth:

This ratio expresses the net profit in terms of the equity shareholders funds. This ratio calculated as follows:

$$\text{Net Worth} = \frac{\text{Net Profit after Interest \& Tax}}{\text{Net Worth}} \times 100 \quad [\text{Net Worth} = \text{Equity Capital} + \text{Reserves \& Surplus}]$$

**Significance:** This ratio is an important yardstick of performance for equity shareholders since it indicates the return on the funds employed by them.

#### 4.3.6.2 Turnover Ratios / Activity Ratio

These ratios indicate the efficiency with which capital employed is rotated in the business. The various turnover ratios are as follows:

##### (i) Over-all Turnover Ratio:

The ratio indicates the number of times the capital employed has been rotated in the process of doing a business. The ratio is computed as follows:

$$\text{Overall Turnover Ratio} = \frac{\text{Net Sales}}{\text{Capital Employed}}$$

**Significance.** The overall profitability of a business depends on two factors, viz, (a) the profit margin, and (b) turnover. The profit margin is disclosed by the net profit ratio while the turnover is indicated by the overall turnover ratio. A business with a lower profit margin can achieve a higher ROI if its turnover is high. This is the reason for wholesalers earning a larger return on their investment even when they have a lower profit margin. A business should not, therefore, increase its profit margin to an extent that it results in reduced turn-over resulting in reduction of overall profit.

##### (ii) Fixed Assets Turnover Ratio:

The ratio indicates the extent to which the investment in fixed assets has contributed towards sales. The ratio can be calculated as follows:

$$\text{Fixed Assets Turnover Ratio} = \frac{\text{Net Sales}}{\text{Net fixed Assets}}$$

**Significance.** The comparison of fixed assets turnover ratio over a period of time indicates whether the investment in fixed assets has been judicious or not. Of course, investment in fixed assets does not push-up sales immediately but the trend of increasing sales should be visible. If such trend is not visible or increase in sales has not been achieved after the expiry of a reasonable time it can be very well said that increased investments in fixed assets has not been judicious.



### (iii) Debtors' Turnover Ratio:

The ratio indicates the speed with which money is collected from the debto ₹ It is computed as follows:

$$\text{Debtors Turnover Ratio} = \frac{\text{Credit Sales}}{\text{Average Accounts Receivable}}$$

The term average account receivable includes trade debtors and bills receivable. Average accounts receivable are computed by taking the average receivables in the beginning and at the end of the accounting year. The higher the ratio, better it is.

Debtors turnover ratio is used for computing the debt collection period. The formula for its computation is as follows:

$$\text{Debt Collection Period} = \frac{\text{Months or days in a year}}{\text{Debtors turnover Ratio}} \times \frac{\text{Average debtor}}{\text{Credit Sales}} \times 365$$

For example, if the credit sales are ₹ 80,000, average accounts receivable ₹ 20,000, the debtors' turnover ratio and debt collection period will be computed as follows:

$$\text{Debtors Turnover Ratio} = \frac{80,000}{20,000} = 4$$

$$\text{Debts Collection Period} = \frac{12 \text{ months}}{4} = 3 \text{ months}$$

This means on an average three months credit is allowed to the debto ₹ An increase in the credit period would result in unnecessary blockage of funds and with increased possibility of losing money due to debts becoming bad.

**Significance:** Debtors Turnover Ratio or Debt Collection Period Ratio measures the quality of debtors since it indicates the speed with which money is collected from the debto ₹ A shorter collection period implies prompt payment by debto ₹ A longer collection period implies too liberal and inefficient credit collection performance. The credit policy should neither be too liberal nor too restrictive. The former will result in more blockage of funds and bad debts while the latter will cause lower sales which will reduce profits.

### (iv) Creditors Turnover Ratio:

This is similar to Debtors Turnover Ratio. It indicates the speed with which payments for credit purchases are made to credito ₹ It can be computed as follows:

$$\text{Creditors Turnover Period} = \frac{\text{Credit Purchases}}{\text{Average Accounts Payable}}$$

The term 'accounts payable' include trade creditors and bills payable.

From the creditors turnover, ratio, creditors payment period can be computed as follows:

$$\text{Credit Period Enjoyed} = \frac{\text{Months or days in a year}}{\text{Creditors Turnover}}$$

For example, if the credit purchases during a year are ₹ 1,00,000, Average accounts payable ₹ 25,000, the Creditors Turnover Ratio will be '4' (i.e., 1,00,000 / 25,000) while the creditors payment period would be 3 months (i.e., 12 months/4).

**Significance:** The creditors turnover ratio and the creditors payment period indicate about the promptness or otherwise in making payment for credit purchases. A higher creditors turnover ratio or a lower creditors payment period signifies that the creditors are being paid promptly thus enhancing the credit-worthiness of the company. However, a very favourable ratio to this effect also shows that the business is not taking full advantage of credit facilities which can be allowed by the creditors.

### (v) Stock Turnover Ratio

The ratio indicates whether the investment in inventory is efficiently used and whether it is within proper limits. It is calculated as follows:

$$\text{Stock Turnover Ratio} = \frac{\text{Cost of Goods Sold during the year}}{\text{Average Inventory}}$$

Average inventory is calculated by taking the average of inventory at the beginning and at the end of the accounting year.

**Significance:** The ratio signifies the liquidity of inventory. A high inventory turnover ratio indicates brisk sales and vice-versa. The ratio is therefore a measure to discover possible trouble in the form of over-stocking or over-valuation of inventory.

#### 4.3.6.3 Financial Ratios:

They are also termed as 'Solvency Ratios'. These ratios indicate about the financial position of the company. A company is considered to be financially sound if it is in a position to carry on its business smoothly and meet all its obligations both short-term and long-term without strain. The Financial or Solvency Ratios can therefore be classified into following categories:

- (i) Long-term Solvency Ratios, which include fixed assets ratio, debt equity ratio and proprietary ratio;
- (ii) Short-term Solvency Ratios, which include current ratio, liquidity ratio, super-quick ratio and defensive interval ratio & debt service coverage ratio.

Each of these ratios are now being discussed in detail in the following pages:

#### Long-term Solvency Ratios

##### (i) Fixed Assets Ratio:

The ratio indicates the extent to which fixed assets have been acquired by use of long-term funds. The ratio is expressed as follows:

$$\text{Fixed Assets Ratio} = \frac{\text{Net Fixed Assets}}{\text{Long - term Funds}}$$

The term 'Net Fixed Assets' means original cost of fixed assets less depreciation to date. The ratio should not be more than '1'. The ideal ratio is 0.67.

**Significance:** It is sound principle that fixed assets should be financed out of long-term funds. As a matter of fact a part of working capital termed as core-working capital, should also be financed by long-term funds. The ratio is therefore an indication of the fact whether the company has followed sound financial policy or not. In case the ratio is more than '1', it shows that a part of working capital has also been used to acquire fixed assets, which may prove quite troublesome for the company.

##### (ii) Debt-Equity Ratio:

The ratio is determined to ascertain the proportion between the 'outsiders' 'funds and share-holders funds' in the capital structure of an enterprise. The term outsiders', funds is generally used to represent total long-term debt. The ratio can be computed as follows:

$$\text{Debt - Equity Ratio} = \frac{\text{Total Long - term Debt}}{\text{Shareholder's Funds}}$$

The ratio may also be calculated for ascertaining proportion of long-term debt in the total long-term funds. In such a case the ratio will be computed as follows:

$$= \frac{\text{Total Long - term Debt}}{\text{Total Long - term Funds}}$$

The ratio is considered to be ideal if the shareholders' funds are equal to total long-term debt. However, these days the ratio is also acceptable if the total long-term debt does not exceed twice of shareholders' funds.

**Significance:** The ratio is an indication of the soundness of the long-term financial policies pursued by the business enterprise. The excessive dependence on outsiders' funds may cause insolvency of the business. The ratio provides the margin of safety to the creditors. It tells the owners the extent to which they can gain by maintaining control with a limited investment.



### (iii) Proprietary Ratio

It is a variant of Debt-Equity Ratio. It establishes relationship between the proprietors' or shareholders' funds and the total tangible assets. It may be expressed as follows:

$$\text{Proprietary Ratio} = \frac{\text{Shareholder's Funds}}{\text{Total Tangible Assets}}$$

**Significance:** The ratio focuses attention on the general financial strength of the business enterprise. The ratio is of particular importance to the creditors who can find out the proportion of shareholders funds in the total assets employed in the business. A high proprietary ratio will indicate a relatively little danger to the creditors or vice-versa in the event of forced reorganization or winding up of the company.

### Short-term Solvency Ratios

#### (i) Current Ratio

The ratio is an indicator of the firm's commitment to meet its short-term liabilities. It is expressed as follows:

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

An ideal current ratio is '2'. However, a ratio of 1.5 is also acceptable if the firm has adequate arrangements with its bankers to meet its short-term requirements of funds.

**Significance:** The ratio is an index of the concern's financial stability, since, it shows the extent to which the current assets exceed its current liabilities. A higher current ratio would indicate inadequate employment of funds, while a poor current ratio is a danger signal to the management.

#### (ii) Liquidity Ratio:

The ratio is also termed as Acid Test Ratio or Quick Ratio. The ratio is ascertained by comparing the liquid assets i.e., current assets (excluding stock and prepaid expenses) to current liabilities. The ratio may be expressed as follows:

$$\text{Liquidity Ratio} = \frac{\text{Liquid Assets}}{\text{Current Liabilities}}$$

Some accountants prefer the term liquid liabilities for current liabilities. The term 'liquid liabilities' means liabilities payable within a short period. Bank overdraft and cash credit facilities (if they become permanent modes of financing) are excluded from current liabilities for this purpose. The ratio may be expressed as follows:

$$\text{Liquidity Ratio} = \frac{\text{Liquid Assets}}{\text{Liquid Liabilities}}$$

The ideal ratio is '1'.

**Significance:** The ratio is an indicator of short-term solvency of the company. A comparison of the current ratio to quick ratio should also indicate the inventory hold-ups. For instance, if two units have the same current ratio but different liquidity ratios, it indicates over-stocking by the concern having low liquidity ratio as compared to the firm which has a higher liquidity ratio.

#### (iii) Super-quick Ratio:

It is a slight variation of quick ratio. It is calculated by comparing the super quick assets with the current liabilities (or liquid liabilities) of a firm. The ratio may be expressed as follows:

$$\text{Super-quick Ratio} = \frac{\text{Super Quick Assets}}{\text{Current Liabilities}}$$

The term 'Super-Quick Assets' means current assets excluding stock, prepaid expenses and debtors. Thus, super-quick assets comprise mainly cash, bank balance and marketable securities.

**Significance:** This ratio is the most rigorous test of a firm's liquidity position. In case the ratio is '1', it means the firm can meet its current liabilities any time.

The ratio is a conservation test and not widely used in practice.

#### **(iv) Defensive-Interval Ratio (DIR)**

This ratio denotes the liquidity of a firm in relation to its ability to meet projected daily expenditure from operations. It can be expressed as follows:

$$\text{Defensive Interval Ratio} = \frac{\text{Liquid Assets (quick assets)}}{\text{Daily cash requirements (projected)}}$$

Daily cash requirements (projected) = Projected cash operating expenditure/Number of days in a year.

**Significance:** The DIR is thought by many people to be a better liquidity measure than the quick and current ratios. Because these ratios compare assets to liabilities rather than comparing assets to expenses, the DIR and current/quick ratios would give quite different results if the company had a lot of expenses, but no debt.

#### **(v) Debt Service Coverage Ratio (DSCR)**

This ratio indicates whether the business is earning sufficient profits to pay not only the interest charged, but also whether due of the principal amount. The ratio is calculated as follows:

$$\text{Debt Service Coverage Ratio} = \frac{\text{Profit after Taxes} + \text{Depreciation} + \text{Interest on Loan}}{\text{Interest on Loan} + \text{Loan repayment in a year}}$$

**Significance:** The ratio is the key indicator to the lender to assess the extent of ability of the borrower to service the loan in regard to timely payment of interest and repayment of loan installment. A ratio of 2 is considered satisfactory by the financial institutions the greater debt service coverage ratio indicates the better debt servicing capacity of the organization.

#### **4.3.7 Ratios in Different Industries:**

##### **1) Ratios used in hotel industry:**

The variety of ratios used by hotel industry which are:

1. Room Occupancy Ratio
2. Bed Occupancy Ratio
3. Double Occupancy Ratio
4. Seat Occupancy Ratios etc.

##### **2) Ratios used in transport industry:**

The following important ratios are used in transport industry:

1. Passenger Kilometers
2. Seat occupancy Ratios
3. Operating cost per kilometer

##### **3) Bank Industry:**

The following important ratios are used in Bank Industry:

1. Operating expenses ratios for various periods
2. Loans to deposits ratios
3. Operating income ratios for various periods

##### **4) Telecom Industry:**

The following important ratios are used in telecom Industry.

1. Average duration of the outgoing call



2. Number of outgoing calls per connection
3. Revenue per customer

### Problems

### Illustration 13

Following is the Profit and Loss Account and Balance Sheet of Jai Hind Ltd. Redraft them for the purpose of analysis and calculate the following ratios:

- 1) Gross Profit Ratio
- 2) Overall Profitability Ratio
- 3) Current Ratio
- 4) Debt-Equity Ratio
- 5) Stock-Turnover Ratio
- 6) Finished goods Turnover Ratio
- 7) Liquidity ratio

**Dr.** **Profit and Loss A/C** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
Opening stock of finished goods	1,00,000	Sales	10,00,000
Opening stock of raw material	50,000	Closing stock of raw material	1,50,000
Purchase of raw material	3,00,000	Closing stock of finished goods	1,00,000
Direct wages	2,00,000	Profit on sale of shares	50,000
Manufacturing Exp	1,00,000		
Administration Exp	50,000		
Selling & distribution Exp	50,000		
Loss on sale of Plant	55,000		
Interest on debentures	10,000		
Net Profit	3,85,000		
	<b>13,00,000</b>		<b>13,00,000</b>

### Balance Sheet

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity share capital	1,00,000	Fixed assets	2,50,000
Preference share capital	1,00,000	Stock of raw material	1,50,000
Reserves	1,00,000	Stock of finished goods	1,00,000
Debentures	2,00,000	Bank balance	50,000
Sundry Creditors	1,00,000	Debtors	1,00,000
Bills Payable	50,000		
	<b>6,50,000</b>		<b>6,50,000</b>

**Solution:**

**Jai Hind Ltd.**  
**Income Statement**

(₹)

Sales		1,000,000
(-) Cost of goods sold:		
Raw material consumed	2,00,000	
Wages	2,00,000	
Manufacturing expenses	1,00,000	
Cost of production	5,00,000	
(+) Opening stock of finished goods	1,00,000	
(-) Closing stock of finished goods	(1,00,000)	(5,00,000)
Gross profit		5,00,000
(-) Operating expenses:		
Administrative expenses	50,000	
Selling and distribution	50,000	(1,00,000)
Operating profit		4,00,000
(+) Non operating income (Profit on Sale of Shares)		50,000
(-) Loss on sale of plant		(55,000)
EBIT		3,95,000
(-) Interest		(10,000)
EBT / Net Profit		3,85,000

**Position Statement**

	(₹)
Bank	50,000
Debtors	1,00,000
Liquid Assets	1,50,000
(+) Stock (R.M.+F.G.)	2,50,000
Current Assets	4,00,000
(-) Current liabilities (S.C.B.P.)	(1,50,000)
Working capital	2,50,000
(+) Fixed assets	2,50,000
Capital employed in business	5,00,000
(-) External liabilities	(2,00,000)
Shareholders funds	3,00,000
(-) Preference share capital	(1,00,000)
<b>Equity share capital</b>	<b>2,00,000</b>

Represented by

Equity share capital	1,00,000
(+) Reserves	1,00,000
	<b>2,00,000</b>



1)

$$\begin{aligned}\text{Gross Profit Ratio} &= \frac{\text{Gross Profit}}{\text{Sales}} \times 100 \\ &= \frac{5,00,000}{1,00,000} \times 100 = 50\%\end{aligned}$$

2)

$$\begin{aligned}\text{Overall Profitability Ratio} &= \frac{\text{Operating Profit}}{\text{Capital employed}} \times 100 \\ &= \frac{4,00,000}{5,00,000} \times 100 = 80\%\end{aligned}$$

3)

$$\begin{aligned}\text{Current Ratio} &= \frac{\text{Current Assets}}{\text{Current Liabilities}} \times 100 \\ \text{Current Ratio} &= \frac{4,00,000}{1,50,000} \times 100 = 2.67 \text{ times}\end{aligned}$$

4)

$$\begin{aligned}\text{Debt equity Ratio} &= \frac{\text{Long term debt}}{\text{Long term fund}} \times 100 \\ &= \frac{2,00,000}{5,00,000} = 0.4\end{aligned}$$

5)

$$\begin{aligned}\text{Stock turnover Ratio} &= \frac{\text{Raw material consumed}}{\text{Average stock of raw material}} \\ &= \frac{2,00,000}{1,00,000} = 2 \quad \left[ \text{Average stock of Raw Mat. } \frac{50,000 + 1,50,000}{2} = 1,00,000 \right]\end{aligned}$$

6)

$$\begin{aligned}\text{Finished goods turnover Ratio} &= \frac{\text{COGS}}{\text{Average Stock of finished goods}} \\ &= \frac{5,00,000}{1,00,000} = 5 \\ &\quad \left[ \text{Average stock of Finished goods } \frac{1,00,000 + 1,00,000}{2} = 1,00,000 \right]\end{aligned}$$

7)

$$\begin{aligned}\text{Liquidity Ratio} &= \frac{\text{Liquid Assets}}{\text{Current Liabilities}} \\ &= \frac{1,50,000}{1,50,000} = 1 \quad \left[ \text{Liquid Asset : Bank Balance + Debtors} = 50,000 + 1,00,000 = 1,50,000 \right]\end{aligned}$$

#### Illustration 14

A company has a profit margin of 20% and asset turnover of 3 times. What is the company's return on investment? How will this return on investment vary if?

- (i) Profit margin is increased by 5%?
- (ii) Asset turnover is decreased to 2 times?
- (iii) Profit margin is decreased by 5% and asset turnover is increase to 4 times?

**Solution:**

Net profit ratio = 20% (given)

Assets turnover ratio = 3 times (given)

Return on Investment (ROI) = Net Profit ratio x Assets turnover ratio  
= 20% x 3 times = 60%

**(i) If net profit ratio is increased by 5%:**

Then Revised Net Profit Ratio = 20 + 5 = 25%

Asset Turnover Ratio (as before) = 3 times

∴ ROI = 25 % x 3 times = 75%

**(ii) If assets turnover ratio is decreased to 2 times:**

NP Ratio (as before) = 20%

Revised Asset Turnover Ratio = 2 times

∴ ROI = 20% x 2 times = 40 %

**(iii) If net profit ratio falls by 5% and assets turnover ratio raises to 4 times:**

Then Revised NP Ratio = 20 – 5 = 15%

Revised Asset Turnover Ratio = 4 times

∴ ROI = 15% x 4 = 60%

**Illustration 15**

The following is the Balance Sheet of M/S Yamuna Enterprise for the year ended 31-12-12:

**Balance Sheet as on 31st December, 2012**

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity share capital	1,00,000	Cash in hand	2,000
12% Preference share capital	1,00,000	Cash in bank	10,000
16% Debentures	40,000	Bills Receivable	30,000
18% Public debts	20,000	Investment	20,000
Bank overdraft	40,000	Debtors	70,000
Creditors	60,000	Stock	40,000
Outstanding Creditors	7,000	Furniture	30,000
Proposed dividends	10,000	Machinery	1,00,000
Reserves	1,50,000	Land & Building	2,20,000
Provision for taxation	20,000	Goodwill	35,000
Profit & Loss Account	20,000	Preliminary expenses	10,000
	<b>5,67,000</b>		<b>5,67,000</b>

During the year provision for taxation was ₹ 20,000. Dividend was proposed at ₹ 10,000. Profit carried forward from the last year was ₹ 15,000. You are required to calculate:

- Short term solvency ratios, and
- Long term solvency ratios.



**Solution:**

**Short term solvency ratios:**

$$\begin{aligned} \text{Current Ratio} &= \frac{\text{Current Assets}}{\text{Current Liabilities}} \times 100 \\ &= \frac{1,52,000}{1,37,000} = 1.109 \text{ times} \end{aligned}$$

The ideal ratio is 2 but in the instant case it is only 1.109. Hence it is not satisfactory.

$$\begin{aligned} \text{Liquid Ratio} &= \frac{\text{Liquid Assets}}{\text{Current Liabilities}} \times 100 \\ &= \frac{1,12,000}{1,37,000} = 0.818 \text{ times} \end{aligned}$$

The ideal ratio is 1; hence it is not quite satisfactory.

$$\begin{aligned} \text{Interest Coverage Ratio} &= \frac{\text{EBIT}}{\text{Interest}} \times 100 \\ &= \frac{45,000}{1,00,000} = 4.5 \text{ times} \end{aligned}$$

This indicates that the company's EBIT covers 4.5 times of its interest expenses. Which is quite satisfactory.

**Calculation of EBIT**

	(₹)
Profit retained	5,000
(+) Proposed dividend	10,000
PAT	15,000
(+) Tax	20,000
PBT	35,000
(+) Interest [6400 + 3600]	10,000
<b>EBIT</b>	<b>45,000</b>

**Long term solvency ratios:**

$$\begin{aligned} \text{Debt equity Ratio} &= \frac{\text{Long term debt}}{\text{Long term fund}} \\ &= \frac{60,000}{3,85,000} = 0.156 \end{aligned}$$

<b>Long term debt:</b>	(₹)
Debentures	40,000
Public debt	20,000
	<u>60,000</u>

<b>Long term fund</b>	(₹)
Equity Share Capital	1,00,000
Preference Share Capital	1,00,000
Debentures	40,000
Public Debts	20,000
Reserves	1,50,000
Profit and Loss Account	20,000
	<u>4,30,000</u>
Less: Goodwill	35,000
Preliminary Expenses	10,000
	<u>3,85,000</u>

<b>Share holder funds:</b>	<b>(₹)</b>
Equity capital	1,00,000
Preference capital	1,00,000
Reserves	1,50,000
P & L A/c	20,000
(-) Good will	35,000
(-) Preliminary exp	10,000
	3,25,000

Long term debt/ share holders funds = 60,000 / 3,25,000 = 0.18

Both are quite satisfactory.

It seems the company has adopted a conservative policy for raising finance. Under such policy the equity share holders may not avail the benefit of trading on equity.

→ Fixed Assets Ratio = Fixed Assets / Long Term Funds = 3,50,000 / 3,85,000 = 0.91

The ratio is satisfactory.

→ Proprietary Ratio Share holder Funds / Total Tangible Assets

= [3,25,000 / (5,67,000 – 4,50,00)] = 0.6226

Ratio is ideal. And long term position is quite satisfactory, it is advised to improve short term solvency.

#### Illustration 16

Following is the Balance Sheet of Sun Ltd., as on December 31, 2012.

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity share capital	20,000	Goodwill	12,000
Capital reserves	4,000	Fixed Assets	28,000
8% loan on mortgage	16,000	Stocks	6,000
Trade creditors	8,000	Debtors	6,000
Bank over draft	2,000	Investments	2,000
Taxation:		Cash in hand	6,000
Current	2,000		
Future	2,000		
Profit & Loss A/c:			
PAT for the year			
Less: Transfer to:	12,000		
Reserves	4,000		
Dividend	2,000		
	<b>60,000</b>		<b>60,000</b>

Sales amounted to ₹ 1,20,000. Calculate ratio for (a) testing liquidity, and (b) testing solvency.

#### Solution:

##### Ratios for testing liquidity

1. Current Ratio = Current Assets/ Current Liabilities = 20,000/12,000 = 1.67

2. Liquidity Ratio = Liquid Assets/ Current Liabilities = 14,000/12,000 = 1.17

The liquid position of the company is satisfactory. Both the current ratio and liquidity ratio are satisfactory.

### Ratios for testing solvency

1. Debt- equity Ratio = Share holders Funds/ Total Long Term Funds = 18,000/36,000 = 0.5
2. Fixed Assets Ratio = Net profit before interest and tax/ Interest = 14,000/1,280 = 10.94

All solvency ratios are very much favorable to the company. Judged from the above, the company has satisfactory position both from liquidity and solvency viewpoints.

### Working notes:

1. Current Assets	(₹)
Stock	6,000
Debtors	6,000
Investments*	2,000
Cash in hand	6,000
	<b>20,000</b>

\* presumed to be short- term.

2. Current Liabilities	
Trade creditors	8,000
Bank overdraft	2,000
Taxation*	2,000
	<b>12,000</b>

\* excluding future taxation presumed to be payable after a year.

3. Liquid Assets	
Current assets	20,000
Less: Stock	6,000
	<b>14,000</b>

### 4. Share holders' Funds

Equity share capital	20000	
Capital reserves	4000	
P & L accounts balance	6000	30000
Less: good will		12000
		<b>18000</b>

### 5. Long Terms Funds

Share holders' funds	18,000
Mortgage loan	16,000
Future taxation	2,000
	<b>36,000</b>

**Illustration 17**

With the help of the following information complete the Balance Sheet of MNOP Ltd.

Equity share capital ₹ 1,00,000

The relevant ratios of the company are as follows:

Current debt to total debt 40

Total debt to owner's equity 60

Fixed assets to owner's equity 60

Total assets turnover 2 Times

Inventory turnover 8 Times

**Solution:****In the Books of MNOP Ltd.****Balance Sheet**

Liabilities	Amount (₹)	Assets	Amount (₹)
Owners equity	1,00,000	Fixed Assets	60,000
Current debt	24,000	Cash	60,000
Long term debt	36,000	Inventory	40,000
	1,60,000		1,60,000

**Working Notes:**

- Fixed assets =  $0.60 \times \text{Owners equity} = 0.60 \times ₹ 1,00,000 = ₹ 60,000$ .
- Total debt =  $0.60 \times \text{Owners equity} = 0.60 \times ₹ 1,00,000 = ₹ 60,000$ .
- Total assets consisting of fixed assets and current assets must be equal to ₹ 1,60,000 (Assets = Liabilities + Owners equity). Since fixed assets are ₹ 60,000 hence, current assets should be ₹ 1,00,000.
- Total equity = Total debt + Owners equity = ₹ 60,000 + ₹ 1,00,000 = ₹ 1,60,000.
- Total assets turnover = 2 Times; Inventory turnover = 8 Times.  
Therefore, Inventory/Total assets =  $2/8 = 1/4$ ; Total assets = ₹ 1,60,000.  
Therefore, Inventory =  $1,60,000 / 4 = 40,000$ .  
Cash = ₹ 1,00,000 – ₹ 40,000 = ₹ 60,000.

**Illustration 18**

Using the following data, prepare the Balance Sheet:

Gross profits	₹ 54,000
Shareholders Funds	₹ 6,00,000
Gross Profit Margin	20%
Credit Sales to Total Sales	80%
Total Assets turnover	0.3 times
Inventory turnover	4 times
Average collection period (a 360 days year)	20 days
Current ratio	1.8
Long-term Debt to Equity	40%



**Solution:**

**Balance Sheet**

<b>Liabilities</b>	<b>Amount (₹)</b>	<b>Assets</b>	<b>Amount (₹)</b>
Creditors (bal. fig)	60,000	Cash	42,000
Long Term Debts	2,40,000	Debtors	12,000
Share Holders Fund	6,00,000	Inventory	54,000
		Fixed Assets (bal. fig).	7,92,000
	9,00,000		9,00,000

**Working Notes:**

**1. Gross Profit:**

$$\begin{aligned} \text{GP Margin} &= 20\% \\ \text{GP} &= ₹ 54,000 \\ \text{Sales} &= 54,000 / 20\% ₹ 2,70,000 \end{aligned}$$

**2. Credit Sales:**

$$\begin{aligned} \text{Cr. Sales} &= 80\% \text{ of Total Sales} \\ &= 2,70,000 \times 80\% \\ &= ₹ 2,16,000 \end{aligned}$$

**3. Total Assets:**

$$\begin{aligned} \text{Total Assets Turnover} &= \text{Sales} / \text{Total Assets} = 0.3 \text{ Times} \\ \text{Total Assets} &= 2,70,000 / 0.3 \\ &= ₹ 9,00,000 \end{aligned}$$

**4. Inventory Turnover:**

$$\begin{aligned} \text{Inventory Turnover} &= \text{Cost of goods sold} / \text{Inventory} \times 100 \\ &= 2,70,000 - 54,000 / \text{Inventory} \\ \text{Inventory} &= 2,16,000 / 4 ₹ 54,000 \end{aligned}$$

**5. Debtors**

$$\begin{aligned} \text{Debtors} &= \text{Credit Sales} \times 20 \text{ days} / 360 \text{ days} \\ &= 2,16,000 \times 20 / 360 \text{ days} \\ &= ₹ 12,000 \end{aligned}$$

**6. Creditors**

$$\begin{aligned} \text{Total Assets} &= 9,00,000 \\ \text{Total of Balance Sheet} &= 9,00,000 \\ \text{Now, Long Term Debt} &= \text{Long Term Debt} / \text{Equity} = 40\% \\ \text{Long Term Debt} &= 40\% \text{ of equity} \\ &= 6,00,000 \times 40\% \\ &= ₹ 2,40,000 \end{aligned}$$

**Now Balancing figure of Liability side is creditors:**

$$= 9,00,000 - 6,00,000 \text{ (Equity)} - 2,40,000 \text{ (Long Term Debt)}$$

$$= ₹ 60,000$$

$$\text{Creditors} = ₹ 60,000$$

**7. Current Ratio – Cash:**

$$\text{Current ratio} = \text{Current Assets} / \text{Current Liabilities}$$

$$1.8 = \text{Debtors} + \text{Inventory} + \text{Cash} / \text{Creditors}$$

$$1.8 = 12,000 + 54,000 + \text{Cash} / 60,000$$

$$1,08,000 = 66,000 + \text{Cash}$$

$$\text{Cash} = ₹ 42,000$$

**8. Fixed Assets:**

Balancing figure on Assets Side is Fixed Assets.

**9. Sales**

$$\text{COGS} = \text{Sales} - \text{G.P.}$$

$$\text{COGS} = ₹ 2,70,000 - 54,000 = 2,16,000$$

**Illustration 19**

JKL Limited has the following Balance Sheets as on March 31, 2012 and March 31, 2011:

**Balance Sheet**

(₹ in Lakhs)

Particulars	March 31, 2011	March 31, 2012
<b>Source of Funds</b>		
Shareholders Funds	2,377	1,472
Loan Funds	3,570	3,083
	<b>5,947</b>	<b>4,555</b>
<b>Application of Funds</b>		
Fixed Assets	3,466	2,900
Cash and bank	489	470
Debtors	1,495	1,168
Stock	2,867	2,407
Other Current Assets	1,567	1,404
Less: Current Liabilities	(3,937)	(3,794)
	<b>5,947</b>	<b>4,555</b>

The Income Statement of the JKL Ltd. for the year ended is as follows:



(₹ in Lakhs)

	March 31, 2011	March 31, 2012
Sales	22,165	13,882
Less: Cost of Goods sold	20,860	12,544
Gross Profit	1,305	1,338
Less: Selling, General and Administrative expenses	1,135	752
Earning before Interest and Tax (EBIT)	170	586
Less: Interest Expenses	113	105
Profits before Tax	57	481
Less: Tax	23	192
Profits after Tax (PAT)	34	289

**Required:**

- Calculate for the year 2011-12:
  - Inventory Turnover Ratio
  - Financial Leverage
  - Return on Investment (ROI)
  - Return on Equity (ROE)
  - Average Collection period.
- Give a brief comment on the Financial Position of JKL Limited.

**Solution:**

**1. Ratios for the year 2011-12**

(a) Inventory Turnover Ratio

$$\begin{aligned} &= \text{Cost of goods sold} / \text{Average Inventory} \\ &= 20,860 / (2,867 + 2,407) / 2 \\ &= 20,860 / 2,637 \\ &= 7.910 \end{aligned}$$

(b) Financial Leverage

	2011-12	2010-11
= EBIT / EBT	= 170 / 57	= 586 / 481
	= 2.98	= 1.22

(c) Return on Investment

$$\begin{aligned} \text{ROI} &= \text{NOPAT} / \text{Sales} \times \text{Sales} / \text{Average Capital employed} \\ &= \frac{57 \times (1 - 0.4)}{22,165} \times \frac{22,165}{(5,947 + 4,555) / 2} \\ &= \frac{57 (0.6)}{22,165} \times \frac{22,165}{5,251} \\ &= 34.2 / 5,251 \\ &= 0.65 \% \end{aligned}$$

## (d) Return on Equity

$$\begin{aligned}
 \text{ROE} &= \text{PAT} / \text{Average share holders fund} \\
 &= 34 / [(2,377 + 1,472)] / 2 \\
 &= 34 / 1,924.5 \\
 &= 1.77\%
 \end{aligned}$$

## (e) Average Collection Period

$$\begin{aligned}
 \text{Average Collection Period} &= \text{Average Debtors} / \text{Average Sales per day} \\
 &= [(1,495 + 1,168) / 2] / [22,165 / 365 \text{ days}] \\
 &= 1,331.5 / 60.73 \\
 &= 22 \text{ days.}
 \end{aligned}$$

**2 Financial position of JKL Limited**

A careful analysis of above Balance Sheet shows that current ratio of company is 1.5 which is less than the standard (i.e. 2) and short-term solvency ratio is therefore not satisfactory. At the same time lot of capital is blocked in inventory as compared to previous year. This affects liquidity of the firm.

As regards utilization of Debt Capital, the percentage of debts to total assets is not high, but as compared to equity, debt content is more in capital structure. Company is said to be levered with higher proportion of debt in its capital structure. This situation involves considerable risk to shareholders in capital structuring, the company should ensure that cost of debt remains lower than return on investment.

**Illustration 20**

The following figures and ratios are related to a company:

(a) Sales for the year (all credit)	₹ 30,00,000
(b) Gross Profit ratio	25 per cent
(c) Fixed assets turnover (basis on cost of goods sold)	1.5
(d) Stock turnover (basis on cost of goods sold)	6
(e) Liquid ratio	1:1
(f) Current ratio	1.5 : 1
(g) Debtors collection period	2 months
(h) Reserve and surplus to share capital	0.6 : 1
(i) Capital gearing ratio	0.5
(j) Fixed assets to net worth	1.20 : 1

You are required to prepare Balance Sheet of the company on the basis of above details.

**Solution:**

**Preparation of Balance Sheet of a Company**

**Working Notes:**

1. Cost of Goods Sold = Sales – Gross Profit (=25% of Sales)  
= ₹ 30,00,000 – ₹ 7,50,000  
= ₹ 22,50,000
2. Closing Stock = Cost of Goods sold/Stock Turnover  
= ₹ 22,50,000 / 6  
= ₹ 3,75,000
3. Fixed Assets = Cost of Goods Sold / Fixed Assets Turnover  
= ₹ 22,50,000 / 1.5  
= ₹ 15,00,000
4. Current Assets : = 1.5 and Liquid Ratio = 1  
Current Ratio Stock = 1.5 – 1 = 0.5  
Current Assets = Amount of Stock x 1.5 / 0.5  
= ₹ 3,75,000 x 1.5/0.5 = ₹ 11,25,000
5. Liquid Assets (Debtors and Cash) = Current Assets – Stock  
= ₹ 11,25,000 – ₹ 3,75,000  
= ₹ 7,50,000
6. Debtors = Sales x Debtors Collection Period / 12  
= ₹ 30,00,000 x 2 / 12  
= ₹ 5,00,000
7. Cash = Liquid Assets – Debtors  
= ₹ 7,50,000 – ₹ 5,00,000  
= ₹ 2,50,000
8. Net worth = Fixed Assets / 1.2  
= ₹ 15,00,000 / 1.2  
= ₹ 12,50,000
9. Reserves and Surplus  
Reserves and Share Capital = 0.6 + 1 = 1.6  
Reserves and Surplus = ₹ 12,50,000 x 0.6 / 1.6  
= ₹ 4,68,750
10. Share capital = Net worth – Reserves and Surplus  
= ₹ 12,50,000 – ₹ 4,68,750  
= ₹ 7,81,250

$$\begin{aligned}
 11. \text{ Current Liabilities} &= \text{Current Assets} / \text{Current Ratio} \\
 &= ₹ 11,25,000 / 1.5 \\
 &= ₹ 7,50,000
 \end{aligned}$$

## 12. Long-term Debts

Capital Gearing Ratio = Long-term Debts/Equity Shareholder's Fund

$$\begin{aligned}
 \text{Long – Term Debts} &= ₹ 12,50,000 \times 0.5 \\
 &= ₹ 6,25,000
 \end{aligned}$$

**Balance Sheet of a Company**

<b>Liabilities</b>	<b>Amount (₹)</b>	<b>Assets</b>	<b>Amount (₹)</b>
Equity Share Capital	7,81,250	Fixed Assets	15,00,000
Reserves and Surplus	4,68,750	Current Assets	
Long-term Debts	6,25,000	Stock	3,75,000
Current Liabilities	7,50,000	Debtors	5,00,000
		Cash	2,50,000
	<b>26,25,000</b>		<b>26,25,000</b>

**Illustration 21**

MNP Limited has made plans for the next year 2011-12. It is estimated that the company will employ total assets of ₹ 25,00,000; 30% of assets being financed by debt at an interest cost of 9% p.a. The direct costs for the year are estimated at ₹ 15,00,000 and all other operating expenses are estimated at ₹ 2,40,000. The sales revenue are estimated at ₹ 22,50,000. Tax rate is assumed to be 40%.

Required to calculate:

- Net profit margin
- Return on Assets
- Asset turnover
- Return on equity

**Solution:**

**The net profit is computed as follows:**

<b>Particulars</b>	<b>(₹)</b>
Sales Revenue	22,50,000
Less: Direct Costs	15,00,000
Gross Profits	7,50,000
Less: Operating Expense	2,40,000
EBIT	5,10,000
Less: Interest (9% x 7,50,000)	67,500
EBT	4,42,500
Less: Taxes (@ 40%)	1,77,000
PAT	2,65,500



(a) Net Profit Margin

$$\begin{aligned}\text{Net Profit Margin} &= \text{EBIT} (1-t) / \text{Sales} \times 100 \\ &= 5,10,000 \times (1 - 0.4) / 22,50,000 = 13.6\%\end{aligned}$$

(b) Return on Assets (ROA)

$$\begin{aligned}\text{ROA} &= \text{EBIT} (1-t) / \text{Total Assets} \\ &= 5,10,000 (1 - 0.4) / 25,00,000 \\ &= 3,06,000 / 25,00,000 \\ &= 0.1224 \\ &= 12.24\%\end{aligned}$$

(c) Asset Turnover

$$\begin{aligned}\text{Asset Turnover} &= \text{Sales} / \text{Assets} \\ &= 22,50,000 / 25,00,000 \\ &= 0.9\end{aligned}$$

(d) Return on Equity (ROE)

$$\begin{aligned}\text{ROE} &= \text{PAT} / \text{Equity} \\ &= 2,65,500 / 17,50,000 \\ &= 15.17\%\end{aligned}$$

### Illustration 22

With the help of the following ratios regarding Indu Films draw the Balance Sheet of the company for the year 2012:

Current Ratio	2.5
Liquidity ratio	1.5
Net working capital	₹ 3,00,000
Stock turn over ratio (cost of sales /closing stock)	6 times
Gross profit ratio	20%
Fixed Assets turn over ratio (on cost of sales)	2 times
Debt collection period	2 months
Fixed Assets to share holders net worth	0.80
Reserve and surplus to capital	0.5

**Solution:**

### Balance Sheet of Indu firms for the year 2012

Liabilities	Amount (₹)	Assets	Amount (₹)
Share capital	5,00,000	Fixed assets	6,00,000
Reserve and surplus	2,50,000	Stock	2,00,000
Long-term borrowings (Bal. fig)	1,50,000	Debtors	2,50,000
Current liabilities	2,00,000	Bank	50,000
	11,00,000		11,00,000

**Working notes:**

If Current Liabilities	1
Current Assets	2.5
It means difference on Working Capital	1.5
Working Capital is 1.5	₹ 3,00,000
Therefore, Current Assets	₹ 5,00,000
Current Liabilities	₹ 2,00,000
As Liquidity Ratio	1.5
And Current Liabilities	₹ 2,00,000
(Bank and Debtors) (2,00,000 x 1.5)	₹ 3,00,000
Stock (5,00,000-3,00,000) i.e., Current Assets- Liquid Assets	₹ 2,00,000
Cost of sales (as stock turnover ratio is 6)	₹ 12,00,000
Sales (as G.P. ratio is 20%, $1,200,000 + 20/80 \times 1,200,000$ )	₹ 15,00,000
Fixed Assets are ₹ 1,200,000/2, since Debtors collection	
Fixed Assets Turnover Ratio is 2 times	₹ 6,00,000
Debtors are ₹ 1,500,000/6 since debtors collection period is 2 months	₹ 2,50,000
Shareholders' net worth 600,000 x 1/0.80	₹ 7,50,000
Out of shareholders' net worth Reserves and Surplus ( 7,50,000 x 0.5/1.5)	₹ 2,50,000
Therefore, Share capital	₹ 5,00,000

#### 4.4 IDENTIFICATION OF INFORMATION REQUIRED TO ASSESS FINANCIAL PERFORMANCE

There are several techniques and statements used to evaluate the financial performance of an enterprise. They are:

1. Historical financial statements
2. Forecasting financial statements

##### 4.4.1 Historical Financial Statements:

- Balance Sheet
- Income Statement
- Statement showing changes in Working Capital
- Statement indicating changes in owner's equity
- Statement showing variations in net income
- Funds Flow Statement
- Cash Flow Statement
- Auditors Report
- Corporate Annual Report
- Ratios

##### (a) Balance Sheet

A Balance Sheet is one of the major financial statements used by accountants and business owners. It summarizes a company's assets, liabilities and shareholders' equity at a specific point in time. These three balance sheet segments give investors an idea as to what the company owns and owes, as well as the amount invested by the shareholders.



The balance sheet is divided into two parts that, based on the following equation, must equal each other, or balance each other out. The main formula behind balance sheets is:

$$\text{Assets} = \text{Liabilities} + \text{Shareholders' Equity}$$

Looking at the equation in this way shows how assets were financed: either by borrowing money (liability) or by using the owner's money (owner's equity). Balance sheets are usually presented with assets in one section and liabilities and net worth in the other section with the two sections "balancing." This means that assets, or the means used to operate the company, are balanced by a company's financial obligations, along with the equity investment brought into the company and its retained earnings.

Assets are what a company uses to operate its business, while its liabilities and equity are two sources that support these assets. Owners' equity, referred to as shareholders' equity in a publicly traded company, is the amount of money initially invested into the company plus any retained earnings and it represents a source of funding for the business.

Understanding balance sheet is very important because it gives an idea of the financial strength of the company at any given point of time. Some describe the balance sheet as a "snapshot" of the company's financial position at a point (a moment or an instant) in time.

However, statement of financial position or balance sheet has limitations associated with the information contained in this financial statement. Some of the important limitations are discussed below:

- i. Balance sheet alone do not provide all of the information needed
- ii. It does list down the asset business has but it does not tell how much money those assets can generate in the future
- iii. Most of the values reported in the statement of financial position is based on historical cost basis i.e. the item is reported on the basis of valuation conducted when the transaction took place instead of the current basis of valuation and thus information might be too old to be relevant and reliable for decision making purposes.
- iv. One of the major limitations of balance sheet and any other financial statement is that only such information reported which can be quantified easily or at least reasonably. Vital qualitative information is left out almost completely!
- v. Many of the items reported involve the use of estimation which might not be suitable and user might be interested in knowing how such estimates have been made and whether such estimates are still relevant after the financial statements have been published.
- vi. The "off-balance sheet" financing tactics employed by those responsible to prepare financial statements seriously impairs the use of balance sheet as a reliable source of information for decision making purposes.

## **(b) Income Statement**

Income statement (also referred to as profit and loss statement (P&L), revenue statement, or statement of financial performance) is a company's financial statement that indicates how the revenue (money received from the sale of products and services before expenses are taken out, also known as the "top line") is transformed into the net income (the result after all revenues and expenses have been accounted for, also known as Net Profit or the "bottom line"). It displays the revenues recognized for a specific period, and the cost and expenses charged against these revenues, including write-offs (e.g., depreciation and amortization of various assets) and taxes. The purpose of the income statement is to show managers and investors whether the company made or lost money during the period being reported.

The important thing to remember about an income statement is that it represents a period of time. This contrasts with the balance sheet, which represents a single moment in time.

The income statement is divided into two parts: the operating and non-operating sections.

The portion of the income statement that deals with operating items is interesting to investors and analysts alike because this section discloses information about revenues and expenses that are a direct result of the regular business operations. The non-operating items section discloses revenue and expense information about activities that are not tied directly to a company's regular operations.

### **(c) Statement showing changes in Working Capital**

The excess of current assets over current liabilities is referred to as the company's working capital. The difference between the working capital for two given reporting periods is called the change in working capital.

Changes in working capital is included in cash flow from operations because companies typically increase and decrease their current assets and current liabilities to fund their ongoing operations. When a company increases its current assets, it's a cash outflow: The company had to shell out money to buy the extra assets. Likewise, when a company increases its current liabilities, it's a cash inflow: The added liabilities, such as short-term debt, provide money. Changes in working capital simply shows the net effect on cash flows of this adding and subtracting from current assets and current liabilities. When changes in working capital is negative, the company is investing heavily in its current assets, or else drastically reducing its current liabilities. When changes in working capital is positive, the company is either selling off current assets or else raising its current liabilities.

This information is found in the Statement of Cash Flow of the company's financial statement.

For many growing companies, changes in working capital is a little like capital spending: It's money the company is investing—in things like inventory—in order to grow. To get a true picture of the cash a company is generating before investment, one can add back changes in working capital to cash flow from operations. Another point: A negative value for changes in working capital could mean the company is investing heavily in growth, or that something's gone wrong. If a company is having trouble selling its goods, inventories will balloon, and changes in working capital will turn sharply negative.

### **(d) Statement showing changes in Owner's Equity**

The *statement of owners equity* is the second report of the *financial statements*. Its full name is the statement of changes in the owners equity.

This accounting report shows all the changes to the owners equity that have occurred during the period. These changes comprise capital, drawings and the profit for the period.

Just like the income statement, this statement normally covers a twelve-month period. It shows the *balances* of the owners equity at the *beginning* and *end* of the period in addition to the *changes* that occurred during this period.

There are two main elements of the owners' equity explained by the statement: paid-in capital and retained earnings.

Paid-in capital is the amount that the entity's owners have invested in it. (For a publicly traded company, the "owners" will be shareholders.)

Retained income is the net income that the entity retains for use.

### **(e) Statement showing variations in Net Income**

Changes in net income are endlessly scrutinized. In general, when a company's net income is low or negative, a myriad of problems could be to blame, ranging from decreasing sales to poor customer experience to inadequate expense management.



Net income varies greatly from company to company and from industry to industry. Because net income is measured in rupees and companies vary in size, it is often more appropriate to consider net income as a percentage of sales, known as “profit margin.” Another common ratio is the price-to-earnings (P/E) ratio, which tells investors how much they are paying (the stock's price) for each rupee of net income the company is able to generate.

#### **(f) Funds Flow Statement**

A fund flow statement is a summary of a firm's inflow and outflow of funds. It tells us from where funds have come and where funds have gone. Fund flows statement can indicate whether sourcing of funds and their use match and also reveal the prudence or otherwise of a firm's financing and investment decisions.

Generally changes in assets and liabilities lead to inflows or outflows of cash (or funds). Increase in assets or liabilities, however does not always lead to flow of funds, for instance, depreciation or any kind of revaluation. Therefore, all increases/decreases in asset or liabilities will not form part of fund flow statement but only those that result in the flows of funds.

#### **(g) Cash Flow Statement**

A cash flow statement, also known as *statement of cash flows*, is a financial statement that shows how changes in balance sheet accounts and income affect cash and cash equivalents, and breaks the analysis down to operating, investing, and financing activities.

Because the income statement is prepared under the accrual basis of accounting, the revenues reported may not have been collected. Similarly, the expenses reported on the income statement might not have been paid, but the cash flow statement already has integrated all that information. As a result, savvy business people and investors utilize this important financial statement.

A cash flow statement is a financial report that describes the sources of a company's cash and how that cash was spent over a specified time period. It does not include non-cash items such as depreciation. The cash flow statement is similar to the income statement in that it records a company's performance over a specified period of time. The difference between the two is that the income statement also takes into account some non-cash accounting items such as depreciation. The cash flow statement strips away all of this and shows exactly how much actual money the company has generated. Cash flow statements show how companies have performed in managing inflows and outflows of cash. It provides a sharper picture of a company's ability to pay creditors, and finance growth. Analysts will look closely at the cash flow statement of any company in order to understand its overall health.

#### **(h) Auditor's Report**

The auditor's report is a formal opinion, or disclaimer thereof, issued by either an internal auditor or an independent external auditor as a result of an internal or external audit or evaluation performed on a legal entity. An auditor's report is considered an essential tool when reporting financial information to users, particularly in business. Since many third-party users prefer, or even require financial information to be certified by an independent external auditor, many auditees rely on auditor reports to certify their information in order to attract investors, obtain loans, and improve public appearance.

#### **(i) Corporate Annual Report**

Every Limited Company prepares an annual report on its accounts and state of affairs. The annual report comprises :-

- (i) Notice of Annual General Meeting
- (ii) Chairman's statement
- (iii) Director's Report
- (iv) Auditors Report

- (v) Balance Sheet
- (vi) Profit and Loss Account
- (vii) Notes on Accounts.

**(j) Ratios**

A 'Ratio' is defined as an arithmetical/quantitative/numerical relationship between two numbers. Ratio analysis is a very important and age old technique of financial analysis. Ratio analysis is used to evaluate relationships among financial statement items. The ratios are used to identify trends over time for one company or to compare two or more companies at one point in time. Financial statement ratio analysis focuses on three key aspects of a business: liquidity, profitability, and solvency.

**4.4.2 FORECASTING FINANCIAL STATEMENTS**

There are several forecasted financial statements are used to analyzing financial performance. They are:

- Forecasted Balance Sheet
- Budgets
- Forecasting Capital Expenditure
- Forecasting Future Incomes And Expenditures
- Forecasting Cost Of Production
- Forecasting Level Of Activity
- Forecasting Variation Statements

**SELF EXAMINATION QUESTIONS:**

1. What is the significance of Funds Flow Statement?
2. Explain Cash Flow Statement as per Accounting Standard – 3.
3. Distinguish between Funds Flow Statement and Cash Flow Statement.
4. What are the various sources and applications of funds?
5. Write short note on cash from operating activities.
6. What are the limitations of Funds Flow Statement and Cash Flow Statement?
7. What are the limitations of Ratio Analysis?
8. "Ratio Analysis is a good tool for assessing the financial performance of an enterprise" – Explain.
9. Write short notes on:
  - a) Current Ratio
  - b) Debt Service Coverage Ratio
  - c) Debt Equity Ratio
  - d) Capital Gearing Ratio
  - e) Return on Investment
  - f) Fixed Asset Turnover Ratio
  - g) Window Dressing



10. How do you broadly classify the ratios?  
 11. What is the information required to assess the financial performance?

**PRACTICAL PROBLEMS:**

1. From the following summary cash account of Siva Ltd. prepare Cash Flow Statement for the year ended 31st March, 2012 in accordance with AS 3 Revised (using the direct method) the Company does not have any cash equivalents.

Summary Cash Account for the year ended 31.3.2012

	₹ '000		₹ '000
Balance on 1.4.2011	50	Payment to Suppliers	2,000
Issue of Equity Shares	300	Purchase of Fixed Assets	200
Receipts from Customers	2,800	Overhead expense	200
Sale of Fixed Assets	100	Wages and Salaries	100
		Taxation	250
		Dividend	50
		Repayment of Bank Loan	300
		Balance on 31.3.2012	150
	3,250		3,250

(Hint: Cash flow from operating activities ₹ 250, Cash flow from investing activities ₹ (100), Cash flow from financing activities ₹ (50))

2. Arrange and redraft the following Cash Flow Statement in proper order keeping in mind the requirements of AS-3.

	₹ (in lacs)	₹ (in lacs)
Net Profit		60,000
Add: Sale of Investments		70,000
Depreciation of Assets		11,000
Issue of Preference Shares		9,000
Loan raised		4,500
Decrease in Stock		12,000
		1,66,500
Less: Purchase of Fixed Assets	65,000	
Decrease in Creditors	6,000	
Increase in Debtors	8,000	
Exchange gain	8,000	
Profit on sale of investments	12,000	
Redemption of Debenture	5,700	
Dividend paid	1,400	
Interest paid	945	1,07,045
		59,455
Add: Opening cash and cash equivalent		12,341
Closing cash and cash equivalent		71,796

3. From the following Balance Sheets of Sneha Ltd. as on 31.3.2011 and 31.3.2012 prepare a Statement of Sources and Applications of Fund and a schedule of changes in Working Capital for the year ending 31.3.2012.

Liabilities	31.3.2011	31.3.2012	Assets	31.3.2011	31.3.2012
Equity Share Capital	13,00,000	16,90,000	Goodwill	65,000	42,500
Profit & Loss A/c	4,90,100	8,77,500	Building	11,70,000	11,37,500
10% Debentures	16,25,000	13,00,000	Machinery	16,18,500	21,38,500

Creditors	9,00,000	10,00,000	Non-Trade Investments	5,07,000	3,93,250
Bills Payable	42,500	1,70,000	Debtors	4,16,000	11,70,000
Provision for Tax	2,60,000	9,75,000	Stock	5,07,000	7,99,500
Dividend payable	-	42,250	Cash	2,60,000	2,92,500
			Prepaid Expenses	42,250	52,000
			Debentures Discount	31,850	29,000
	46,17,600	60,54,750		46,17,600	60,54,750

The following additional information is given:

Accumulated Depreciation 31.3.2011	4,87,500	15,92,500
Accumulated Depreciation 31.3.2012	5,20,000	15,66,500
Depreciation for 2003-2004	32,500	1,36,500

Profit and Loss Account for 2011-2012 is as follows:

Balance as on 31.3.2011	4,90,100
Add: Profit for 2003-2012	4,71,900
	9,62,000
Less: Dividend	84,500
	8,77,500

During 2011-2012 machinery costing ₹ 2,92,500 was sold for ₹ 97,500.

Investments which were sold for ₹ 1,17,000 had cost ₹ 97,500.

Provision for Taxation and Dividend are to be taken as Non-current liabilities.

4. From the following Balance Sheet of a company you are requested to prepare (i) a statement showing changes in the Working Capital and (ii) a statement of sources and applications of funds.

	1-1-2012	31-12-2012
Cash	₹ 40,000	44,400
Accounts Receivable	10,000	20,700
Inventories	15,000	15,000
Land	4,000	4,000
Buildings	20,000	16,000
Accumulated Depreciation	(5,000)	(2,800)
Equipment	15,000	17,000
Patents	1,000	900
	<b>1,00,000</b>	<b>1,15,200</b>
Current Liabilities	30,000	32,000
Bonds Payable	22,000	22,000
Bonds Payable discount	(2,000)	(1,800)
Capital stock	35,000	43,500
Retained Earnings	15,000	19,500
	<b>1,00,000</b>	<b>1,15,200</b>

Additional information:

- Income for the period ₹ 10,000.
- A building that cost ₹ 4,000 and which had a book value of ₹ 1,000 was sold for ₹ 1,400.



- c. The depreciation charge for the period was ₹ 800.
- d. There was ₹ 5,000 issue of common stock.
- e. Cash dividends ₹ 2,000 and ₹ 3,500 stock dividend were declared.
- (Hint: Increase in Working Capital ₹ 13,100, Funds from Operation ₹ 10,700)
5. The following schedule shows the Balance Sheets in condensed form of Bradstreet Manufacturing Co. Ltd., at the beginning and end of the year 2012.

Assets	1-1-2011(₹)	31-12-2011(₹)
Cash and Bank balances	50,000	40,000
Sundry Debtors	77,000	73,000
Temporary Investments	1,10,000	84,000
Prepaid Expenses	1,000	2,000
Stock-in-trade	92,000	1,06,000
Land and Buildings	1,00,000	1,00,000
Machinery	72,000	80,000
	<b>5,02,000</b>	<b>4,85,000</b>
Liabilities and Capital:		
Sundry Creditors	1,03,000	96,000
Outstanding Expenses	13,000	22,000
5% Debentures	90,000	70,000
Depreciation Fund	40,000	44,000
Reserve for contingencies	60,000	50,000
Profit and Loss Account	16,000	23,000
Capital	1,80,000	1,80,000
	<b>5,02,000</b>	<b>4,85,000</b>

The following information concerning the transactions is available:

- a. 10% Dividend was paid in cash
- b. New Machinery for ₹ 20,000 was purchased but old machinery costing ₹ 12,000 was sold for ₹ 4,000 accumulated depreciation was ₹ 6,000.
- c. ₹ 20,000 5% Debentures were redeemed by purchased from open market @₹ 96/-
- d. ₹ 10,000 was debited to contingency Reserve for settlement of previous tax liability.

You are required to prepare a Schedule of changes in Working Capital and a statement showing the Sources and Application of Funds.

(Hint: Decrease in Working Capital ₹ 27,000, Funds from Operation ₹ 36,200, Sources of Funds ₹ 67,200)

6. Condensed financial data of the Gamma Company for the years ended Dec. 31, 2010 and Dec.31, 2011 are presented below:

LIABILITIES	2011	2012	ASSETS	2011	2012
Accounts payable	67,300	1,00,000	Cash	18,400	1,35,800
Mortgage payable	73,500	50,000	Receivable net	49,000	82,200
Allowance for Depreciation	50,000	30,000	Inventories	61,900	92,500
Equity Capital	1,25,000	1,75,000	Plant	2,20,000	2,40,000
Retained Earnings	1,33,500	2,85,500	Investments	1,00,000	90,000
	<b>4,49,300</b>	<b>6,40,500</b>		<b>4,49,300</b>	<b>6,40,500</b>

**INCOME STATEMENT****For the year ended Dec. 31, 2012.**

Sales	3,00,000	
Interest and other revenue	<u>10,000</u>	3,10,000
Less: Cost of goods sold	1,00,000	
Selling and administrative exp.,	10,000	
Depreciation	22,000	
Income Tax	5,000	
Interest charges	3,000	
Loss on sale of plant assets	<u>8,000</u>	1,48,000
Net Income		1,62,000
Dividends		<u>10,000</u>
Income Retained in business		<u>1,52,000</u>

**Additional information:**

New plant assets costing ₹ 80,000 were purchased during the year.

**Required:** From the foregoing information prepare:-

1. A statement of sources and uses of funds for the 2012.
2. A schedule of changes in net Working Capital.

(Hint: Increase in Working Capital ₹ 1,48,500, Funds from Operation 1,87,000, sources of funds ₹ 2,67,000)

7. Prepare Funds Flow Statement from the following Balance Sheet of XL Engineering Limited:

Liabilities	2011	2012	Assets	2011	2012
Share Capital	17,00,000	18,35,000	Buildings	8,00,000	10,00,000
Reserves	40,000	83,700	Plant & Machinery	2,50,000	3,70,000
Profit & Loss Appropriation a/c	1,00,000	1,30,000	Fixtures and Fittings	5,000	6,000
Provision for Dividends	70,000	50,000	Cash	2,000	2,200
Bank Overdraft	8,000	18,000	Debtors	1,00,000	45,700
Creditors	1,00,000	95,000	Accounts Receivable	8,000	9,000
Bills payable	14,000	13,000	Stock	4,00,000	3,43,000
Loan on Mortgage	10,000	70,000	Prepaid Exp.	3,000	3,100
			Goodwill	3,00,000	3,43,700
			Investments	1,64,000	1,70,000
			Preliminary Expenses	10,000	2,000
	<b>20,12,000</b>	<b>22,94,700</b>		<b>20,42,000</b>	<b>22,94,700</b>

**Additional information:**

- (a) Depreciation charged on Buildings @ 3% on cost ₹ 9,00,000, on plant and Machinery @ 8% of cost ₹ 4,00,000, on Fixtures and Fittings @ 5% on cost ₹ 8,000.



(b) Investments were purchased and interest received was ₹ 3,000 was used in writing down the book value of investments. The declared dividend for 2011 was paid and interim dividend of ₹ 20,000 paid out of Profit and Loss Appropriation Account.

(Hint: Decrease in Working Capital ₹ 1,14,000, Funds from Operation ₹ 1,67,400, Sources of funds ₹ 3,11,100)

9. The summarised Balance Sheets of XYZ Ltd., as at 31st Dec., 2011 and 31st Dec., 2012 are given below:

Liabilities	Amount (₹)	Amount (₹)	Assets	Amount (₹)	Amount (₹)
Share capital	4,50,000	4,50,000	Fixed Assets	4,00,000	3,20,000
General Reserve	3,00,000	3,10,000	Investments	50,000	60,000
P & L A/c	56,000	68,000	Stock	2,40,000	2,10,000
Creditors	1,68,000	1,34,000	Debtors	2,10,000	4,55,000
Provision for taxation	75,000	10,000	Bank	1,49,000	1,97,000
Mortgage Loan	-----	2,70,000			
	10,49,000	12,42,000		10,49,000	12,42,000

**Additional information:**

1. Investment costing ₹ 8,000 were sold during the year 2012 for ₹ 8,500
2. Provision for tax made during the year was ₹ 9,000
3. During the year part of the fixed assets book value ₹ 10,000 were sold for ₹ 12,000 and the profit was included in profit and loss account and
4. Dividend paid during the year amounted to ₹ 40,000.

You are required to prepare a statement of sources and used of Funds.

(Hint: Increase in Working Capital ₹ 2,97,000, Funds from Operation ₹ 1,38,500, Sources of Funds ₹ 1,97,000)

10. Following are the summarised Balance Sheets of AMCO as on December 31st 2011 and 2012.

Liabilities	2011	2012
Share Capital	2,00,000	2,50,000
General Reserve	50,000	60,000
Profit and Loss A/c	30,500	30,600
Bank Loan (Long term)	70,000	----
Sundry Creditors	1,50,000	1,35,200
Provision for taxation	30,000	35,000
	<b>5,30,500</b>	<b>5,10,800</b>
<b>Assets:</b>		
Land and Buildings	2,00,000	1,90,000
Machinery	1,50,000	1,69,000
Stock	1,00,000	74,000
Sundry Debtors	80,000	64,200
Cash	500	600
Bank	----	10,000
Goodwill	----	3,000
	<b>5,30,500</b>	<b>5,10,800</b>

**Additional information supplied:-** During the year ended December 31, 2012:

1. Dividend of ₹ 23,000 was paid.
2. Assets of another company were purchased for a consideration purchased payable in shares. The following assets were purchased: Stock ₹ 20,000; Machinery ₹ 25,000.

3. Machinery further purchased for ₹ 8,000.
4. Depreciation written off on machinery ₹ 12,000.
5. Income tax provided during the year ₹ 33,000.
6. Loss on sale of machine ₹ 200 was written off to general reserve.

You are required to prepare Statement of Funds Flow.

(Hint: Decrease in Working Capital ₹ 16,900, Funds from Operation ₹ 90,300, Sources of Funds ₹ 1,20,800)

11. From the following figures extracted from the Income statement and the Balance Sheet of Anu Sales Pvt. Ltd. Calculate the return on Total Capital Employed (ROI):

	Amount (₹)		Amount (₹)
Fixed Assets	4,50,000	Reserves	1,00,000
Current Assets	1,50,000	Debentures	1,00,000
Investments in		Income for investments	10,000
Govt. securities	1,00,000	Interest on debentures	
Sales	5,00,000	at 10%	
Cost of goods sold	3,00,000	Provision for tax at	
Share capital		50% of net profits.	
10% Preference	1,00,000		
Equity	2,00,000		

(Hint: Net Operating Profit after tax ₹ 2,00,000, Capital Employed ₹ 5,00,000, ROI: 40%)

12. From the following compute the Fixed Assets Ratio:

Share Capital	₹ 1,00,000	Furniture	₹ 25,000
Reserves	50,000	Trade Debtors	50,000
6% Debentures	1,00,000	Cash Balance	30,000
Trade Creditors	50,000	Bills Payable	10,000
Plant and Machinery	1,00,000	Stock	40,000
Land and Buildings	1,00,000		

(Hint: Fixed Assets ₹ 2,25,000, Long term funds ₹ 2,50,000, Fixed Assets Ratio: 0.9)

13. From the following calculate the Debt-Equity Ratio and Proprietary Ratio:

Preference Share Capital	₹ 1,00,000	Fixed Assets	₹ 2,00,000
Equity Share Capital	2,00,000	Current Asset	1,00,000
Reserves and Surplus	50,000	Goodwill	50,000
Debentures	1,00,000	Investments	1,50,000
Creditors	50,000		
	5,00,000		5,00,000

(Hint: Shareholder funds ₹ 3,00,000, Total Tangible Assets ₹ 4,50,000, Proprietary Ratio: 0.67 or 67%)

14. Following are the ratios to the trading activities of National Traders Ltd:

Debtors velocity	3 months
Stock velocity	8 months
Creditors velocity	2 months
Gross profit ratio	25%

Gross profit for a year ended 31st December, 2012 amounts to ₹ 4,00,000 closing stock of the year is ₹ 10,000 above the opening stock. Bills receivable amount to ₹ 25,000 and Bills payable to ₹ 10,000.



Find out:

(a) Sales (b) Sundry Debtors (c) Closing stock & (d) Sundry creditors

(Hint: Sales ₹ 16,00,000, Debtors ₹ 3,75,000, Closing Stock ₹ 8,05,000, Creditors ₹ 1,91,667)

15. From the following details, prepare statement of proprietary Funds with as many details as possible:

a.	Stock velocity	6
b.	Capital Turn over ratio (on cost of sales)	2
c.	Fixed Assets Turn over ratio (on cost of sales)	4
d.	Debtors velocity	2months
e.	Gross profit turn over ratio	20%
f.	Creditors velocity	73days

The gross profit was ₹ 60,000. Reserves and surplus amounts to ₹ 20,000. Closing stock was ₹ 5,000 in excess of opening stock.

(Hint: Fixed Assets ₹ 60,000, Current Assets ₹ 1,09,000, Current Liabilities ₹ 49,000, Proprietary Funds ₹ 1,20,000)

16. From the following information of a textile company, complete the proforma balance sheet if its sales are ₹ 32,00,000.

Sales to net worth	2.3times
Current debt to net worth	42%
Total debt to net worth	75%
Current ratio	2.9 times
Net sales to inventory	4.7 times
Average collection period	64 days
Fixed assets to net worth	53.2%

Proforma Balance Sheet

Net worth	?	Fixed Assets	?
Long -term debt	?	cash	?
Current debt	?	stock	?
		sundry debtors	?

(Hint: Net worth ₹ 13,91,304, Long term debt ₹ 4,59,130, Current Debt ₹ 5,94,348, Fixed Assets ₹ 7,40,193)

17. From the Following information prepare a Balance sheet with as many details as possible:

Gross profit	₹ 80,000
Current assets	₹ 1,50,000
Gross profit to cost of goods sold ratio	1/3
Account payable velocity	90 days
Stock velocity	6 times
Bills receivables	₹ 20,000
Bills payable	₹ 5,000
Opening stock	₹ 36,000
Fixed assets turnover ratio	8 times
Accounts receivable velocity	72 days (year 360 days)

(Hint: Current Assets ₹ 42,000, Creditors ₹ 57,000, Capital (balancing figure) ₹ 1,18,000, Balance Sheet Total ₹ 1,80,000)

18. You are given the following figures worked out from the Profit and Loss account and Balance Sheet of Blue Ltd, relating to the year 2012. Prepare the Balance Sheet.

	₹
Fixed assets(net after writing off 30%)	10,50,000
Fixed assets turnover ratio(on cost of sales)	2
Finished Goods turnover ratio(on cost of sales)	6
Rate of gross profit to sales	25%
Net profit(before interest)to sales	8%
Fixed charges cover(Debenture interest 7%)	8
Debt collection period	1½ months
Materials consumed to sales	30%
Stock of raw materials (in terms of number of month's consumption)	3
Current ratio	2.4
Quick ratio	1.0
Reserves to capital	0.21

(Hint: Stock of Raw materials ₹ 2,10,000, Stock of finished goods ₹ 3,50,000, Book debts ₹ 3,50,000, Capital ₹ 10,00,000, Debentures ₹ 4,00,000, Current liabilities ₹ 4,00,000, Balance Sheet Total ₹ 20,10,000)

19. From the following particulars, prepare the Balance Sheet of X Ltd. which has only one class of share capital:

	₹
a. Sales for the year	20,00,000
b. Gross profit ratio	25%
c. Current assets ratio	1.50
d. Quick assets(cash and debtors)ratio	1.25
e. Stock turnover ratio	15
f. Debt collection period	1½ months
g. Turnover to fixed assets	1.5
h. Ratio of reserves to share capital	0.33 i.e(1/3)
i. Fixed assets to net worth	0.83 i.e(5/6)

(Hint: Fixed Assets ₹ 10,00,000, Debtors ₹ 2,50,000, Stock ₹ 1,00,000, Equity Capital ₹ 9,00,000, Reserves ₹ 3,00,000, Creditors ₹ 4,00,000)

20. Using the information and the form given below, compute the Balance Sheet items for a firm having a sale of ₹ 36 lacks

Sales/Total assets	3	Sales/Debtors	15
Sales/Fixed assets	5	Current ratio	2
Sales/Current assets	7.5	Total assets/Net worth	2.5
Sales/Inventories	20	Debt/Equity	1

Balance Sheet

Net worth	....	Fixed assets	....
Long-term Debt	....	Inventories	....
Current Liabilities	....	Debtors	....
		Liquid assets	....
		Total current assets	....



(Hint: Total Assets ₹ 12,00,000, Fixed Assets ₹ 7,20,000, Current Assets ₹ 4,80,000, Current Liabilities ₹ 2,40,000, Long term debt 4,80,000, Networth ₹ 4,80,000)

21. From the following information you are required to prepare a Balance Sheet.

1. Current ratio	1.75
2. Liquid ratio	1.25
3. Gross profit ratio	25%
4. Debt collection period	1½ months
5. Stock turnover ratio(cost of sales/cost of stock)	9
6. Reserves and surplus to capital	0.2
7. Turnover to fixed assets	1.2
8. Capital gearing ratio	0.6
9. Fixed assets to net worth	1.25
10. Sales for the year	₹ 12,00,000

(Hint: Share Capital ₹ 5,00,000, Long term liabilities ₹ 3,00,000, Reserves ₹ 1,00,000, Current Liabilities ₹ 2,00,000, Fixed Assets 7,50,000, Balance Sheet Total ₹ 11,00,000)

22. You are given the following information pertaining to the financial statements of XYZ Ltd., as on 31-12-2007. On the basis of the information supplied, you are required to prepare the Trading and Profit & Loss Account for the year ended and a Balance Sheet as on that date.

	₹
Net current assets	2,00,000
Issued share capital	6,00,000
Current Ratio	1.8
Quick ratio(Ratio of debtors and bank balance to current liabilities)	1.35
Fixed assets to shareholder's equity	80%
Ratio of gross profit in turnover	25%
Net profit to issued share capital	20%
Stock turnover ratio(cost of goods sold/ closing stock)	5 times
Average age of outstanding for the year	36½ days.

On 31st Dec, 2007, the current assets consisted only of stock, Debtors and bank balance; liabilities consisted of share capital and current liabilities and assets consisted of fixed assets and current assets.

(Hint: Gross profit ₹ 1,87,500, Net Profit ₹ 1,20,000, Current Assets ₹ 4,50,000, Current Liabilities ₹ 2,50,000, Fixed Assets 8,00,000, Stock ₹ 1,12,500, Balance Sheet Total ₹ 12,50,000)

23. From the following information, prepare a summarised Balance Sheet as at 31st March, 2011:

a. Working capital	₹ 1,20,000	d. Fixed assets-Proprietary Ratio	0.75
b. Reserves and surplus	80,000	e. Current Ratio	2.5
c. Bank overdraft	20,000	f. Liquid Ratio	1.5

(Hint: Share Capital ₹ 4,00,000, Fixed Assets ₹ 3,60,000, Stock ₹ 1,10,000, Other current assets ₹ 90,000, Creditors ₹ 60,000, Balance Sheet Total ₹ 5,60,000)



# Study Note - 5

## WORKING CAPITAL MANAGEMENT AND LEVERAGE ANALYSIS



### This Study Note includes

- 5.1 Working Capital - Meaning & Definition
- 5.2 Kinds of Working Capital
- 5.3 Adequacies and Inadequacies of Working Capital
- 5.4 Danger of too high amount of Working Capital
- 5.5 Danger of inadequacies or low amount of Working Capital
- 5.6 Working Capital Cycle
- 5.7 Working Capital Financing
- 5.8 Inventory Management
- 5.9 Management of Receivable
- 5.10 Determinants of Credit Policy
- 5.11 Cash Management
- 5.12 Leverages
- 5.13 EBIT-EPS Indifference Point Level
- 5.14 Calculation of Indifference Point

### 5.1 WORKING CAPITAL - MEANING & DEFINITION

The term Working Capital also called gross working capital refers to the firm's aggregate of Current Assets and current liabilities. These assets which can be convertible into cash within an accounting period, generally a year. Therefore, they are Cash or mere cash resources of a business concern. However, we can understand the meaning of Working Capital from the following:

- a. "Working capital means the funds available for day-to-day operations of an enterprise. It also represents the excess of current assets over current liabilities including short-term loans". — Accounting Standards Board, The Institute of Chartered Accountants of India.
- b. "Working capital is that portion of a firm's current assets which is financed by short term funds."— Gitman, L.J. From the above definitions, we can say that the working capital is the firm's current assets or the excess of current assets over current liabilities. However, the later meaning will be more useful in most of the times as in all cases we may not find excess of current assets over current liabilities.

#### Concepts of Working Capital

Working capital has two concepts:

- i) Gross working capital and
- ii) Net working capital.

Gross Working capital refers to the total of the current assets and not working capital refers to the excess of the current assets over current liabilities. Though both concepts are important for managing it, gross working capital is more helpful to the management in managing each individual current assets for day-to-day operations. But, in the long run, it is the net working capital that is useful for the purpose.

When we want to know the sources from which funds are obtained, it is not working capital that is more important and should be given greater emphasis. The definition given by the Accountants, U.S.A., will give clear view of working capital which is given below:

Working capital sometimes called net working capital, is represented by excess of current assets over current liabilities and identifies the relatively liquid portion of total enterprise capital which constitutes a margin of better for maturing obligations within the ordinary operation cycle of the business."

Each concern has its own limitations and constraints within which it has to decide whether it should give importance to gross or not working capital.

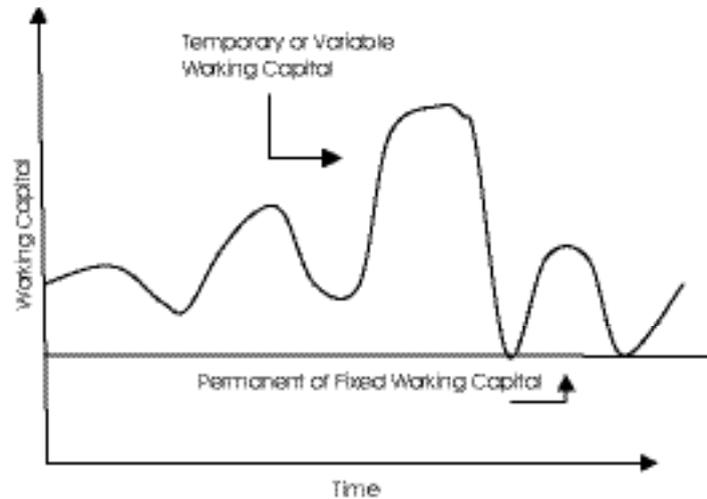
### 5.2 KINDS OF WORKING CAPITAL

There are two kinds of working capital, the distinction of which made keeping in view the nature of such funds in a business concern, which are as follows:

- (a) Rigid, fixed, regular or permanent working capital; and
- (b) Variable, seasonal, temporary or flexible working capital.

Every business concern has to maintain certain minimum amount of current assets at all times to carry on its activities efficiently and effectively. It is indispensable for any business concern to keep some material as stocks, some in the shape of work-in-progress and some in the form of finished goods. Similarly, it has to maintain certain amount of cash to meet its day-to-day requirements. Without such minimum amounts, it cannot sustain and carry on its activities. Therefore, some amount of working capital i.e., current assets is permanent in the business without any fluctuations like fixed assets and such amount is called Working Capital. To say precisely, Permanent Working Capital is the irreducible minimum amount of working capital necessary to carry on its activities without any interruptions. It is that minimum amount necessary to outlays its fixed assets effectively.

On the other hand, temporary working capital is that amount of current assets which is not permanent and fluctuating from time to time depending upon the company's requirements and it is generally financed out of short term funds, It may also high due to seasonal character of the industry as such it is also called seasonal working capital.



### 5.3 ADEQUACIES AND INADEQUACIES OF WORKING CAPITAL

Working Capital of a business should be commensurate with its needs. Too high or too low working capital of a business or two extremes of working capital are equally dangerous to the existence of the business enterprise itself.

High amount of working capital, though increases its liquidity position but reduces its profitability and on the other hand too low working capital though increases its profitability reduces its liquidity. Both such extreme situations may cause business concerns to shut down.

#### 5.4 DANGER OF TOO HIGH AMOUNT OF WORKING CAPITAL

- (a) It results in unnecessary accumulation of inventories and gives chance to inventory mishandling, wastage, pilferage, theft, etc., and losses increase.
- (b) Excess working capital means idle funds which earns no profits for the business.
- (c) It shows a defective credit policy of the company resulting in higher incidence of bad debts and adversely affects Profitability.
- (d) It results in overall inefficiency.

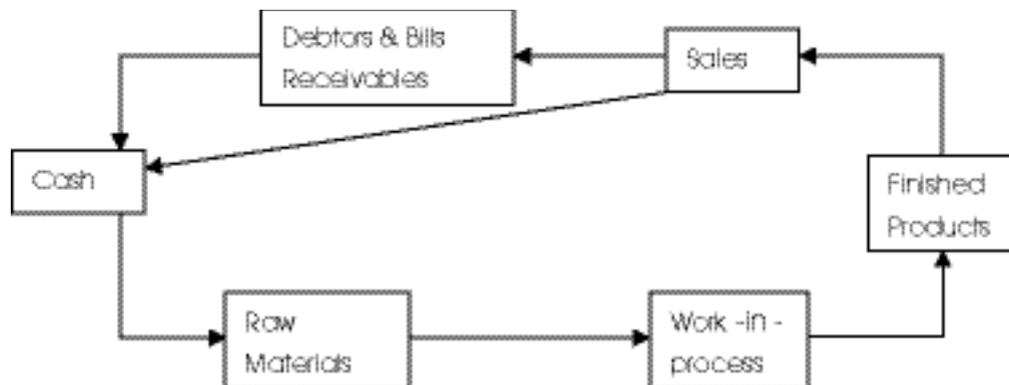
#### 5.5 DANGER OF INADEQUATE OR LOW AMOUNT OF WORKING CAPITAL

- (a) It becomes difficult to implement operating plans and achieve the firm's profit target.
- (b) It stagnates growth and it will become difficult to the firm to undertake profitable ventures for non availability of working capital funds.
- (c) It may not be in a position to meet its day-to-day current obligations and results in operational inefficiencies.
- (d) The Return on Investment falls due to under utilisation of fixed assets and other capacities of the business concern.
- (e) Credit facilities in the market will be lost due to faulty working capital.
- (f) The reputation and goodwill of the firm will also be impaired considerably.

#### 5.6 WORKING CAPITAL CYCLE

Working Capital Cycle or Operating Cycle are synonymous terms in the context of management of working capital. Any business concern, whether it is of financial nature, trade organisation or a manufacturing organisation needs certain time to net fruits of the efforts. That is, by investment of cash, producing or doing something for some time will fetch profit. But soon after the investment of cash, it cannot get that profit by way of cash again immediately. It takes time to do so. The time required to take from investment of cash in some assets and conversion of it again into cash termed as operating or working capital cycle. Here the cycle refers to the time period.

Chart for Operating Cycle or Working Capital Cycle.



In case of trading concerns, the operating cycle will be:

Cash → Stock → Debtors → Cash.



In case of financial concerns, the operating cycle will be:

Cash → Debtors → Cash only.



It is obvious from the above that the time gap between the sales and their actual realisation of cash is technically termed as Operating Cycle or Working Capital Cycle.

The period of working capital cycle may differ from one business enterprise to the other depending upon the nature of the enterprise and its activities. It means the pattern of working capital cycle do change according to its activities.

### Determinants of Working Capital

The size or magnitude and amount of working capital will not be uniform for all organisations. It differs from one type of organisation to the other type of organisation. Depending upon various conditions and environmental factors of each and every organisation. There are many factors that determine the size of working capital. However, there are some factors, which are common to the most of the business concerns. Such factors are enumerated below:

**1. Nature and size of the Business:** A company's working capital requirements depends on the activities it carried on and its size too. For instance, public utility organisation or service organisation where its activities are of mere service nature, does not require high amount of working capital, as it has no need of maintaining any stocks of inventories. In case of trading organisation the magnitude of working capital is high as it requires to maintain certain stocks of goods as also some credit to debtors. Further, if we go to manufacturing organisation the cycle period of working capital is high because the funds are to be invested in each and every type of inventory forms of raw-material, work-in-progress, finished goods as also debtors. Industrial units too require a large amount of working capital.

**2. Production Policies:** These policies will have a great significance in determining the size of the working capital. Where production policies are designed in such a way that uniform production is carried on throughout the accounting period, such concern requires a uniform and lesser amount of working capital. On the other hand, the concerns with production policies according to the needs of the customers will be peak at sometimes and require high amount of working capital. In seasonal industries too, where production policies are laid down tightly in the business season requires a high amount of working capital.

**3. Process of Manufacture:** If the manufacturing process of a particular industry is longer due to its complex nature, more working capital is required to finance that process, because, longer the period of manufacture, the larger the inventory tied up in the process and naturally requires a high amount of working capital.

**4. Growth and Expansion of Business:** A business concern at status requires a uniform amount of working capital as against the concerns which are growing and expanding. It is the tendency of any business organisation to grow further and further till its saturation point, if any. Such growth may be within the



existing units by increased activities. Similarly, business concerns will expand their organisation by establishing new units. In both the cases, the need for working capital requirement increases as the organisation increases.

**5. Fluctuations in the Trade Cycle:** Business activities vary according to the general fluctuations in the world. There are four stages in a trade cycle which affects the activities of any business concern. Accordingly, the requirements of working capital are bound to change. When conditions of boom prevail, it is the policy of any prudent management to build or pile up large stock of inventories of various forms to take the advantage of the lower prices. Such fluctuations causes a business concern to demand for more amount of working capital. The other phase of trade cycle i.e., depression i.e., low or absence of business activities cause business concerns to demand for more working capital. In condition of depression, the products produced are not sold due to fall in demand, lack of purchasing power of the people. As a result of which entire production obtained was not sold in the market and high inventories are piled up. Therefore, there arises the need for heavy amount of working capital.

Thus, the two extreme stages of trade cycles make the business concerns to demand for more working capital. In the former case due to acts and policies of management and in the later case due to natural phenomena of trade cycle.

**6. Terms and conditions of Purchases and Sales:** A business concern which allows more credit to its customers and buys its supplies for cash requires more amount of working capital. On the other hand, business concerns which do not allow more credit period to its customers and seek better credit facilities for their supplies naturally require lesser amount of working capital.

**7. Dividend Policy:** A consistent dividend policy may affect the size of working capital. When some amount of working capital is financed out of the internal generation of funds such affect will be there. The relationship between dividend policy and working, capital is well established and very few companies declare dividend without giving due consideration to its effects on cash and their needs for cash.

If the dividend is to be declared in cash, such outflow reduces working capital and therefore, most of the business concerns declare dividend now-a-days in the form of bonus shares as such retain their cash. A shortage of working capital acts as powerful reason for reducing or skipping cash dividend.

**8. Price Level Changes:** The changes in prices make the functions of a finance manager difficult. The anticipations of future price level changes are necessary to avoid their affects on working capital of the firm. Generally, rising price level will require a company to demand for more amount of working capital, because the same level of current assets requires higher amount of working capital due to increased prices.

**9. Operating Efficiency:** The Operating efficiency of a firm relates to its optimum utilisation of resources available whether in any form of factor of production, say, capital, labour, material, machines etc; If a company is able to effectively operate its costs, its operating cycle is accelerated and requires relatively lessor amount of working capital. On the other hand, if a firm is not able to utilise its resources properly will have slow operating cycle and naturally requires higher amount of working capital.

**10. Percentage of Profits and Appropriation out of Profits:** The capacity of all the firms will not be same in generating their profits. It is natural that some firms enjoy a dominant and monopoly positions due to the quality of its products, reputations, goodwill etc. (for example Colgate Tooth Paste, Bata Chapels etc..) and some companies will not have such position due to poor quality and other inherent hazards.

The company policy of retaining or distribution of profits will also affect the working capital. More appropriation out of profits than distribution of profit necessarily reduces the requirements of working capital.

**11. Other Factors:** Apart from the above general considerations, there may be some factors responsible for determination of working capital which are inherent to the type of business. Some of such factors may be as follows:

- (a) General co-ordination and control of the activities in the organisation.
- (b) Absence of specialisation of products and their advantages.
- (c) Market facilities.
- (d) Means of transport and communication system.
- (e) Sector in which the firm works i.e., private or public sector etc.
- (f) Government policy as regard to:
  - i) Imports and Exports
  - ii) Tax considerations.
- (g) Availability of labour and its organisation.
- (h) Area in which it is situated such as backward, rural sub-urban, etc.,

## 5.7 WORKING CAPITAL FINANCING

### Accruals

The major accrual items are wages and taxes. These are simply what the firm owes to its employees and to the government.

### Trade Credit

Trade credit represents the credit extended by the supplier of goods and services. It is a spontaneous source of finance in the sense that it arises in the normal transactions of the firm without specific negotiations, provided the firm is considered creditworthy by its supplier. It is an important source of finance representing 25% to 50% of short-term financing.

### Working capital advance by commercial banks

Working capital advance by commercial banks represents the most important source for financing current assets.

**Forms of Bank Finance:** Working capital advance is provided by commercial banks in three primary ways: (i) cash credits / overdrafts, (ii) loans, and (iii) purchase / discount of bills. In addition to these forms of direct finance, commercial banks help their customers in obtaining credit from other sources through the letter of credit arrangement.

**Cash Credit / Overdrafts:** Under a cash credit or overdraft arrangement, a pre-determined limit for borrowing is specified by the bank. The borrower can draw as often as required provided the out standings do not exceed the cash credit / overdraft limit.

**Loans:** These are advances of fixed amounts which are credited to the current account of the borrower or released to him in cash. The borrower is charged with interest on the entire loan amount, irrespective of how much he draws.

**Purchase / Discount of Bills:** A bill arises out of a trade transaction. The seller of goods draws the bill on the purchaser. The bill may be either clean or documentary (a documentary bill is supported by a document of title to goods like a railway receipt or a bill of lading) and may be payable on demand or after a usance period which does not exceed 90 days. On acceptance of the bill by the purchaser, the seller offers it to the bank for discount / purchase. When the bank discounts / purchases the bill it releases the funds to the seller. The bank presents the bill to the purchaser (the acceptor of the bill) on the due date and gets its payment.

**Letter of Credit:** A letter of credit is an arrangement whereby a bank helps its customer to obtain credit from its (customer's) suppliers. When a bank opens a letter of credit in favour of its customer for some specific purchases, the bank undertakes the responsibility to honour the obligation of its customer, should the customer fail to do so.



## Regulation of Bank Finance

Concerned about such a distortion in credit allocation, the Reserve Bank of India (RBI) has been trying, particularly from the mid 1960s onwards, to bring a measure of discipline among industrial borrowers and to redirect credit to the priority sectors of the economy. From time to time, the RBI issue guidelines and directives relating to matters like the norms for inventory and receivables, the Maximum Permissible Bank Finance, the form of assistance, the information and reporting system, and the credit monitoring mechanism. The important guidelines and directives have stemmed from the recommendations of various committees such as the Dehejia Committee, the Tandon Committee, the Chore Committee, and the Marathe Committee.

However, in recent years, in the wake of financial liberalisation, the RBI has given freedom to the boards of individual banks in all matters relating to working capital financing.

From the mid-eighties onwards, special committees were set up by the RBI to prescribe norms for several other industries and revise norms for some industries covered by the Tandon Committee.

### Public Deposits

Many firms, large and small, have solicited unsecured deposits from the public in recent years, mainly to finance their working capital requirements.

### Inter-corporate Deposits

A deposit made by one company with another, normally for a period up to six months, is referred to as an inter-corporate deposit. Such deposits are usually of three types.

**Call Deposits:** In theory, a call deposit is withdrawal by the lender on giving a day's notice. In practice, however, the lender has to wait for at least three days. The interest rate on such deposits may be around 10 percent per annum.

**Three-months Deposits:** More popular in practice, these deposits are taken by borrowers to tide over a short-term cash inadequacy that may be caused by one or more of the following factors: disruption in production, excessive imports of raw material, tax payment, delay in collection, dividend payment, and unplanned capital expenditure. The interest rate on such deposits is around 12 percent per annum.

**Six-months Deposits:** Normally, lending companies do not extend deposits beyond this time frame. Such deposits, usually made with first-class borrowers, carry an interest rate of around 15 percent per annum.

### Short-term loans from financial institutions

The Life Insurance Corporation of India and the General Insurance Corporation of India provide short-term loans to manufacturing companies with an excellent track record.

### Rights debentures for working capital

Public limited companies can issue "Rights" debentures to their shareholders with the object of augmenting the long-term resources of the company for working capital requirements. The key guidelines applicable to such debentures are as follows:

The amount of the debenture issue should not exceed (a) 20% of the gross current assets, loans, and advances minus the long-term funds presently available for financing working capital, or (b) 20% of the paid-up share capital, including preference capital and free reserves, whichever is the lower of the two.

The debt-equity ratio, including the proposed debenture issue, should not exceed 1:1.

The debentures shall first be offered to the existing Indian resident shareholders of the company on a pro rata basis.

### Commercial paper

Commercial paper represents short-term unsecured promissory notes issued by firms which enjoy a fairly high credit rating. Generally, large firms with considerable financial strength are able to issue commercial paper. The important features of commercial paper are as follows:

The maturity period of commercial paper usually ranges from 90 days to 360 days.

Commercial paper is sold at a discount from its face value and redeemed at its face value. Hence the implicit interest rate is a function of the size of the discount and the period of maturity.

Commercial paper is either directly placed with investors who intend holding it till its maturity. Hence there is no well developed secondary market for commercial paper.

### Factoring

Factoring, as a fund based financial service, provides resources to finance receivables as well as facilitates the collection of receivables. It is another method of raising short-term finance through account receivable credit offered by commercial banks and factors. A commercial bank may provide finance by discounting the bills or invoices of its customers. Thus, a firm gets immediate payment for sales made on credit. A factor is a financial institution which offers services relating to management and financing of debts arising out of credit sales. Factoring is becoming popular all over the world on account of various services offered by the institutions engaged in it. Factors render services varying from bill discounting facilities offered by commercial banks to a total take over of administration of credit sales including maintenance of sales ledger, collection of accounts receivables, credit control and protection from bad debts, provision of finance and rendering of advisory services to their clients. Factoring, may be on a recourse basis, where the risk of bad debts is borne by the client, or on a non-recourse basis, where the risk of credit is borne by the factor.

At present, factoring in India is rendered by only a few financial institutions on a recourse basis. However, the Report of the Working Group on Money Market (Vaghul Committee) constituted by the Reserve Bank of India has recommended that banks should be encouraged to set up factoring divisions to provide speedy finance to the corporate entities.

In spite of many services offered by factoring, it suffers from certain limitations. The most critical fall outs of factoring include (i) the high cost of factoring as compared to other sources of short-term finance, (ii) the perception of financial weakness about the firm availing factoring services, and (iii) adverse impact of tough stance taken by factor, against a defaulting buyer, upon the borrower resulting into reduced future sales.

### Tandon Committee Report

The recommendations of the Dehejia Committee regarding plugging the loopholes in the existing credit system and change in the lending policy of the banks remained unimplemented. As a result banks 'oversold credit' and large part of it remained unutilised. There was no exchange of information between the banks and the customer.

A committee was, therefore, appointed by the Reserve Bank in July, 1974, under the chairmanship of Shri P.L.Tandon, then Chairman of the Punjab National Bank.

The salient features of the recommendations of the committee are being summarised below:

**1. Fixation of norms:** The important feature of the Tandon Committee's recommendations relate to fixation of norms for bank lending to industry. These norms can be divided into two categories:

- a. Inventory and receivables norms covering 15 major industries for (i) Raw material; (ii) Stocks in process; (iii) Finished Goods; and (iv) Receivables and bills discounted.
- b. Lending norms of which there are three alternatives, (i) the method under which the borrower will have to contribute a minimum of 25% of the working capital gap from long-term funds, i.e., owned funds and term borrowings. This will give a ratio of 1.17:1 (ii) second, method under which



the borrower has to provide the minimum of 25% of the total current assets and that will give a current ratio of 1.33:1; (iii) third method, under which the borrower's contribution from long-term funds will be to the extent of the entire core current assets and a minimum of 25% of the balance of the current assets. The above three methods of Tandon Committee norms may be explained by the following example.

Given	1. Current Assets	₹ 20,000
	2. Current Liabilities other than borrowings	₹ 15,000
	3. Core Current Assets	₹ 2,000

Then the permissible bank borrowings under the three methods is as follows:

$$\begin{aligned}\text{Method I} &= 0.75 (\text{Current Assets} - \text{Current Liabilities}) \\ &= 0.75 (20,000 - 5,000) \\ &= ₹ 11,250\end{aligned}$$

$$\begin{aligned}\text{Method II} &= 0.75 (\text{Current Assets}) - \text{Current Liabilities} \\ &= (0.75 \times 20,000) - 5,000 \\ &= ₹ 10,000\end{aligned}$$

$$\begin{aligned}\text{Method III} &= 0.75 (\text{Current Assets} - \text{Core Current Assets}) - \text{Current Liabilities} \\ &= 0.75 (20,000 - 2,000) - 5,000 \\ &= ₹ 8,500\end{aligned}$$

### Chore Committee Report

Having implemented the recommendations of the Tandon Committee, the Reserve Bank of India in March, 1979, appointed another committee under the chairmanship of Shri K.B.Chore, Chief Officer, Department of Banking Operation and Development, Reserve Bank of India. The important points in the findings of the committee are as follows:

- (i) Continuance of the existing three lending systems of Tandon Committee.
- (ii) No bifurcation of cash credit accounts.
- (iii) Fixation of separate limits for peak level, non-peak level requirements.
- (iv) Submission of quarterly statements by even small borrowers.
- (v) Borrowers should be discouraged from approaching banks frequently for adhoc or temporary limits in excess of sanctioned limits to meet unforeseen contingencies.
- (vi) The overdependence on bank credit by medium/large borrowers is sought to be reduced by requiring them to enhance their contribution towards Working Capital.

The data relating to Working Capital and its allied ratios based on various journals, RBI reports etc., relating to private industries, engineering industries etc., are given.

### Illustration 1

A company has prepared its annual budget, relevant details of which are reproduced below.

(a) Sales ₹ 46.80 lakhs	:	78,000 units
25% cash sales and balance on credit		
(b) Raw material cost	:	60% of sales value
(c) Labour cost	:	₹ 6 per unit
(d) Variable overheads	:	₹ 1 per unit
(e) Fixed overheads	:	₹ 5 lakhs (including ₹ 1,10,000 as depreciation)

(f) Budgeted stock levels:

Raw materials	:	3 weeks
Work-in-progress	:	1 week (Material 100%, Labour & overheads 50%)
Finished goods	:	2 weeks

(g) Debtors are allowed credit for 4 weeks.

(h) Creditors allow 4 weeks credit.

(i) Wages are paid bi-weekly, i.e. by the 3rd week and by the 5th week for the 1st & 2nd weeks and the 3rd & 4th weeks respectively.

(j) Lag in payment of overheads : 2 weeks

(k) Cash-in-hand required : ₹ 50,000

Prepare the Working Capital budget for a year for the company, making whatever assumptions that you may find necessary.

**Solution:**

Unit Selling Price and Cost	(₹)
Selling price	60
Cost:	
Raw materials	36
Labour	6
Variable overheads	1
Fixed overheads (excluding depreciation)	5
<b>Total Cost per unit</b>	<b>48</b>

**Statement showing Working Capital Required**

₹

<b>Current Assets</b>		
Raw materials	(78,000 units x ₹ 36 x 3/52)	1,62,000
Work-in-progress	(78,000 units x ₹ 42 x 1/52)	63,000
Finished goods	(78,000 units x ₹ 48 x 2/52)	1,44,000
Debtors	(78,000 units x ₹ 60 x 75/100 x 4/52)	2,70,000
Cash in hand		50,000
	(a)	6,89,000
<b>Current Liabilities</b>		
Creditors	(78,000 units x ₹ 36 x 4/52)	2,16,000
Lag in wages	(78,000 units x ₹ 6 x 2/52)	18,000
Lag in payment of overheads	(78,000 units x ₹ 6 x 2/52)	18,000
	(b)	2,52,000
Net working capital required	(a) – (b)	4,37,000

**Note:**

- Total sales for 4 weeks is 6,000 units. Excluding 25% cash sales, credit sales amounts to 4,500 units.
- One year is assumed to be of 52 weeks.

**Illustration 2**

A company plans to manufacture and sell 400 units of a domestic appliance per month at a price of ₹ 600 each. The ratio of costs to selling price are as follows:



	(% of selling price)
Raw materials	30%
Packing materials	10%
Direct labour	15%
Direct expense	5%

Fixed overheads are estimated at ₹ 4,32,000 per annum.

The following norms are maintained for inventory management:

Raw materials	30 days
Packing materials	15 days
Finished goods	200 units
Work-in-progress	7 days

**Other particulars are given below:**

- (a) Credit sales represent 80% of total sales and the dealers enjoy 30 working days credit. Balance 20% are cash sales.
- (b) Creditors allow 21 working days credit for payment.
- (c) Lag in payment of overheads and expenses is 15 working days.
- (d) Cash requirements to be 12% of net working capital.
- (e) Working days in a year are taken as 300 for budgeting purpose.

Prepare a Working Capital requirement forecast for the budget year.

**Solution:**

**Selling Price and Cost per unit** ₹

Raw materials	(₹ 600 x 30/100)	180
Packing materials	(₹ 600 x 10/100)	60
Direct labour	(₹ 600 x 15/100)	90
Direct expenses	(₹ 600 x 5/100)	30
Fixed overheads	[₹ 4,32,000 / (400 x 12)]	<u>90</u>
Total cost		450
Profit		<u>150</u>
Selling Price per unit		600

**Forecast of Working Capital Requirement:**

₹

<b>Current Assets</b>		
Raw materials stock	(₹ 4800 x 180 x 30/300)	86,400
Packing materials stock	(₹ 4800 x 60 x 15/300)	14,400
Working in progress	(₹ 4800 x 285 x 7/300)	31,920
Finished goods stock	(₹ 450 x 200 units)	90,000
Debtors	(₹ 4800 x 80/100 x ₹ 600 x 30/300)	2,30,400
<b>(a)</b>		<b>4,53,120</b>

<b>Current Liabilities:</b>		
Creditors for raw material suppliers	(₹ 4800 x 180 x 21/300)	60,480
Creditors for packing material	(₹ 4800 x 60 x 21/300)	20,160
Creditors for expenses and overheads	(₹ 4800 x 120 x 15/300)	28,800
<b>(b)</b>		1,09,440
Net Working Capital	<b>(a) – (b)</b>	3,43,680
Add: Cash required (12% of net working capital)		41,242
Total Working Capital Required		3,84,922

**Note:**

- Work in progress is valued with raw material cost at 100% and 50% of wages, overheads and expenses.
- Debtors are valued at selling price.

**Illustration 3:**

A Company provided the following data:

	Cost per unit (₹)
Raw materials	52.00
Direct labour	19.50
Overheads	39.00
Total Cost	110.50
Profit	19.50
Selling Price	130.00

The following additional information is available:

- (a) Average raw materials in stock: one month.
- (b) Average materials in process: half-a-month
- (c) Average finished goods in stock: one month
- (d) Credit allowed by suppliers: one month
- (e) Credit allowed to debtors: two months.
- (f) Time lag in payment of wages: one and a half weeks.
- (g) Overheads: one month
- (h) One-fourth of sales are on cash basis.
- (i) Cash balance is expected to be ₹ 1,20,000.

You are required to prepare a statement showing the Working Capital needed to finance a level of activity of 70,000 units of annual output. The production is carried throughout the year on even basis and wages and overheads accrue similarly. (Calculation be made on the basis of 30 days a month and 52 weeks a year).

**Solution:****Statement showing estimate of Working Capital**

₹

Current Assets:		
Stock of Raw material (70,000 units x 52 x 30/360)		3,03,333
Work-in-progress:		
Raw materials (70,000 units x 52 x 15/360)	1,51,667	
Direct labour (70,000 units x 19.50 x 30/360 x 1/4)	28,437	
Overheads (70,000 units x 39 x 30/360 x 1/4)	56,875	2,36,979
Stock of finished goods (70,000 units x 110.50 x 30/360)		6,44,583
Debtors (70,000 units x 130 x 60/360)		15,16,667
Cash balance		1,20,000
	<b>(a)</b>	<b>28,21,562</b>
Current Liabilities		
Creditors for raw material (70,000 units x 52 x 30/360)		3,03,333
Creditors for wages (70,000 units x 19.50 x 1.5/52)		39,375
Creditors for overheads (70,000 units x 39 x 30/360)		2,27,500
	<b>(b)</b>	<b>5,70,208</b>
<b>Net Working Capital</b>	<b>(a) – (b)</b>	<b>22,51,354</b>

**Illustration 4:**

From the following data, compute the duration of the operating cycle for each of years:

₹

	Year 1	Year 2
Stock:		
Raw materials	20,000	27,000
Work-in-progress	14,000	18,000
Finished goods	21,000	24,000
Purchases	96,000	1,35,000
Cost of goods sold	1,40,000	1,80,000
Sales	1,60,000	2,00,000
Debtors	32,000	50,000
Creditors	16,000	18,000

Assume 360 days per year for computational purposes.

**Solution:**

**Calculation of operating cycle**

	Year 1	Year 2
<b>Current Assets:</b>		
1.Raw material stock = $\frac{\text{Stock of raw material}}{\text{Purchases}} \times 360$	$(20 / 96) \times 360 = 75$ days	$(27 / 135) \times 360 = 72$ days
2. WIP turnover = $(\text{WIP} / \text{COGS}) \times 360$	$(14 / 140) \times 360 = 36$ days	$(18 / 180) \times 360 = 36$ days
3.Finished goods turnover = (Finished good/ COGS)x360	$(21 / 140) \times 360 = 54$ days	$(24 / 180) \times 360 = 48$ days
4.Debtors turnover = $(\text{Debtors} / \text{Sales}) \times 360$	$(32 / 160) \times 360 = 72$ days	$(50 / 200) \times 360 = 90$ days
<b>Total (A)</b>	237 days	246 days
Creditors period = $(\text{Creditors} / \text{Purchases}) \times 360$	$(16 / 96) \times 360 = 60$ days	$(18 / 135) \times 360 = 48$ days
<b>Total (B)</b>	60 days	48 days
<b>Operating cycle (A-B)</b>	177 days	198 days

**Illustration 5:**

(a) From the following details, prepare an estimate of the requirement of Working Capital:

Production	60,000 units
Selling price per unit	₹ 5
Raw material	60% of selling price
Direct wages	10% of selling price
Overheads	20% of selling price
Materials in hand	2 months requirement
Production Time	1 month
Finished goods in Stores	3 months
Credit for Material	2 months
Credit allowed to Customers	3 months
Average Cash Balance	₹ 20,000

Wages and overheads are paid at the beginning of the month following/ In production all the required materials are charged in the initial stage and wages and overheads accrue evenly.

(b) What is the effect of Double Shift Working on the requirement of Working capital?

**Solution:**

**a) Computation of requirement of Working Capital**

Annual production      60,000 units

Monthly production      5,000 units

### Unit Cost Sheet

Particulars		₹
Selling price		5.00
Cost of Raw Material	60% of 5=3.00	
Wages	10% of 5=0.50	
Overheads	20% of 5=1.00	
Total cost per unit		4.50
Profit per unit		0.50

Current Assets:		₹	₹
Stock of Raw material	$3 \times 60000 \times \frac{2}{12}$		30,000
<b>Work in Progress:</b>			
Raw Materials	$3 \times 60,000 \times \frac{1}{12}$	15,000	
Wages + Overheads	$1.50 \times 60,000 \times \frac{1}{12} \times \frac{1}{2}$	3,750	18,750
Stock of Finished Goods	$4.50 \times 60,000 \times \frac{3}{12}$		67,500
Debtors (on sales)	$5.00 \times 60,000 \times \frac{3}{12}$		75,000
Cash			20,000
<b>Total Current Assets</b>	<b>(A)</b>		<b>2,11,250</b>

Current Liabilities:		
Creditors	$3 \times 60,000 \times \frac{2}{12}$	30,000
Outstanding wages	$0.5 \times 60,000 \times \frac{1}{12}$	2,500
Outstanding overheads	$1 \times 60,000 \times \frac{1}{12}$	5,000
<b>Total Current Liabilities (B)</b>		<b>37,500</b>

Working Capital: (A-B) = 2,11,250 – 37,500 = ₹ 1,73,750

#### b) Effects of Double shift working:

The following assumptions are made before estimating the Working Capital requirement for double shift working:

1. Production will be 10000 units per month or 1,20,000 units per year.
2. Materials may not be required at double rate. Due to inventory control measures it may be taken as 2/3
3. WIP will be the same at 5000 units. This will not increase as WIP of first shift will be handed over to second shift.
4. 50% of overheads are assumed as fixed. This will not increase due to double shift working.

On the basis of above assumptions, the following capital requirement is estimated as follows:

<b>Current Assets:</b>			₹.
Stock of Raw material		$\frac{30,000 + 30000 \times 2}{3}$	50,000
<b>Work in Progress:</b>			
Raw materials	$3 \times 60,000 \times \frac{1}{12}$	15,000	
Wages + Overheads	$**1.25 \times 60,000 \times \frac{1}{12} \times \frac{1}{2}$	3,125	18,125
Stock of finished Goods	$4.25 \times 1,20,000 \times \frac{3}{12}$		1,27,500
Debtors (on sales)	$5.00 \times 1,20,000 \times \frac{3}{12}$		1,50,000
Cash (double)			40,000
<b>Total Current Assets</b>	<b>(A)</b>		<b>3,85,625</b>

<b>Current liabilities:</b>			₹.
Creditors		$3 \times 1,20,000 \times \frac{2}{12}$	60,000
Outstanding wages		$0.5 \times 1,20,000 \times \frac{1}{12}$	5,000
Outstanding overheads (Fixed Overheads remain same)		2,500	
(Variable Overheads double as before)		5,000	7,500
<b>Total Current Liabilities (B)</b>			<b>72,500</b>

Working Capital required for two shifts: (A-B) = 3,85,625 – 72,500 = ₹. 3,13,125

Therefore additional working capital required for second shift = 3,13,125 – 1,73,750  
= ₹. 1,39,375

\*\* Calculation of Cost per unit

	Single shift	Double shift
Raw material Cost	3.00	3.00
Wages	0.50	0.50
Overhead expenses:		
Fixed	0.50	0.25
Variable	0.50	0.50
Cost per unit	4.50	4.25

→ Production in 2 shifts are doubled

**Illustration 6:**

Estimate the requirement of total capital of the following project with an estimated production of 250 m/t per annum of chemical X, presently imported and which can be entirely sold at the rate of its landed cost of ₹. 8,500 per m/t. You are also required to find out.

- (i) Percentage of yield on investment;
- (ii) Percentage of profit on sales;
- (iii) Rate of cash generation per annum before tax.



Details of the proposed project for expected production of 250 m/t are as under:

<b>i) Investment</b>	
Land	₹ 1,00,000
Building	₹ 8,00,000
Plant and Machinery	₹ 12,00,000
<b>ii) Cost of Production (p.a)</b>	
Imported Raw Material	₹ 6,50,000
Indigenous Raw Material	₹ 6,26,000
Salaries and Wages	₹ 1,35,000
Repairs and Maintenance on Plant Cost	5%
on Building	2%
Depreciation on Plant cost	7%
on Building Cost	2 ½ 0%
Administrative and other expenses	₹ 50,000
Steam requirement 7,000 m/t	@ ₹ 16 per m/t
Power	₹ 6,000
Packing Drums (of 500 kg. capacity)	₹ 30 each
<b>iii) Working Capital requirement</b>	
Imported Raw Material stock	6 months
Indigenous Raw Material and Packing Material stock	3 months
Stock of Finished Products	1 month
Credit to Customers	1 month
Credit from suppliers (only on Indigenous Raw Material and Packing Material)	1 month
Cash expenses	1 month

**Solution:**

**Working notes:**

1. Packing of drums of 500g each. It is assumed of 500kg each.

**Cost of production per annum (production of chemical x – 250m / t).**

		₹ in lakhs
Imported Raw Material		6.50
Indigenous Raw Material		6.26
Salaries & Wages		1.35
Repairs and Maintenance :		
5% on 12,00,000	0.60	
2% on 8,00,000	0.16	0.76
Depreciation		
7 % on 12,00,000	0.84	
2.5 % on 8,00,000	0.20	1.04
Administration & Other Expenses		0.50
Steam	7000 x 16	1.12
Power		0.06
Packing drums (250 m/t) / 500 kg. = 500 nos. @ 30 each		0.15
Total Cost		17.74
Sales	250 x 8500	21.25
Profit		3.51

## 2. Working Capital requirement

Particulars	Basis of calculation	Amount (₹)
Imported Raw Material stock	$(6 / 12) \times 6.5$	3.25
Indigenous Raw Material and Packing Material	$6.26 + 0.15 = 6.41 \times (3 / 12)$	1.60
Stock of finished goods	At works cost excluding depreciation & admin exp = $17.74 - 1.04 - 0.5 = (16.20/12)$	1.35
Credit to customers	$17.74 - 1.04 = (16.70 / 12)$	1.39
Cash Expenses	Salaries, wages, repairs, admin, steam, power = $3.79 / 12$	0.32
Current Assets		7.91
(Less): Credit from suppliers	$6.41 / 12$	0.53
Working Capital requirement		7.38

### Requirement of Total Capital:

	(₹)
Land	1.00
Building	8.00
Plant and Machinery	12.00
Working Capital	7.38
	28.38

- percentage of yield on investment = Profit / Investment x 100  
=  $(3.51 / 28.38) \times 100 = 12.37 \%$
- percentage of profit on sales = Profit / Sales x 100  
=  $(3.51 / 21.25) \times 100 = 16.52 \%$
- cash generation per annum before tax :

	(₹)
PBT	3.51
Add. Depreciation	1.04
Cash generation before tax	4.55

$$\text{Rate} = (4.55 / 28.38) \times 100 = 16.03 \%$$

### Illustration 7:

Solaris Ltd. sells goods in domestic market at a gross profit of 25 percent, not counting on depreciation as a part of the 'cost of goods sold'. Its estimates for next year are as follows:

Amount (₹ in lakhs)

Sales - Home at 1 month's credit	1,200
Exports at 3 months' credit, selling price 10 percent below home price	540
Materials used (suppliers extend 2 months' credit)	450
Wages paid, ½ month in arrears	360
Manufacturing expenses, paid 1 month in arrears	540
Administrative expenses, paid 1 month in arrears	120
Sales promotion expenses (payable quarterly - in advance)	60
Income - tax payable in 4 installments of which one falls in the next financial year	150



The company keeps 1 month's stock of each of raw materials and finished goods and believes in keeping ₹ 20 lakh as cash. Assuming a 15 percent safety margin, ascertain the estimated Working Capital requirement of the company (ignore work -in-process).

**Solution:**

**Statement showing determination of Working Capital**

(Amount in ₹ lakhs)

Current assets	₹	Computation
Cash	20.00	
Raw Material	37.50	(450 lakhs / 12)
Finished Goods	122.50	(1,470 lakhs / 12)
Debtors Domestic market	100.00	(1,200 / 12 )
Export market	135.00	(540 x )
Sales promotion expense	15.00	(60 lakhs x $\frac{3}{12}$ )
<b>Total Current Assets (A)</b>	<b>430.00</b>	

Current Liabilities	₹
Raw Materials (450 x 2 / 12)	75.00
Wages (360 / 24)	15.00
Manufacturing expenses (540 /12)	45.00
Administration expenses (120/12)	10.00
Total Current Liabilities (B)	145.00
Net Current Assets	285.00
Add: Safety margin @ 15%	42.75
Working Capital Requirement	327.75

**Working notes :**

**1. Cost of Production**

	₹ in lakhs
Material used	450
Wages paid	360
Manufacturing exp	540
Administration exp	120
Total	1470

**2. Tax aspect is ignored as it is to be paid out of profits.**

**Illustration 8:**

Camellia Industries Ltd. is desirous of assessing its Working Capital requirements for the next year. The finance manager has collected the following information for the purpose.

Estimated cost per unit of finished product	₹
Raw materials	90
Direct labour	50
Manufacturing and administrative overhead (Excluding depreciation)	40
Depreciation	20
Selling overheads	30
Total Cost	230

The product is subject to excise duty of 10 percent (levied on cost of production) and is sold at ₹ 300 per unit.

**Additional information:**

- (i) Budgeted level of activity is 1,20,000 units of output for the next year.
- (ii) Raw material cost consists of the following:
  - Pig iron                    65 per unit
  - Ferro alloys                15 per unit
  - Cast iron borings        10 per unit
- (iii) Raw materials are purchased from different suppliers, extending different credit period.
  - Pig iron 2 months
  - Ferro alloys ½ months
  - Cast iron borings 1 month.
- (iv) Product is in process for a period of 1/2 month. Production process requires full unit (100 percent) of pig iron and ferroalloys in beginning of production: cost iron boring is required only to the extent of 50 percent in the beginning and the remaining is needed at a uniform rate during the process. Direct labour and other overheads accrue similarly at a uniform rate throughout production process.
- (v) Past trends indicate that the pig iron is required to be stored for 2 months and other materials for 1 month.
- (vi) Finished goods are in stock for a period of 1 month.
- (vii) It is estimated that one-fourth of total sales are on cash basis and the remaining sales are on credit. The past experience of the firm has been to collect the credit sales in 2 months.
- (viii) Average time-lag in payment of all overheads is 1 month and ½ month in the case of direct labour.
- (ix) Desired cash balance is to be maintained at ₹ 10 lakh.

You are required to determine the amount of Net Working Capital of the firm. State your assumptions, if any.

**Solution:**

**Determination of net working capital of CAMELLIA Industries Ltd**

<b>Current Assets</b>	<b>₹</b>	
Minimum desired cash balance	10,00,000	
Raw Materials :		
Pig iron	13,00,000	[1,20,000 x 65 x (2 / 12)]
Ferry alloys	1,50,000	[1,20,000 x 15 x (1 / 12)]
Cast iron borings	1,00,000	[1,20,000 x 10 x (1 / 12)]
WIP	6,62,500 x	[1,20,000 x 132.5 (1/24)]
Finished goods	18,00,000	[1,20,000 x 180 x (1 / 12)]
Debtors	60,00,000	[1,20,000 x 300 x (2/12)]
<b>Total Current Assets: (A)</b>	<b>1,00,12,500</b>	

<b>Current liabilities</b>			₹
Creditors:			
Pig iron	13,00,000	[1,20,000 x 65 x (2/12)]	
Ferry alloys	75,000	[1,20,000 x 15 x (1 / 24)]	
Cast iron borings	1,00,000	[1,20,000 x 10 x (1 / 12)]	
Outstanding Wages	2,50,000	[1,20,000 x 50 x (1 / 24 )]	
Outstanding Total Over heads	7,00,000	[1,20,000 x 70 x (1 / 12)]	
<b>Total current liabilities (B)</b>	<b>24,25,000</b>		

Working Capital (A-B) = 1,00,12,500 – 24,25,000 = 75,87,500

#### Working Notes:

*Determination of Work in Process		₹
Pig iron		65.00
Ferry alloys		15.00
Cast iron boring (0.5 x 10)		5.00
Other costs –		
Cast iron borings	2.50	
Dir. Labour	(0.5 x 50)	25.00
Mfg. and admn OHs	(0.5x40)	20.00
		<b>47.50</b>
		<b>132.50</b>

#### Illustration 9:

Compute “Maximum Bank Borrowings” permissible under Method I, II & III of Tandon Committee norms from the following figures and comment on each method.

<b>Current Liabilities</b>	<b>₹ in lakhs</b>	<b>Current assets</b>	<b>₹ in lakhs</b>
Creditors for purchases	200	Raw materials	400
Other current liabilities	100	Work in progress	40
		Finished goods	180
Bank borrowings including bills discounted with bankers	400	Receivable including bills discounted with bankers	100
		Other current assets	20
	700		740

Assume core current assets are ₹ 190 lakhs.

#### Solution:

#### TANDON Committee norms

##### Method 1

Under Method 1 the proprietor should contribute 25% of Working Capital Gap from their long term source of finance and the balance is the Maximum Permissible Bank Borrowings.

#### Working Capital Gap means:

Working Capital Gap	=	Current Assets - Current Liabilities (except bank borrowings)
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In the given problem

	₹ in lakhs
Total Current Assets	740
Less: Current liabilities excluding bank borrowings	300
Working Capital Gap	440
Less: Contribution from long term source of finance (25%)	110
Maximum Permissible Bank Borrowings	330

Comment: Maximum Permissible Bank Borrowings under method 1 is ₹.330 lakhs. But existing bank borrowing is ₹ 400 lakhs.

Therefore the excess bank borrowings of ₹ 70 lakhs convert into term loan.

### Method 2

Under Method 2 the proprietor should contribute 25% of Current Assets from their long term source of finance and the balance is the Maximum Permissible Bank Borrowings.

In the given problem

	Rs. In lakhs
Total Current Assets	740
Less: Current liabilities excluding bank borrowings	300
Working Capital Gap	440
Less: Contribution from long term source of finance (25% of 740)	185
Maximum Permissible Bank Borrowings	255

**Comment:** Maximum Permissible Bank Borrowings under method 2 is ₹ 255 lakhs. But existing bank borrowing is ₹ 400 lakhs.

Therefore the excess bank borrowings of ₹. 145 lakhs convert into term loan.

### Method 3

Under Method 3 the proprietor should contribute the entire investment in Core Current Assets and 25% of remaining current assets from their long term source of finance and the balance is the Maximum Permissible Bank Borrowings.

In the given problem

	₹ in lakhs
Total Current Assets	740
Less: Current liabilities excluding bank borrowings	300
Working Capital Gap	440
Less: Contribution from long term source of finance (190+ 25% of (740-190))	328
Maximum permissible bank borrowings	112

Comment: maximum permissible bank borrowings under method 3 is ₹ 112 lakhs. But existing bank borrowing is ₹. 400 lakhs.

Therefore the excess bank borrowings of ₹ 288 lakhs convert into term loan.

## 5.8 INVENTORY MANAGEMENT

Inventory constitutes an important item in the working capital of many business concerns. Net working capital is the difference between current assets and current liabilities. Inventory is a major item of current assets. The term inventory refers to the stocks of the product a firm is offering for sale and the components that make up the product. Inventory is stores of goods and stocks. This includes raw materials, work-in-process and finished goods. Raw materials consist of those units or input which are

used to manufacture goods that require further processing to become finished goods. Finished goods are products ready for sale. The classification of inventory and the levels of the components vary from organisation to organisation depending upon the nature of business. For example steel is a finished product for a steel industry, but raw material for an automobile manufacturer. Thus, inventory may be defined as "Stock of goods that is held for future use". Since inventory constitute about 50 to 60 percent of current assets, the management of inventories is crucial to successful Working Capital Management. Working capital requirements are influenced by inventory holding. Hence, there is a need for effective and efficient management of inventory

A good inventory management is important to the successful operations of the most of the organizations, unfortunately the importance of inventory is not always appreciated by top management. This may be due to a failure to recognize the link between inventory and achievement of organisational goals or due to ignorance of the impact that inventory can have on costs and profits.

Inventory management refers to an optimum investment in inventory. It should neither be too low to effect the production adversely nor too high to block the funds unnecessarily. Excess investment in inventory is unprofitable for the business. Both excess and inadequate investment in inventory is not desirable. The firm should operate within the two danger points. The purpose of inventory management is to determine and maintain the optimum level of inventory investment.

#### **Techniques and Tools of Inventory Control:**

1. Economic Order Quantity.
2. Fixing Levels of Material.
  - (a) Minimum Level
  - (b) Maximum Level
  - (c) Reorder Level
  - (d) Danger Level
3. ABC Inventory Control
4. Perpetual Inventory System
5. VED classification.
6. Just-In-Time
7. FSN Analysis
8. Inventory Turnover Ratio

***All the above tools and techniques have been discussed in detail in Section A under Inventory Control of Materials Chapter.***

### **5.9 MANAGEMENT OF RECEIVABLES**

Receivables mean the book debts or debtors and these arise, if the goods are sold on credit. Debtors form about 30% of current assets in India. Debt involves an element of risk and bad debts also. Hence, it calls for careful analysis and proper management. The goal of Receivables Management is to maximize the value of the firm by achieving a tradeoff between risk and profitability.

The objectives of Receivables Management are as follows:

- (a) To obtain optimum (non-maximum) value of sales;
- (b) To control the cost of receivables, cost of collection, administrative expenses, bad debts and opportunity cost of funds blocked in the receivables.
- (c) To maintain the debtors at minimum according to the credit policy offered to customers.

- (d) To offer cash discounts suitably depending on the cost of receivables, bank rate of interest and opportunity cost of funds blocked in the receivables.

### **5.9.1 Costs of Maintaining Receivables**

The costs with respect to maintenance of receivables can be identified as follows:

*Capital costs:* Maintenance of accounts receivable results in blocking of the firm's financial resources in them. This is because there is a time lag between the sale of goods to customers and the payments by them. The firm has, therefore, to arrange for additional funds to meet its own obligations, such as payment to employees, suppliers of raw materials, etc.

*Administrative costs:* The firm has to incur additional administrative costs for maintaining accounts receivable in the form of salaries to the staff kept for maintaining accounting records relating to customers, cost of conducting investigation regarding potential credit customers to determine their credit worthiness etc

*Collection costs:* The firm has to incur costs for collecting the payments from its credit customers. Sometimes, additional steps may have to be taken to recover money from defaulting customers.

*Defaulting costs:* Sometimes after making all serious efforts to collect money from defaulting customers, the firm may not be able to recover the overdues because of the inability of the customers. Such debts are treated as bad debts and have to be written off since they cannot be realised.

### **5.9.2 Benefits of Maintaining Receivables**

*Increase in Sales:* Except a few monopolistic firms, most of the firms are required to sell goods on credit, either because of trade customers or other conditions. The sales can further be increased by liberalizing the credit terms. This will attract more customers to the firm resulting in higher sales and growth of the firm.

*Increase in Profits:* Increase in sales will help the firm (i) to easily recover the fixed expenses and attaining the break-even level, and (ii) increase the operating profit of the firm. In a normal situation, there is a positive relation between the sales volume and the profit.

*Extra Profit:* Sometimes, the firms make the credit sales at a price which is higher than the usual cash selling price. This brings an opportunity to the firm to make extra profit over and above the normal profit.

### **5.9.3 Factors Affecting the size of receivables**

The size of accounts receivable is determined by a number of factors. Some of the important factors are as follows:

*Level of sales:* This is the most important factor in determining the size of accounts receivable. Generally in the same industry, a firm having a large volume of sales will be having a larger level of receivables as compared to a firm with a small volume of sales.

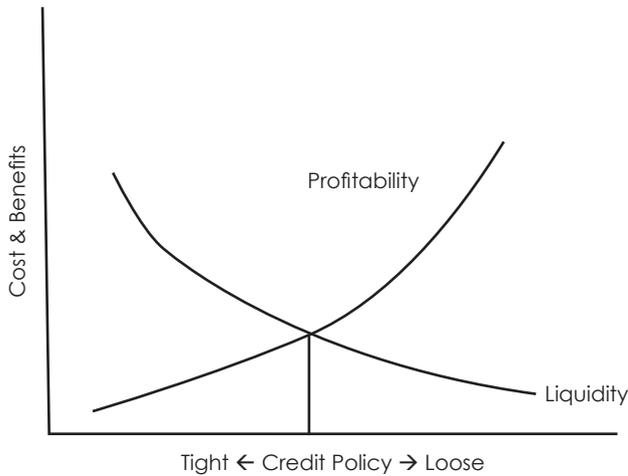
*Credit policies:* A firm's credit policy, as a matter of fact, determines the amount of risk the firm is willing to undertake in its sales activities. If a firm has a lenient or a relatively liberal credit policy, it will experience a higher level of receivables as compared to a firm with a more rigid or stringent credit policy.

*Terms of trade:* The size of the receivables is also affected by terms of trade (or credit terms) offered by the firm. The two important components of the credit terms are (i) Credit period and (ii) Cash discount.

### **5.9.4 Optimum Size of Receivables**

The optimum investment in receivables will be at a level where there is a trade-off between costs and profitability. When the firm resorts to a liberal credit policy, the profitability of the firm increases on account of higher sales. However, such a policy results in increased investment in receivables, increased chances of bad debts and more collection costs. The total investment in receivables increases and, thus, the problem of liquidity is created. On the other hand, a stringent credit policy reduces the profitability but

increases the liquidity of the firm. Thus, optimum credit policy occurs at a point where there is a “Trade-off” between liquidity and profitability as shown in the chart below.



### 5.10 DETERMINANTS OF CREDIT POLICY

The following are the aspects of credit policy:

- (i) Level of credit sales required to optimise the profit.
- (ii) Credit period i.e. duration of credit, whether it may be 15 days or 30 or 45 days etc.
- (iii) Cash discount, discount period and seasonal offers.
- (iv) Credit standard of a customer : 5 C's of credit :
  - (a) Character of the customer i.e. willingness to pay.
  - (b) Capacity----ability to pay.
  - (c) Capital----financial resources of a customer.
  - (d) Conditions----special conditions for extension of credit to doubtful customers and prevailing economic and market conditions and;
  - (e) Collateral security.
- (v) Profits.
- (vi) Market and economic conditions.
- (vii) Collection policy.
- (viii) Paying habits of customers.
- (ix) Billing efficiency, record-keeping etc.
- (x) Grant of credit----size and age of receivables.

#### 5.10.1 Optimum credit policy

A firm should establish receivables policies after carefully considering both benefits and costs of different policies. These policies relate to:

- (i) Credit Standards, (ii) Credit Terms, and (iii) Collection Procedures.

Each of these have been explained below:

**(i) Credit Standards**

The term credit standards represent the basic criteria for extension of credit to customers. The levels of sales and receivables are likely to be high if the credit standards are relatively loose, as compared to a situation when they are relatively tight. The firm's credit standards are generally determined by the five "C's". Character, Capacity, Capital, Collateral and Conditions. Character denotes the integrity of the customer, i.e. his willingness to pay for the goods purchased. Capacity denotes his ability to manage the business. Capital denotes his financial soundness. Collateral refers to the assets which the customer can offer by way of security. Conditions refer to the impact of general economic trends on the firm or to special developments in certain areas of economy that may affect the customer's ability to meet his obligations.

Information about the five C's can be collected both from internal as well as external sources. Internal sources include the firm's previous experience with the customer supplemented by its own well developed information system. External resources include customer's references, trade associations and credit rating organizations.

**(ii) Credit terms**

It refers to the terms under which a firm sells goods on credit to its customers. As stated earlier, the two components of the credit terms are (a) Credit Period and (b) Cash Discount. The approach to be adopted by the firm in respect of each of these components is discussed below:

**(iii) Collection procedures**

A stringent collection procedure is expensive for the firm because of high out-of-pocket costs and loss of goodwill of the firm among its customers. However, it minimises the loss on account of bad debts as well as increases savings in terms of lower capital costs on account of reduction in the size of receivables. A balance has therefore to be struck between the costs and benefits of different collection procedures or policies.

**5.10.2 Credit evaluation of customer**

Credit evaluation of the customer involves the following 5 stages:

(i) Gathering credit information of the customer through:

- (a) financial statements of a firm,
- (b) bank references,
- (c) references from Trade and Chamber of Commerce,
- (d) reports of credit rating agencies,
- (e) credit bureau reports,
- (f) firm's own records (Past experience),
- (g) other sources such as trade journals, Income-tax returns, wealth tax returns, sales tax returns, Court cases, Gazette notifications etc.

(ii) *Credit analysis* – After gathering the above information about the customer, the credit-worthiness of the applicant is to be analysed by a detailed study of 5 C's of credit as mentioned above.

(iii) *Credit decision* – After the credit analysis, the next step is the decision to extend the credit facility to potential customer. If the analysis of the applicant is not upto the standard, he may be offered cash on delivery (COD) terms even by extending trade discount, if necessary, instead of rejecting the credit to the customer.



- (iv) *Credit limit* – If the decision is to extend the credit facility to the potential customer, a limit may be prescribed by the financial manager, say, ₹ 25,000 or ₹ 1,00,000 or so, depending upon the credit analysis and credit-worthiness of the customer.
- (v) *Collection procedure* – A suitable and clear-cut collection procedure is to be established by a firm and the same is to be intimated to every customer while granting credit facility. Cash discounts may also be offered for the early payment of dues. This facilitates faster recovery.

#### Illustration 10:

Gemini Products Ltd. is considering the revision of its credit policy with a view to increasing its sales and profits. Currently all its sales are on credit and 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 director of the company has given the following options with draft estimates for consideration.

Particulars	Current position	Option I	Option II	Option III
Sales (₹ Lakhs)	200	210	220	250
Credit period (months)	1	1 ½	2	3
Bad debts (% of sales)	2	2 ½	3	5
Cost of credit administration (₹ Lakhs)	1.20	1.30	1.50	3.00

Advise the company to take the right decision. (Workings should form part of the answer).

#### Solution:

#### Evaluation of the different options in credit policy of Gemini Products Ltd.

(₹ in Lakhs)

Credit period (months)	Current 1.0	Option I (1.5)	Option II (2.0)	Option III (3.0)
Sales	200	210	220	250
Less: Variable cost (60%)	120	126	132	150
Contribution (40%)	80	84	88	100
Investment in debtors [Sales x credit period / 12 months]	16.67	26.25	36.67	62.50
Cost of funds invested in debtors balances @ 20%	3.33	5.25	7.33	12.50
Sales	200	210	220	250
Bad debts (% of sales)	2%	2.5%	3%	5%
Bad debts	4	5.25	6.6	12.5
<b>Contribution (a)</b>	<b>80.00</b>	<b>84.00</b>	<b>88.00</b>	<b>100.00</b>
Less: Costs				
Cost of funds invested in debtors balance	3.33	5.25	7.33	12.50
Bad debts	4.00	5.25	6.60	12.50
Cost of credit administration	1.20	1.30	1.50	3.00
<b>(b)</b>	<b>8.53</b>	<b>11.80</b>	<b>15.43</b>	<b>28.00</b>
<b>Net contribution (a) – (b)</b>	<b>71.47</b>	<b>72.20</b>	<b>72.57</b>	<b>72.00</b>

#### Analysis:

Since the net contribution is highest in option II, it is suggested to extend 2 months credit period to the customers.

**Illustration 11:**

Surya Industries Ltd. is marketing all its products through a network of dealers. All sales are on credit and the dealers are given one month time to settle bills. The company is thinking of changing the credit period with a view to increase its overall profits. The marketing department has prepared the following estimates for different periods of credit:

Particulars	Present Policy	Plan I	Plan II	Plan III
Credit period (in months)	1	1.5	2	3
Sales (₹ Lakhs)	120	130	150	180
Fixed costs (₹ Lakhs)	30	30	35	40
Bad debts (% of sales)	0.5	0.8	1	2

The company has a contribution/sales ratio of 40% further it requires a pre-tax return on investment at 20%. Evaluate each of the above proposals and recommend the best credit period for the company.

**Solution:****Analysis of Credit Policies****(₹ in Lakhs)**

Credit Period (months)	Current Policy (1)	Plan I (1.5)	Plan II (2)	Plan III (3)
Credit sales	120	130	150	180
Less: Variable cost @ 60%	72	78	90	108
Contribution	48	52	60	72
Less: Fixed cost	30	30	35	40
<b>Operating Profit (a)</b>	<b>18</b>	<b>22</b>	<b>25</b>	<b>32</b>
Cost of Sales (Variable Cost + Fixed Cost)	102	108	125	148
Investment in debtors [Cost of sales x Credit period / 12 months]	8.5	13.5	20.83	37.00
<b>Cost of Investment in debtors @ 20% (b)</b>	<b>1.70</b>	<b>2.70</b>	<b>4.17</b>	<b>7.40</b>
Credit sales	120	130	150	180
Bad debts (% of sales)	0.5%	0.8%	1%	2%
<b>Bad debts (c)</b>	<b>0.60</b>	<b>1.04</b>	<b>1.50</b>	<b>3.60</b>
<b>Net Profit (a) – [(b) + (c)]</b>	<b>15.70</b>	<b>18.26</b>	<b>19.33</b>	<b>21.00</b>

**Analysis:**

The net profit is higher if 3 months credit period is allowed. Hence, it is suggested to adopt plan III.

**Illustration 12**

The following are the details regarding the operations of a firm during a period of 12 months.

Sales	₹12,00,000
Selling price per unit	₹10
Variable cost price per unit	₹7
Total cost per unit	₹9

Credit period allowed to customers one month. The firm is considering a proposal for a more liberal extension of credit which will result in increasing the average collection period from one month to two months. This relaxation is expected to increase the sales by 25% from its existing level.

You are required to advise the firm regarding adoption of the new credit policy, presuming that the firm's required return on investment is 25%.



**Solution:**

**Appraisal of Credit policy**

(₹)

Particulars	Present	Proposed	Incremental
Credit period(ACP)	1 month	2 months	1 months
Sales (units)	1,20,000	1,50,000	30,000
Sales @ 10(in ₹)	12,00,000	15,00,000	3,00,000
Total Cost	10,80,000	12,90,000	2,10,000
Profit	1,20,000	2,10,000	90,000
Investment in receivables	10,80,000 / 12 = 90,000	12,90,000 / 6 = 2,15,000	1,25,000

Required return on Incremental Investment (1,25,000@ 25%) = 31,250

Actual return on Investment = 90,000

(or)

$$(90,000 / 1,25,000) \times 100 = 72\%$$

Since the Incremental return is greater than required return on Incremental investment advised to adopt new credit policy.

**Illustration 13:**

Trinadh Traders Ltd. currently sells on terms of net 30 days. All the sales are on credit basis and average collection period is 35 days. Currently, it sells 5,00,000 units at an average price of ₹ 50 per unit. The variable cost to sales ratio is 75% and a bad debt to sales ratio is 3%. In order to expand sales, the management of the company is considering changing the credit terms from net 30 to '2/10, net 30'. Due to the change in policy, sales are expected to go up by 10%, bad debt loss on additional sales will be 5% and bad debt loss on existing sales will remain unchanged at 3%. 40% of the customers are expected to avail the discount and pay on the tenth day. The average collection period for the new policy is expected to be 34 days. The company required a return of 20% on its investment in receivables.

You are required to find out the impact of the change in credit policy of the profit of the company. Ignore taxes.

**Solution:**

**Trinadh Traders**

**Appraisal of Credit Policy**

(₹)

	Present	Proposed	Gain / (Loss)
Credit terms	Net 30	(2 / 10)Net 30	
Avg. Collection Period	35 days	34 days	
Discount sales	-	40%	
Bad debts	3%	3 % + 5%	
Sales (units)	5,00,000	5,50,000	
Incremental Contribution	[50,000 x 50 x 25%]		6,25,000
Incremental bad debts	[50,000 x 50 x 5%]		(1,25,000)
Discount	[5,50,000 x 40% x 50 x 2%]		(2,20,000)
Investment in Receivables	[5,00,000 x 50 x (35/360)] = 24,30,555	[5,00,000 x 50 x (37/365)] + [50,000 x 50 x 75% x 34/360] = 25,38,194	
Incremental investment		1,07,629	
Finance cost	(1,07,629 x 20%)		(21,528)
Incremental gain			2,58,472

By implementing new credit policy, the profit is increased by ₹ 2,58,472. So the new credit policy is advised to implement.

**Illustration 14:**

A firm is considering pushing up its sales by extending credit facilities to the following categories of customers:

- (a) Customers with a 10% risk of non-payment, and
- (b) Customers with a 30% risk of non-payment.

The incremental sales expected in case of category (a) are ₹ 40,000 while in case of category (b) they are ₹ 50,000.

The cost of production and selling costs are 60% of sales while the collection costs amount to 5% of sales in case of category (a) and 10% of sales in case of category (b).

You are required to advise the firm about extending credit facilities to each of the above categories of customers.

**Solution:****Evaluation of Credit Policies****Category a) 10% risk of non-payment**

Particulars		₹
Incremental sales		40,000
Less: Bad debts @ 10%		4,000
Sales realized		36,000
Less: Cost of production and selling cost (40,000 x 60%)	24,000	
Less: Collection cost (40,000 x 5%)	2,000	26,000
Incremental profit		10,000

**Category b) 30% risk of non-payment**

		₹
Incremental sales		50,000
Less: Bad debts @ 30% (50,000 x 30%)		15,000
Sales realized		35,000
Less: Cost of production and selling cost (50,000 x 60%)	30,000	
Less: Collection cost (50,000 x 10%)	5,000	35,000
Incremental profit		Nil

**Comment:** Advise to extend credit facility to category (a) customers alone.

**Illustration 15:**

The ABC Company currently sells on terms 'net 45'. The company has sales of ₹ 37.50 Lakhs a year, with 80% being the credit sales. At present, the average collection period is 60 days. The company is now considering offering terms '2/10, net 45'. It is expected that the new credit terms will increase current credit sales by 1/3rd. The company also expects that 60% of the credit sales will be on discount and average collection period will be reduced to 30 days. The average selling price of the company is ₹ 100 per unit and variable cost is 85% of selling price. The Company is subject to a tax rate of 40%, and its before-tax rate of borrowing for working capital is 18%. Should the company change its credit terms to '2/10, net 45'? Support your answers by calculating the expected change in net profit. (Assume 360 days in a year)

**Solution:**

**Appraisal of new credit policy**

	<b>Present</b>	<b>Proposed</b>	<b>Incremental</b>
Credit term	"net 45"	"2/10 net 45"	
Average collection period	60 days	30 days	
Discount sales	-	60%	
	₹	₹	₹
1. Credit sales (37,50,000 x 80%)	30,00,000	40,00,000	
2. Variable Cost 85%	25,50,000	34,00,000	
3. Contribution (1-2)	4,50,000	6,00,000	1,50,000
4. Discount (40,00,000 x 60% x 2%)		48,000	(48,000)
5. Investment in debtors			
30,00,000 x $\frac{60}{360}$	5,00,000		
30,00,000 x $\frac{30}{360}$ + 10,00,000 x 85% x $\frac{30}{360}$		3,20,833	
6. Savings in investment	-	1,79,167	
7. Finance cost saved (1,79,167 x 10.8%)*			19,350
8. Surplus (3-4+7)			1,21,350

Decision: Advised to implement the proposed policy, as there is a surplus of ₹ 1,21,350

\* Cost of capital = Rate of interest x (1-tax rate) = 18% x (1-0.4) = 10.8%

**Illustration 16:**

Slow Players are regular customers of Goods Dealers Ltd., Calcutta and have approached the sellers for extension of credit facility for enabling them to purchase goods from Goods Dealers Ltd. On the analysis of past performance and on the basis of information supplied, the following pattern of payment schedule emerges in regard to Slow Players:

<b>Schedule</b>	<b>Pattern</b>
At the end of 30 days	15% of the bill
60 days	34% of the bill
90 days	30% of the bill
100 days	20% of the bill
Non recovery	1% of the bill

Slow Players wants to enter into a firm commitment for purchase of goods of ₹ 15,00,000 in 2012, deliveries to be made in equal quantities on the first day of each quarter in the calendar year. The price per unit of the commodity is ₹ 150 on which a profit of ₹ 5 per unit is expected to be made. It is anticipated by the Good Dealers Ltd., that taking up of this contract would mean an extra recurring expenditure of ₹ 5,000 per annum. If the opportunity cost of funds in the hands of Goods Dealers is 24% per annum, would you as the Finance Manager of the seller recommend the grant of credit to Slow Players? Working should form part of your answer.

**Solution:**

**Appraisal of credit proposal from Slow Players:**

a) Incremental profit = 15,00,000 x  $\frac{5}{150}$  = ₹ 50,000

b) Calculation of incremental finance cost: 17,975\* x 4 = ₹ 71,900

\*Sales per quarter =  $\frac{15,00,000}{4}$  = ₹ 3,75,000

Finance cost per quarter:

₹

For 15% of bill	$3,75,000 \times 15\% \times 24\% \times \frac{30}{360}$	1,125
For 34% of bill	$3,75,000 \times 34\% \times 24\% \times \frac{60}{360}$	5,100
For 30% of bill	$3,75,000 \times 30\% \times 24\% \times \frac{90}{360}$	6,750
For 20% of bill	$3,75,000 \times 20\% \times 24\% \times \frac{100}{360}$	5,000
Finance cost per quarter		17,975

c) Extra recurring expenses = ₹ 5,000

d) Bad debts = 15,00,000 x 1% = ₹ 15,000

Therefore, **incremental profit = a-b-c-d = 50,000 – 71,900 – 5,000 – 15,000 = ₹ 41,900 (loss)**

**Comment:** As there is incremental loss, it is advice not to extend credit facility to slow players.

### 5.11 CASH MANAGEMENT

The term "Cash" with reference to management of cash is used in two ways. In a narrow sense cash refers to coins, currency, cheques, drafts and deposits in banks. The broader view of cash includes near cash assets such as marketable securities and time deposits in banks. The reason why these near cash assets are included in cash is that they can readily be converted into cash. Usually, excess cash is invested in marketable securities as it contributes to profitability.

Cash is one of the most important components of current assets. Every firm should have adequate cash, neither more nor less. Inadequate cash will lead to production interruptions, while excessive cash remains idle and will impair profitability. Hence, there is a need for cash management. The cash management assumes significance for the following reasons:-

#### Significance

- (i) *Cash planning:* Cash is the most important as well as the least unproductive of all current assets. Though, it is necessary to meet the firm's obligations, yet idle cash earns nothing. Therefore, it is essential to have a sound cash planning neither excess nor inadequate.
- (ii) *Management of cash flows:* This is another important aspect of cash management. Synchronisation between cash inflows and cash outflows rarely happens. Sometimes, the cash inflows will be more than outflows because of receipts from debtors, and cash sales in huge amounts. At other times, cash outflows exceed inflows due to payment of taxes, interest and dividends etc. Hence, the cash flows should be managed for better cash management.
- (iii) *Maintaining optimum cash balance:* Every firm should maintain optimum cash balance. The management should also consider the factors determining and influencing the cash balances at various point of time. The cost of excess cash and danger of inadequate cash should be matched to determine the optimum level of cash balances.
- (iv) *Investment of excess cash:* The firm has to invest the excess or idle funds in short term securities or investments to earn profits as idle funds earn nothing. This is one of the important aspects of management of cash.

Thus, the aim of cash management is to maintain adequate cash balances at one hand and to use excess cash in some profitable way on the other hand.

## Motives

Motives or desires for holding cash refers to various purposes. The purpose may be different from person to person and situation to situation. There are four important motives to hold cash.

- (i) To carry out the regular business transactions.
- (ii) As a precautionary measure to meet the business exigencies.
- (iii) In order to exploit the profitable opportunities under speculative conditions.
- (iv) To compensate banks and other financial institutes for providing certain services and loans.

## Objectives

The basic objectives of cash management are

- (i) to make the payments when they become due and
- (ii) to minimize the cash balances.

The task before the cash management is to reconcile the two conflicting nature of objectives.

## Factors determining cash needs

Maintenance of optimum level of cash is the main problem of cash management. The level of cash holding differs from industry to industry, organisation to organisation. The factors determining the cash needs of the industry is explained as follows:

- i. Matching of cash flows:** The first and very important factor determining the level of cash requirement is matching cash inflows with cash outflows. If the receipts and payments are perfectly coincide or balance each other, there would be no need for cash balances. The need for cash management therefore, due to the non-synchronisation of cash receipts and disbursements.
- ii. Short costs:** Short costs are defined as the expenses incurred as a result of shortfall of cash. The short costs includes, transaction costs associated with raising cash to overcome the shortage, borrowing costs associated with borrowing to cover the shortage i.e. interest on loan, loss of trade-discount, penalty rates by banks to meet a shortfall in cash balances and costs associated with deterioration of the firm's credit rating etc. which is reflected in higher bank charges on loans, decline in sales and profits.
- iii. Cost of excess cash balances:** One of the important factors determining the cash needs is the cost of maintaining cash balances i.e. excess or idle cash balances. The cost of maintaining excess cash balance is called excess cash balance cost.
- iv. Uncertainty in business:** The first requirement of cash management is a precautionary cushion to cope with irregularities in cash flows, unexpected delays in collections and disbursements and defaults. The uncertainty can be overcome through accurate forecasting of tax payments, dividends, capital expenditure etc. and ability of the firm to borrow funds through over draft facility.
- v. Cost of procurement and management of cash:** The costs associated with establishing and operating cash management staff and activities determining the cash needs of a business firm. These costs are generally fixed and are accounted for by salary, storage and handling of securities etc. The above factors are considered to determine the cash needs of a business firm.

The strategies for cash management are discussed in detail in the following lines:

- 1) Projection of cash flows and planning:** The cash planning and the projection of cash flows is determined with the help of Cash Budget. The Cash Budget is the most important tool in cash management. It is a device to help a firm to plan and control the use of cash. It is a statement showing the estimated cash inflows and cash outflows over the firm's planning horizon. In other words the net cash position i.e., surplus or deficiency of a firm is highlighted by the cash budget from one budgeting period to another period.

## II) Determining optimal level of cash holding by the company

The optimal level of cash holding by a company can be determined with the help of the following models:

- (a) Inventory model (Economic Order Quantity) to cash management
- (b) Stochastic model
- (c) Probability model

**[(a) Inventory model (EOQ) to cash management (Baumol model)]:** Economic Order Quantity (EOQ) model is used in determination of optimal level of cash of a company. According to this model optimal level of cash balance is one at which cost of carrying the inventory of cash and cost of going to the market for satisfying cash requirements is minimum. The carrying cost of holding cash refers to the interest foregone on marketable securities where as cost of giving to the market means cost of liquidating marketable securities in cash.

Optimum level of cash balance can be determined as follows:

$$Q = \sqrt{\frac{2AO}{C}}$$

Where Q = Optimum level of cash

A= Total amount of transaction demand

O= Average fixed cost of securing cash from the market (transaction cost)

C= Cost of carrying cash, i.e., interest rate on marketable securities for the period involved.

**Assumptions:** The model is based on the following assumptions:

- (i) The demand for cash, transactions costs of obtaining cash and the holding costs for a particular period are given and do not change during that period.
- (ii) There is a constant demand for cash during the period under consideration.
- (iii) Cash payments are predictable
- (iv) Banks do not impose any restrictions on firms with respect of maintenance of minimum cash balances in the bank accounts.

**b) Stochastic (Miller-Orr) Model:** The model prescribes two control limits, Upper control Limit (UCL) and Lower Control Limit (LCL). when the cash balances reaches the upper limit a transfer of cash to investment account should be made and when cash balances reach the lower point a portion of securities constituting investment account of the company should be liquidated to return the cash balances to its return point. The control limits are converting securities into cash and the vice – versa, and the cost carrying stock of cash.

The “O” optimal point of cash balance is determined by using the formula

$$O = \sqrt[3]{\frac{2TV}{4I}}$$

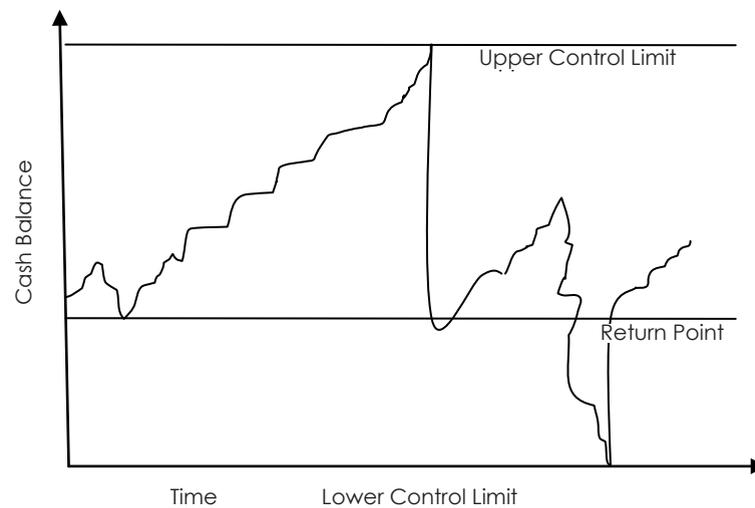
Where,

O = Target cash balance (Optimal cash balance)

T = Fixed cost associated with security transactions

I = Interest per day on marketable securities

V = Variance of daily net cash flows.



**Limitations:** This model is subjected to some practical problems

- (i) The first and important problem is in respect of collection of accurate data about transfer costs, holding costs, number of transfers and expected average cash balance.
- (ii) The cost of time devoted by financial managers in dealing with the transfers of cash to securities and vice versa.
- (iii) The model does not take into account the short term borrowings as an alternative to selling of marketable securities when cash balance reaches lower limit.

Besides the practical difficulties in the application of the model, the model helps in providing more, better and quicker information for management of cash. It was observed that the model produced considerable cost savings in the real life situations.

### c) Probability Model

According to this model, a Finance Manager has to estimate probabilistic out comes for net cash flows on the basis of his prior knowledge and experience. He has to determine what is the operating cash balance for a given period, what is the expected net cash flow at the end of the period and what is the probability of occurrence of this expected closing net cash flows.

The optimum cash balance at the beginning of the planning period is determined with the help of the probability distribution of net cash flows. Cost of cash shortages, opportunity cost of holding cash balances and the transaction cost.

#### Assumptions:

- (i) Cash is invested in marketable securities at the end of the planning period say a week or a month.
- (ii) Cash inflows take place continuously throughout the planning period.
- (iii) Cash inflows are of different sizes.
- (iv) Cash inflows are not fully controllable by the management of firm.
- (v) Sale of marketable securities and other short term investments will be effected at the end of the planning period.

The probability model prescribed the decision rule for the Finance Manager that he should go on investing in marketable securities from the opening cash balance until the expectation, that the ending cash balance will be below the optimum cash balance, where the ratio of the incremental net return per rupee of investment is equal to the incremental shortage cost per rupee.

**III) Strategy for economizing cash:** Once cash flow projections are made and appropriate cash balances are established, the finance manager should take steps towards effective utilization of available cash resources. A number of strategies have to be developed for this purpose. They are:

- a) Strategy towards accelerating cash inflows and
- b) Strategy towards decelerating cash outflows
- a) Strategy towards accelerating cash inflows:** In order to accelerate the cash inflows and maximize the available cash the firm has to employ several methods such as reduce the time lag between the moment a payment to the company is mailed and the moment the funds are ready for redeployment by the company. This includes the quick deposit of customer's cheques, establishing collection centers and lock – box system etc.
- b) Strategy for slowing cash outflows:** In order to accelerate cash availability in the company, Finance Manager must employ some devices that could slow down the speed of payments outward in addition to accelerating collections. The methods of slowing down disbursements are as follows:
  - (i) Delaying outward payment;
  - (ii) Making pay roll periods less frequent;
  - (iii) Solving disbursement by use of drafts;
  - (iv) Playing the float;
  - (v) Centralised payment system;
  - (vi) By transferring funds from one bank to another bank firm can maximize its cash turnover.

**Illustration 17:**

United Industries Ltd. projects that cash outlays of ₹ 37,50,000 will occur uniformly throughout the coming year. United plans to meet its cash requirements by periodically selling marketable securities from its portfolio. The firm's marketable securities are invested to earn 12% and the cost per transaction of converting securities to cash is ₹ 40.

- (a) Use the Baumol Model to determine the optimal transaction size of marketable securities to cash.
- (b) What will be the company's average cash balance?
- (c) How many transfers per year will be required?
- (d) What will be the total annual cost of maintaining cash balances?

**Solution:**

(a) Optimal size =  $\sqrt{2TA/I} = \sqrt{(2 \times 40 \times 37,50,000)/0.12} = 50,000$

(b) Average cash balance = ₹ 25,000

(c) No of transactions per year =  $37,50,000/50,000 = 75$

(d) Total annual cost

Transaction cost     $75 \times 40$                     =    3,000

Opportunity cost  $50,000 \times 1/2 \times 12\%$  =    3,000

6,000

**Illustration 18:**

The Cyberglobe Company has experienced a stochastic demand for its product. With the result that cash balances fluctuate randomly. The standard deviation of daily net cash flows is ₹ 1,000, The company

wants to impose upper and lower bound control limits for conversion of cash into marketable securities and vice-versa. The current interest rate on marketable securities is 6%. The fixed cost associated with each transfer is ₹ 1,000 and minimum cash balance to be maintained is ₹ 10,000.

Compute the upper and lower limits.

**Solution:**

Standard Deviation = 1,000

Variance = 1,000 x 1,000 = 10,00,000

Interest = 6% / 365 = 0.016%

T = 1,000

L = 10,000

$$Z = 3\sqrt{(3TV / 4I)} = 3\sqrt{(3 \times 1,000 \times 1,000 \times 1,000) / (4 \times 0.016\%)} \\ = 3,573$$

Return point = Z + L

$$\rightarrow 3573 + 10000 = 13573$$

Upper limit = 3R - 2L

$$\rightarrow 40719 - 20000 = 20719$$

## 5.12 LEVERAGES

The concept of leverage has its origin in science. It means influence of one force over another. Since financial items are inter-related, change in one, causes change in profit. In the context of financial management, the term 'leverage' means sensitiveness of one financial variable to change in another. The measure of this sensitiveness is expressed as a ratio and is called degree of leverage.

Algebraically, the leverage may be defined as,

$$\text{Leverage} = \frac{\% \text{ change in one variable}}{\% \text{ change in some other variable}}$$

### Measures of Leverage

To understand the concept of leverage, it is imperative to understand the three measures of Leverage which are as follows:

- (i) Operating Leverage
- (ii) Financial Leverage
- (iii) Combined Leverage

#### (i) Operating Leverage

Operating Leverage reflects the impact of change in sales on the level of operating profits of the firm.

The significance of DOL may be interpreted as follows:

- Other things remaining constant, higher the DOL, higher will be the change in EBIT for same change in number of units sold in, if firm A has higher DOL than firm B, profits of firm A will increase at faster rate than that of firm B for same increase in demand.

This however works both ways and so losses of firm A will increase at faster rate than that of firm B for same fall in demand. This means higher the DOL, more is the risk.

- DOL is high where contribution is high.
- There is an unique DOL for each level of output.

$$\text{Thus, DOL} = \frac{\text{Contribution}}{\text{EBIT}}$$

### (ii) Financial Leverage

The Financial Leverage may be defined as a % increase in EPS associated with a given percentage increase in the level of EBIT. Financial leverage emerges as a result of fixed financial charge against the operating profits of the firm. The fixed financial charge appears in case the funds requirement of the firm are partly financed by the debt financing. By using this relatively cheaper source of finance, in the debt financing, the firm is able to magnify the effect of change in EBIT on the level of EPS.

The significance of DFL may be interpreted as follows :

- Other things remaining constant, higher the DFL, higher will be the change in EPS for same change in EBIT. In other words, if firm K has higher DFL than firm L, EPS of firm K increases at faster rate than that of firm L for same increase in EBIT. However, EPS of firm K falls at a faster rate than that of firm K for same fall in EBIT. This means, higher the DFL more is the risk.
- Higher the interest burden, higher is the DFL, which means more a firm borrows more is its risk.
- Since DFL depends on interest burden, it indicates risk inherent in a particular capital mix, and hence the name financial leverage.

There is an unique DFL for each amount of EBIT.

While operating leverage measures the change in the EBIT of a company to a particular change in the output, the financial leverage measures the effect of the change in EBIT on the EPS of the company.

Thus the degree of financial leverage (DFL) is ratio between proportionate change in EPS and proportionate change in EBIT.

$$\text{DFL} = \frac{\text{Earning before interest and tax}}{\text{Earning after interest}} = \frac{\text{EBIT}}{\text{EBT}}$$

### (iii) Combined Leverage

A combination of the operating and financial leverages is the total or Combination Leverage.

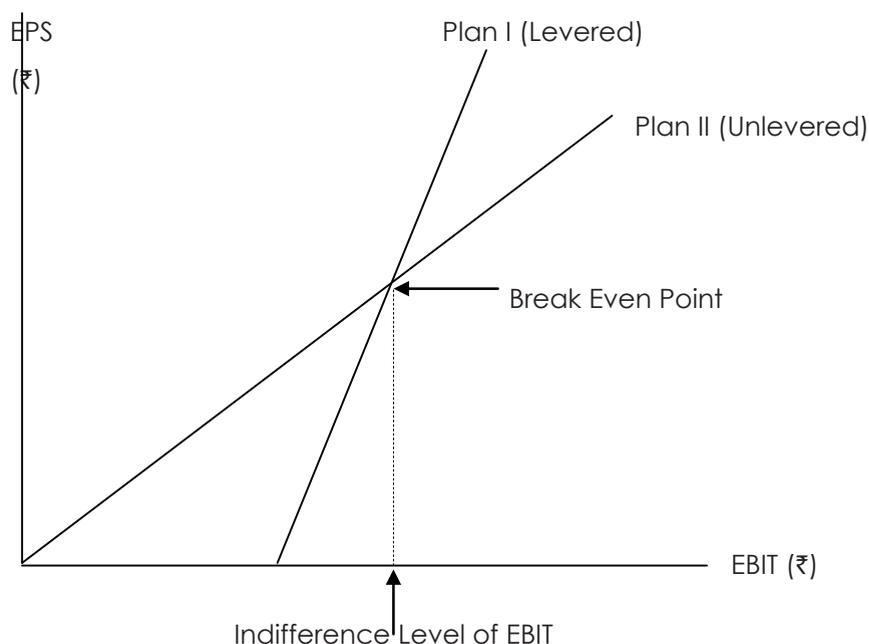
The operating leverage causes a magnified effect of the change in sales level on the EBIT level and if the financial leverage combined simultaneously, then the change in EBIT will, in turn, have a magnified effect on the EPS. A firm will have wide fluctuations in the EPS for even a small change in the sales level. Thus effect of change in sales level on the EPS is known as combined leverage.

Thus Degree of Combined Leverage may be calculated as follows:

$$\text{DCL} = \frac{\text{Contribution}}{\text{Earning after Interest}} = \frac{C}{\text{EBT}}$$

## 5.13 EBIT – EPS INDIFFERENCE POINT/LEVEL

The indifference level of EBIT is one at which the EPS remains same irrespective of the debt-equity mix. While designing a capital structure, a firm may evaluate the effect of different financial plans on the level of EPS, for a given level of EBIT. Out of several available financial plans, the firm may have two or more financial plans which result in the same level of EPS for a given EBIT. Such a level of EBIT at which the firm has two or more financial plans resulting in same level of EPS, is known as indifference level of EBIT.



**Fig: Graphical Presentation of Indifference Level**

Thus, the indifference level of EBIT is one at which the EPS under different financial plans are expected to be same. If the EBIT is more than the indifference level, the financial leverage being to operate resulting increase in EPS. However, if the EBIT is less than the indifferent level, then the EPS is expected to decrease as a result of debt financing. So, the expected level of EBIT should be more than the indifference level EBIT in order to avail the benefits of financial leverage i.e., debt financing from the point of view of equity shareholders. However, if the expected EBIT is less than the indifference level EBIT, the firm should raise the funds by issuing equity share capital only and avoid the debt financing.

The intersection between the EPS lines that represent the EBIT break-even points or indifference level of EBIT can be quite easily calculated. For this purpose, one has to formulate simple equations for the conditions underlying any intersecting pair of line. EPS are then set as equal for the two alternatives, and the equations are solved for the value of EBIT level at which this condition hold.

#### 5.14 CALCULATION OF INDIFFERENCE POINT

For calculation of indifference EBIT:

	EPS under Plan I (100% equity)	EPS under Plan II (Debt Plan)	EPS under Plan III (Preference Capital)
EPS	$\frac{EBIT (1 - t)}{N_a}$	$\frac{EBIT - I (1 - t)}{N_b}$	$\frac{EBIT (1 - t) - P.D.}{N_c}$

Where EBIT = Earnings before interest and taxes

t = Corporate tax rate

$N_a = N_b = N_c =$  No. of equity shares under different plans.

Where Plan I = 100% equity

Plan II = Debt plan

Plan III = Preference Capital

### Interpretation of the Indifference Point

Situation	Option	Reason
EBIT below Indifference Point	Option with lower debt (Interest Burden)	When rate of earnings and operating profits (EBIT) are low, more interest and debt burden is not advisable. A high DOL should be properly managed by low Financial Leverage.
EBIT equal to Indifference Point	Any alternative can be chosen.	Same EPS due to Indifference Point.
EBIT above Indifference Point	Option with higher debt (Interest Burden)	When EBIT is high, Financial Leverage works till the EPS is maximised. Low DOL should be coupled with high DFL, to maximize gain of Equity Shareholders.

#### Illustration 19:

Calculate the Degree of Operating Leverage (DOL), Degree of Financial Leverage (DFL) and the Degree of Combined Leverage (DCL) for the following firms and interpret the results.

	Firm K	Firm L	Firm M
1. Output (Units)	60,000	15,000	1,00,000
2. Fixed costs (₹.)	7,000	14,000	1,500
3. Variable cost per unit (₹.)	0.20	1.50	0.02
4. Interest on borrowed funds (₹.)	4,000	8,000	—
5. Selling price per unit (₹.)	0.60	5.00	0.10

#### Solution:

X	Firm K	Firm L	Firm M
Output (Units)	60,000	15,000	1,00,000
Selling Price per unit (₹)	0.60	5.00	0.10
Variable Cost per unit	0.20	1.50	0.02
Contribution per unit (₹)	0.40	3.50	0.08
Total Contribution (Unit × Contribution per unit) (₹)	₹ 24,000	₹ 52,500	₹ 8,000
Less: Fixed Costs (₹)	7,000	14,000	1,500
EBIT (₹)	17,000	38,500	6,500
Less : Interest (₹)	4,000	8,000	—
Profit before Tax (P.B.T.) (₹)	13,000	30,500	6,500
Degree of Operating Leverage = $\frac{\text{Contribution}}{\text{EBIT}}$	$\frac{24,000}{17,000}$	$\frac{52,500}{38,500}$	$\frac{8,000}{6,500}$
	=1.41	=1.38	=1.23
Degree of Financial Leverage = $\frac{\text{EBIT}}{\text{PBT}}$	$\frac{17,000}{13,000}$	$\frac{38,500}{30,500}$	$\frac{6,500}{6,500}$
	=1.31	=1.26	=1.00
Degree of Combined Leverage = $\frac{\text{Contribution}}{\text{PBT}}$	$\frac{24,000}{13,000}$	$\frac{52,500}{30,500}$	$\frac{8,000}{6,500}$
	=1.85	=1.72	=1.23

#### Interpretation:

High operating leverage combined with high financial leverage represents risky situation. Low operating leverage combined with low financial leverage will constitute an ideal situation. Therefore, firm M is less risky because it has low fixed cost and low interest and consequently low combined leverage.

### Illustration 20:

A firm has sales of ₹ 10,00,000, variable cost of ₹ 7,00,000 and fixed costs of ₹ 2,00,000 and debt of ₹ 5,00,000 at 10% rate of interest. What are the operating, financial and combined leverages? If the firm wants to double its Earnings before interest and tax (EBIT), how much of a rise in sales would be needed on a percentage basis?

#### Solution:

#### Statement of Existing Profit

Sales	₹ 10,00,000
Less : Variable Cost	7,00,000
Contribution	3,00,000
Less : Fixed Cost	2,00,000
EBIT	1,00,000
Less : Interest @ 10% on 5,00,000	50,000
Profit before tax (PBT)	50,000

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EPBT}} = \frac{3,00,000}{1,00,000} = 3$$

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{PBT}} = \frac{1,00,000}{50,000} = 2$$

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{PBT}} = \frac{3,00,000}{50,000} = 6$$

#### Statement of Sales needed to double the EBIT

Operating leverage is 3 times i.e., 33-1/3% increase in sales volume cause a 100% increase in operating profit or EBIT. Thus, at the sales of ₹ 13,33,333, operating profit or EBIT will become ₹ 2,00,000 i.e., double the existing one.

#### Verification

Sales	₹ 13,33,333
Variable Cost (70%)	9,33,333
Contribution	4,00,000
Fixed Costs	2,00,000
EBIT	2,00,000

### Illustration 21:

X Corporation has estimated that for a new product its break-even point is 2,000 units if the items are sold for ₹ 14 per unit; the Cost Accounting department has currently identified variable cost of ₹ 9 per unit. Calculate the degree of operating leverage for sales volume of 2,500 units and 3,000 units. What do you infer from the degree of operating leverage at the sales volumes of 2,500 units and 3,000 units and their difference if any?

**Solution:****Statement of Operating Leverage**

₹

Particulars	2,500 Units	3,000 Units
Sales @ ₹ 14 per unit	35,000	42,000
Variable cost @ ₹ 149 per unit	22,500	27,000
Contribution	12,500	15,000
Fixed cost ₹ [2,000 × (14 – 9)]	10,000	10,000
EBIT	2,500	5,000
Operating Leverage = $\frac{\text{Contribution}}{\text{PBT}}$	$\frac{12,500}{2,500}$	$\frac{15,000}{5,000}$
=	5	3

At the sales volume of 3000 units, the operating profit is ₹ 5,000 which is double the operating profit of ₹ 2,500 (sales volume of 2,500 units) because of the fact that the operating leverage is 5 times at the sales volume of 2,500 units. Hence increase of 20% in sales volume, the operating profit has increased by 100% i.e., 5 times of 20%. At the level of 3,000 units, the operating leverage is 3 times. If there is change in sales from the level of 3,000 units, the % increase in EBIT would be three times that of % increase in sales volume.

**Illustration 22**

The following information is available for ABC & Co.

₹

EBIT	11,20,000
Profit before Tax	3,20,000
Fixed costs	7,00,000

Calculate % change in EPS if the sales are expected to increase by 5%.

**Solution:**

In order to find out the % change in EPS as a result of % change in sales, the combined leverage should be calculated as follows:

$$\text{Operating Leverage} = \text{Contribution/EBIT} = \frac{\text{₹ } 11,20,000 + \text{₹ } 7,00,000}{11,20,000} = 1.625$$

$$\text{Financial Leverage} = \text{EBIT/Profit before Tax} = \frac{\text{₹ } 11,20,000}{3,20,000} = 3.5$$

$$\text{Combined Leverage} = \text{Contribution/Profit before tax} = \text{OL} \times \text{FL} = 1.625 \times 3.5 = 5.69.$$

The combined leverage of 5.69 implies that for 1% change in sales level, the % change in EPS would be 5.69%. So, if the sales are expected to increase by 5%, then the % increase in EPS would be  $5 \times 5.69 = 28.45\%$ .

**Illustration 23:**

XYZ and Co. has three financial plans before it, Plan I, Plan II and Plan III. Calculate operating and financial leverage for the firm on the basis of the following information and also find out the highest and lowest value of combined leverage:

Production	800 Units
Selling Price per unit	₹ 15
Variable cost per unit	₹ 10
Fixed Cost : Situation A	₹ 1,000
Situation B	₹ 2,000
Situation C	₹ 3,000

Capital Structure	Plan I	Plan II	Plan III
Equity Capital	₹ 5,000	₹ 7,500	₹ 2,500
12% Debt	5,000	2,500	7,500

**Solution:**

**Calculation of Operating Leverage:**

₹

	Situation A	Situation B	Situation C
Number of unit sold	800	800	800
Sales @ ₹ 15	12,000	12,000	12,000
Variable cost @ ₹ 10	8,000	8,000	8,000
Contribution	4,000	4,000	4,000
Fixed cost	1,000	2,000	3,000
EBIT	3,000	2,000	1,000
Operating Leverage	1.33	2.00	4.00
Contribution/EBIT			

**Calculation of Financial Leverage:**

₹

	Plan I	Plan II	Plan III
<b>Situation A</b>			
EBIT	₹ 3,000	₹ 3,000	₹ 3,000
Less : Interest @ 12%	600	300	900
Profit before Tax	2,400	2,700	2,100
Financial Leverage (EBIT/Profit before Tax)	1.25	1.11	1.43
<b>Situation B</b>			
EBIT	₹ 2,000	₹ 2,000	₹ 2,000
Less : Interest @ 12%	600	300	900
Profit before Tax	1,400	1,700	1,100
Financial Leverage (EBIT/Profit before Tax)	1.43	1.18	1.82
<b>Situation C</b>			
EBIT	₹ 1,000	₹ 1,000	₹ 1,000
Less : Interest @ 12%	600	300	900
Profit before Tax	400	700	100
Financial Leverage (EBIT/Profit before Tax)	2.5	1.43	10.0

**Calculation of Combined Leverage:**

The combined leverage may be calculated by multiplying the operating leverage and financial leverage for different combination of Situation A, B & C and the Financial Plans, I, II & III as follows:

	Situation A	Situation B	Situation C
Plan I	1.66	2.86	10
Plan II	1.47	2.36	5.72
Plan III	1.90	3.64	40

The calculation of combined leverage shows the extent of the total risk and is helpful to understand the variability of EPS as a consequence of change in sales levels. In this case, the highest combined leverages is there when financial plan III is implemented in situation C; and lowest value of combined leverage is attained when financial plan II is implemented in situation A.

**Illustration 24:**

The selected financial data for A, B and C companies for the year ended March, 2012 are as follows:

Particulars	A	B	C
Variable expenses as a % Sales	66.67	75	50
Interest	₹ 200	₹ 300	₹ 1,000
Degree of Operating leverage	5 : 1	6 : 1	2 : 1
Degree of Financial leverage	3 : 1	4 : 1	2 : 1
Income tax rate	50%	50%	50%

Prepare Income Statements for A, B and C companies.

**Solution:**

The information regarding the operating leverage and financial leverage may be interpreted as follows—For Company A, the DFL is 3 : 1 (i.e., EBIT : PBT) and it means that out of EBIT of 3, the PBT is 1 and the remaining 2 is the interest component. Or, in other words, the EBIT : Interest is 3:2.

Similarly, for the operating leverage of 6:1 (i.e., Contribution : EBIT) for Company B, it means that out of Contribution of 6, the EBIT is 1 and the balance 5 is fixed costs. In other words, the Fixed costs: EBIT is 5:1. This information may be used to draw the statement of sales and profit for all the three firms as follows:

**Statement of Operating Profit and Sales**

Particulars	A	B	C
Financial leverage = (EBIT/PBT) =	3 : 1	4 : 1	2 : 1
or, EBIT/Interest	3 : 2	4 : 3	2 : 1
Interest	₹ 200	₹ 300	₹ 1,000
EBIT $200 \times 3/2$ ; $300 \times 4/3$ ; $1,000 \times 2/1$	= 300	= 400	= 2,000
Operating leverage = (Cont./EBIT)	5 : 1	6 : 1	2 : 1
i.e., Fixed Exp./EBIT	4 : 1	5 : 1	1 : 1
Variable Exp. to Sales	66.67%	75%	50%
Contribution to Sales	33.33%	25%	50%
Fixed costs	$300 \times 4/1$	$400 \times 5/1$	$2,000 \times 1/1$
	= 1,200	= 2,000	= 2,000
Contribution = (Fixed cost + EBIT)	1,500	2,400	4,000
Sales	4,500	9,600	8,000

**Income Statement for the year ended 31.03.12**

Particulars	A	B	C
Sales	₹ 4,500	₹ 9,600	₹ 8,000
Variable cost	3,000	7,200	4,000
Contribution	1,500	2,400	4,000
Fixed Costs	1,200	2,000	2,000
EBIT	300	400	2,000
Interest	200	300	1,000
PBT	100	100	1,000
Tax at 50%	50	50	500
Profit after Tax (PAT)	50	50	500
Operating leverage (Cont./EBIT) =	5	6	2
Financial leverage (EBIT/PBT) =	3	4	2
Combined leverage	15	24	4

### Illustration 25:

The following data is available for XYZ Ltd. :

Sales	₹ 2,00,000
Less : Variable cost @ 30%	60,000
Contribution	1,40,000
Less : Fixed Cost	1,00,000
EBIT	40,000
Less : Interest	5,000
Profit before tax	35,000

#### Find out:

- Using the concept of financial leverage, by what percentage will the taxable income increase if EBIT increase by 6%?
- Using the concept of operating leverage, by what percentage will EBIT increase if there is 10% increase in sales, and
- Using the concept of leverage, by what percentage will the taxable income increase if the sales increase by 6%. Also verify results in view of the above figures.

#### Solution :

- a) Degree of Financial Leverage :

$$DFL = \text{EBIT} / \text{Profit before Tax} = 40,000 / 35,000 = 1.15$$

If EBIT increase by 6%, the taxable income will increase by  $1.15 \times 6 = 6.9\%$  and it may be verified as follows:

EBIT (after 6% increase)	₹ 42,400
Less : Interest	5,000
Profit before Tax	37,400

Increase in taxable income is ₹ 2,400 i.e., 6.9% of ₹ 35,000

- b) Degree of Operating Leverage:

$$DOL = \text{Contribution} / \text{EBIT} = 1,40,000 / 40,000 = 3.50$$

If Sales increase by 10%, the EBIT will increase by  $3.50 \times 10 = 35\%$  and it may be verified as follows:

Sales (after 10% increase)	₹ 2,20,000
Less : Variable Expenses @ 30%	66,000
Contribution	1,54,000
Less : Fixed cost	1,00,000
EBIT	54,000

Increase in EBIT is ₹ 14,000 i.e., 35% of ₹ 40,000.

- c) Degree of Combined Leverage :

$$DCL = \text{Contribution} / \text{Profit before Tax} = 1,40,000 / 35,000 = 4$$

If Sales increases by 6%, the profit before tax will increase by  $4 \times 6 = 24\%$  and it may be verified as follows:

Sales (after 6% increase)	₹ 2,12,000
Less : Variable Expenses @ 30%	63,600
Contribution	1,48,400
Less : Fixed cost	1,00,000
EBIT	48,400
Less : Interest	5,000
Profit before Tax	43,400

Increase in Profit before tax is ₹ 8,400 i.e., 24% of ₹ 35,000.

**Illustration 26:**

(i) Find out operating leverage from the following data:

Sales	₹ 50,000
Variable Costs	60%
Fixed Costs	₹ 12,000

(ii) Find out of financial leverage from the following data :

Net Worth	₹ 25,00,000
Debt/Equity	3 : 1
Interest rate	12%
Operating Profit	₹ 20,00,000

**Solution:**

(i)

Sales	₹ 50,000
Less : Variable cost at 60%	30,000
Contribution	20,000
Less : Fixed Cost	12,000
Operating Profit	₹ 8,000

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{Operating Profit}} = \frac{20,000}{8,000} = 2.50$$

(ii)

Net worth =	₹ 25,00,000
Debt/Equity =	3 : 1
Hence Debt =	₹ 75,00,000
EBIT	20,00,000
Less : Interest at 12% on 75,00,000	9,00,000
PBT	11,00,000

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{PBT}} = \frac{20,00,000}{11,00,000} = 1.82$$

### Illustration 27

From the following, prepare Income Statements of A, B and C firms.

	Firm A	Firm B	Firm C
Financial Leverage	3 : 1	4 : 1	2 : 1
Interest	₹ 200	₹ 300	₹ 1,000
Operating Leverage	4 : 1	5 : 1	3 : 1
Variable cost as a % of sales	66.67%	75%	50%
Income-tax Rate	45%	45%	45%

#### Solution:

##### Firm A

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{PBT}} = \frac{3}{1} \text{ or EBIT} = 3 \times \text{EBT} \dots (1)$$

$$\text{Again EBIT-Interest} = \text{EBT}$$

$$\text{or EBIT}-200 = \text{EBT} \dots (2)$$

Taking (1) and (2) we get  $3 \text{ EBT}-200 = \text{EBT}$

$$\text{or } 2 \text{ EBT} = 200$$

$$\text{or EBT} = ₹ 100$$

$$\text{Hence EBIT} = 3 \text{ EBT} = ₹ 300$$

Again, the operating leverage =  $\text{Contribution}/\text{EBIT} = 4/1$

$$\text{EBIT} = ₹. 300,$$

$$\text{Contribution} = 4 \times \text{EBIT} = ₹ 1,200$$

Now variable cost = 66.67% on sales

$$\text{Contribution} = 100-66.67\% \text{ i.e., } 33\frac{1}{3}\% \text{ on sales}$$

$$\text{Hence sales} = 1200/33\frac{1}{3}\% = ₹ 3,600.$$

Same way EBIT, EBT, Contribution and Sales for firms B and C can be worked out.

##### Firm B

$$\text{Firm B} = \frac{\text{EBIT}}{\text{PBT}} = \frac{4}{1} \text{ or EBIT} = 4 \text{ EBT} \dots (3)$$

$$\text{Again EBIT-Interest} = \text{EBT or EBIT}-300 = \text{EBT} \dots (4)$$

Taking (3) and (4) we get  $4 \text{ EBT}-300 = \text{EBT}$

$$\text{or } 3 \text{ EBT} = 300$$

$$\text{or EBT} = ₹ 100$$

$$\text{Hence EBIT} = 4 \times \text{EBT} = ₹ 400$$

Again Operating leverage =  $\text{Contribution}/\text{EBIT} = 5/1$

$$\text{EBIT} = ₹ 400, \text{ Hence Contribution} = 5 \times \text{EBIT} = ₹ 2,000$$

Now variable cost = 75% on Sales

$$\text{Contribution} = 100-75\% \text{ i.e., } 25\% \text{ on Sales}$$

$$\text{Hence Sales} = 2000/25\% = ₹ 8,000.$$

**Firm C**

Financial Leverage =  $\frac{EBIT}{PBT} = \frac{2}{1}$  or EBIT = 2EBT .....(5)

Again EBIT-Interest = EBT or EBIT – 1000 = EBT ... (6)

Taking (5) and (6) we get 2EBT-1000 = EBT or EBT = ₹ 1,000

Hence EBIT = 2 × EBT = ₹ 2,000

Again Operating leverage = Contribution/EBIT = 3/1

EBIT = ₹ 2,000, Hence Contribution = 3 × EBIT = ₹ 6,000

Now Variable cost = 50% on Sales

Contribution = 100 – 50 = 50% on Sales

Hence Sales = 6,000/50% = ₹ 12,000.

**Income Statement**

Particulars	Firm A	Firm B	Firm C
Sales	₹ 3,600	₹ 8,000	₹ 12,000
Less : Variable Cost	2,400	6,000	6,000
Contribution	1,200	2,000	6,000
Less : Fixed cost	900	1,600	4,000
EBIT	300	400	2,000
Less : Interest	200	300	1,000
EBT	100	100	1,000
Less : Tax @ 45%	45	45	450
Profit after Tax (PAT)	55	55	550

**Illustration 28**

ABC Ltd. wants to raise ₹ 5,00,000 as additional capital. It has two mutually exclusive alternative financial plans. The current EBIT is ₹ 17,00,000 which is likely to remain unchanged. The relevant Information is –

Present Capital Structure: 3,00,000 Equity shares of ₹ 10 each and 10% Bonds of ₹ 20,00,000.

Tax Rate:	50%
Current EBIT:	₹ 17,00,000
Current EPS:	₹ 2.50
Current Market Price:	₹ 25 per share
Financial Plan I:	20,000 Equity Shares at ₹ 25 per share.
Financial Plan II:	12% Debentures of ₹ 5,00,000.

What is the indifference level of EBIT? Identify the financial break-even levels.

**Solution:**

**1. Computation of EBIT - EPS Indifference Point**

Particulars	Financial Plan I - Equity	Financial Plan II - Debt
Owner's Funds	(3,00,000×10+20,000×25)=	3,00,000×10= ₹ 30,00,000
	₹ 35,00,000	
Borrowed Funds (given)	₹ 20,00,000	20,00,000+5,00,000= ₹ 25,00,000
Total Capital Employed	₹ 55,00,000	₹ 55,00,000

Particulars	Financial Plan I	Financial Plan II
EBIT (let it be ₹. X)	X	X
Less: Interest	20,00,000×10%= ₹ 2,00,000	(20,00,000×10%+5,00,000×12%)= ₹ 2,60,000
EBT	X—2,00,000	X—2,60,000
Less: Tax at 50%	$\frac{1}{2}X-1,00,000$	$\frac{1}{2}X-1,30,000$
EAT	$\frac{1}{2}X-1,00,000$	$\frac{1}{2}X-1,30,000$
Number of Equity Shares	3,00,000+20,000=3,20,000	(given) 3,00,000
EPS	$[\frac{1}{2}X-1,00,000] \div 3,20,000$	$[\frac{1}{2}X-1,30,000] \div 3,00,000$

For indifference between the above alternatives, EPS should be equal. Hence, we have

$$\frac{\frac{1}{2}x - 1,00,000}{3,00,000} = \frac{\frac{1}{2}x - 1,30,000}{3,20,000}$$

On Cross Multiplication, 15X - 30 Lakhs = 16X - 41.6 Lakhs; or X = 11.6 Lakhs

Hence EBIT should be ₹ 11.60 Lakhs and at that level, EPS will be ₹ 1.50 under both alternatives.

## 2. Computation of Financial Break-Even Point

The Financial BEP for the two plans are --

Plan I EBIT = ₹ 2,00,000 (i.e. 10% interest on ₹ 20,00,000)

Plan II EBIT = ₹ 2,60,000 (i.e. 10% interest on ₹ 20,00,000 and 12% interest on ₹ 5,00,000)

### SELF EXAMINATION QUESTIONS:

1. Explain Working Capital and its kinds.
2. What are the determinants of Working Capital?
3. What are the consequences of excessive and inadequate Working Capital?
4. What are the various sources of Working Capital?
5. What are the costs associated with maintaining receivables?
6. Write short note on:
  - a) Tandon Committee norms
  - b) Hard Core Working Capital
  - c) Economic Ordering Quantity
  - d) Inventory Turnover Ratio
  - e) Working Capital Cycle (or) Operating Cycle
  - f) Miller-Orr Model Cash Management
  - g) Strategy for accelerating cash inflow.
  - h) Credit evaluation of customer.
  - i) Operating Leverage
  - j) Financial Leverage
  - k) Combined Leverage
  - l) EBIT – EPS Indifference Point

**PRACTICAL PROBLEMS**

7. The board of Directors of Nanak Engineering Company Private Ltd. request you to prepare a statement showing the Working Capital requirements forecast for a level of activity of 1,56,000 units of production.

The following information is available for your calculation:

a.

	Per unit
Raw materials	₹ 90
Direct labour	40
Overheads	75
	205
Profits	60
Selling price per unit	265

b.

- (i) Raw materials are in stock on average one month.
- (ii) Materials are in process, on average 2 weeks.
- (iii) Finished goods are in stock, on average 1 month.
- (iv) Credit allowed by supplier one month.
- (v) Time lag in payment from debtors two months.
- (vi) Lag in payment of wages 1½ week.
- (vii) Lag in payment of overheads is one month.

20% of the output is sold against cash. Cash in hand and at bank is expected to be ₹ 60,000. It is to be assumed that production is carried on evenly throughout the year, wages and overheads accrue similarly and a time period of 4 weeks is equivalent to a month.

**Hint:** Current Assets ₹ 84,21,000, Current liabilities ₹ 21,60,000

8. On 1st April, 2011 the Board of Directors of Calci Limited wishes to know the amount of Working Capital that will required to meet the programme of activity they have planned for the year. The following information is available.
- i) Issued and paid-up capital ₹ 2,00,000
  - ii) Fixed assets valued at ₹ 1,25,000 on 31-12-2010
  - iii) 5% Debentures ₹ 50,000
  - iv) Production during the previous year was 60,000 units; it is planned that this level of activity should be maintained during the present year.
  - v) The expected ratios of cost to selling price are – raw materials 60%, direct wages 10%, and overheads 20%.
  - vi) Raw materials are expected to remain in stores for an average of two months before these are issued for production.
  - vii) Each unit of production is expected to be in process for one month.
  - viii) Finished goods will stay in warehouse for approximately three months.
  - ix) Creditors allow credit for 2 months from the date of delivery of raw materials.



- x) Credit allowed to debtors is 3 months from the date of dispatch.
- xi) Selling price per unit is ₹ 5.
- xii) There is a regular production and sales cycle.

You are required to prepare:

- a) Working Capital requirement forecast; and
- b) An estimated Profit and Loss Account and Balance Sheet at the end of the year.

**Hint:** Current Assets ₹ 1,83,750, Current liabilities ₹ 30,000, Work in process ₹ 18,750, Balance Sheet Total ₹ 3,16,250, Debtors ₹ 75,000, Investment in Debtors ₹ 67,500

9. Q 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:

	₹
Sales (at 2 months credit)	24,00,000
Materials consumed (suppliers credit 2 months)	6,00,000
Wages paid (Monthly at the beginning of the subsequent month)	4,80,000
Manufacturing expenses (cash expenses are paid – one month in arrear)	6,00,000
Administration expenses (cash expenses are paid – one month in arrear)	1,50,000
Sales promotion expenses (paid quarterly in advance)	75,000

The company keeps one month stock each of raw materials and finished goods. A minimum cash balance of ₹ 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.

**Hint:** Current Assets ₹ 6,06,250, Current liabilities ₹ 2,02,500

10. X Ltd. sells goods at a gross profit of 20%. It includes depreciation as part of cost of production. The following figures for the 12 months ending 31st Dec, 2011 are given to enable you to ascertain the requirement of working capital of the company on a cash cost basis.

In your working, you are required to assume that:

- i) a safety margin of 15% will be maintained;
- ii) Cash is to be held to the extent of 50% of current liabilities;
- iii) There will be no work-in-progress;
- iv) Tax is to be ignored.

Stocks of raw materials and finished goods are kept at one month's requirements. All working notes are to form part of your answer.

Sales at 2 months credit	₹ 27,00,000
Materials consumed (suppliers credit is for 2 months)	6,75,000
Total wages (paid at the beginning of the next month)	5,40,000
Manufacturing expenses outstanding at the end of the year (These expenses are paid one month in arrears)	60,000
Total administrative expenses (paid as above)	1,80,000
Sales promotion expenses paid quarterly and in advance	90,000

**Hint:** Current Assets ₹ 7,23,250, Current liabilities ₹ 2,32,500

11. Shree Cement Company Ltd, has an installed capacity of producing 1.25 lakh tonnes of cement per annum; its present capacity utilization is 80 percent, The major raw material to manufacture cement is limestone which is obtained from the company's own mechanized mine-located near the plant. The company produces cement in 200 kgs bags. From the information given below, determine the net working capital (NWC) requirement of the company for the current year.

**Cost structure per bag of cement (estimated)**

	₹
Gypsum	25
Limestone	15
Coal	30
Packing material	10
Direct labour	50
Factory overheads (including depreciation of ₹. 10)	30
Administrative overheads	20
Selling overheads	25
Total cost	205
Profit margin	45
Selling price	250
Add sale tax (10 percent of selling price)	25
Invoice price to consumers'	275

**Additional information**

- (i) Desired holding period of raw materials:
  - Gypsum, 3 months
  - Limestone, 1 month
  - Coal, 2.5 months
  - Packing material, 1.5 months
- (ii) The product is in process for a period of  $\frac{1}{2}$  month (assume full units of materials, namely gypsum, limestone and coal are required in the beginning; other conversion costs are to be taken at 50 percent.
- (iii) Finished goods are in stock for a period of 1 month before they are sold.
- (iv) Debtors are extended credit for a period of 3 months.
- (v) Average time lag in payment of wages is approximately  $\frac{1}{2}$  month and of overheads, 1 month.
- (vi) Average time lag in payment of sales tax is 1.5 months.
- (vii) The credit period extended by various suppliers are:
  - i. Gypsum, 2 months
  - ii. Coal, 1 month.
  - iii. Packing materials  $\frac{1}{2}$  month
- (viii) Minimum desired cash balance is ₹. 25 lakh. You may state your assumptions, if any.

**[Hint: Total Current Assets ₹ 4,69,79,166; current liabilities ₹ 88,54,166; \* WIP ₹ 23,95,833]**

12. XYZ Corporation is considering relaxing its present credit policy and is in the process of evaluating two proposed policies. Currently, the firm has annual credit sales of ₹ 50 lakhs and accounts receivable turnover ratio of 4 times a year. The current level of loss due to bad debts is ₹ 1,50,000. The firm is required to give a return of 25% on the investment in new accounts receivable. The company's variable costs are 70% of the selling price. Given the following information, which is the better option?

	Present Policy	Policy Option I	Option II
Annual credit sales Accounts receivable	₹ 50,00,000	60,00,000	67,50,000
Turnover ratio	4 times	3 times	2.4 times
Bad debts losses	1,50,000	3,00,000	4,50,000

**Hint:** Investment in debtors under present policy I ₹ 8,75,000, under proposed policy I ₹ 14,00,000, and policy II ₹ 19,68,750

13. A trader whose current sales are in the region of ₹ 8,00,000 per annum and an average collection period of 30 days wants to pursue a more liberal policy to improve sales. A study made by a management consultant reveals the following information

Credit policy	Increase in collection period	Increase in Sales	Present default anticipated
A	10 days	₹ 30,000	1.5%
B	20 days	₹ 48,000	2%
C	30 days	₹ 75,000	3%
D	40 days	₹ 90,000	4%

The selling price per unit is ₹ 3. Average cost per unit is ₹ 2.25 and variable costs per unit are ₹ 2.

The current bad debt loss is 1%. Required return on additional investment is 20%. Assume a 360 days year.

Which of the above policies would you recommend for adoption?

**Hint:** policy A is recommended.

14. XYZ Ltd. has annual credit sales amounting to ₹ 10,00,000 for which it grants a credit of 60 days. However, at present no discount facility is offered by the firm to its customers. The company is considering a plan to offer a discount of "3 / 15 net 60". The offer of discount is expected to bring the total credit periods from 60 days to 45 days and 50% of the customers (in value) are likely to avail the discount facility. The selling price of the produces is ₹ 15 while the average cost per unit comes to ₹ 12.

Please advise the company whether to resort to discount facility if the rate of return is 20% and a month is equal to 30 days.

**Hint:** New policy not recommended

15. Deluge Cosmetics Company Limited is considering changing its credit policy from net 60 to 2/10 net 45. Its current sales are ₹ 8,00,000 and variable cost to sales ratio is 0.6. Administrative and collection costs are ₹ 60,000 and ₹ 40,000 respectively. Their present bad debt to sales ratio is 0.01. With the change in credit terms it expects an increase in sales and operating costs by ₹ 4000.00 and ₹ 20,000 respectively. The new bad debts to sales ratio would be 0.03. Assume 40% of the customers avail the discount and the remaining pay by 60 days amounting to an average collection period of 40 days. Also assume the cost of financing receivables is 14%.

You are required to advise the company regarding the change in credit terms.

**Hint:** New policy is recommended

16. Mr. Barin Basu, the finance director of Swan Bearing Co. is evaluating the present credit policy of his company. Under the present policy, the company is offering 3% discount for payment within 10 days. The analysis of accounts receivable shows an average collection period of 30 days. Mr. Basu is of the opinion that the discount should be discontinued as it is affecting the profitability of the company in the present scenario of rising manufacturing costs. It is estimated that if the discount is discontinued the average collection period would increase to 35 days. Presently 30% of the total customers are availing discount and if the discount is withdrawn; these customers can also be expected to pay along with the other customers. The marketing manager informed him that as a result, sales might drop from the present level of 2,10,000 units to 2,00,000 units under the proposed policy. Selling price per unit is ₹. 45. The average cost per unit is ₹. 40 and variable cost of sales ratio is 75%. The required rate of return on the company's investments is 20%.

You are required to evaluate whether he should withdraw the discount or not.

**Hint:** New policy not recommended.

17. MM Ltd had the following Balance Sheet as on March 31, 2012:

Liabilities and Equity	₹ (In crores)	Assets	₹ (in crores)
Equity Share Capital (one crore shares of ₹ 10 each)	10	Fixed Assets (Net)	25
Reserves and Surplus	2	Current Assets	15
15% Debentures	20		
Current Liabilities	8		
	40		40

The additional information given is as under:

Fixed Costs per annum (excluding interest)	₹ 8 Crores
Variable operating costs ratio	65%
Total Assets turnover ratio	2.5
Income – tax rate	40%

**Required:**

Calculate the following and comment:

- i) Earnings per shares
- ii) Operating Leverage
- iii) Financial Leverage
- iv) Combined Leverage

**Hint:** EPS ₹ 14.40, DOL 1.296, DFL 1.125, DCL 1.458

18. Annual sales of a company is ₹ 60,00,000. Sales to variable cost ratio is 150% and Fixed cost other than interest is ₹ 5,00,000 per annum. Company has 11% debentures of ₹ 30,00,000.

You are required to calculate the Operating, Financial and Combined Leverage of the company.

**Hint:** DOL 1.333, DFL 1.2821, DCL 1.7094

19. The following details of ₹T Limited for the year ended 31st March, 2012 are given below:

Operating leverage	1.4
Combined leverage	2.8
Fixed Cost (Excluding interest)	₹ 2.04 lakhs
Sales	₹ 30.00 lakhs
12% Debentures of ₹ 100 each	₹ 21.25 lakhs
Equity Share Capital of ₹ 10 each	₹ 17.00 lakhs
Income tax rate	30%

**Required:**

- i) Calculate Financial Leverage
- ii) Calculate P/V ratio and Earning Per Share (EPS)
- iii) If the company belongs to an industry, whose assets turnover is 1.5, does it have a high or low assets leverage?
- iv) At what level of sale the Earning before Tax (EBT) of the company will be equal to zero?

**Hint:** DFL: 2, P.V. Ratio: 23.8%, EPS: ₹ 1.05, Asset Turnover Ratio: 0.784

20. A firm has Sales of ₹ 40 lakhs; Variable cost of ₹ 25 lakhs; Fixed cost of ₹ 6 lakhs 10% debt of ₹ 30 lakhs; and Equity Capital of ₹ 45 lakhs.

Required: Calculate operating and financial leverage.

Hint: DOL: 1.67, DFL: 1.50

21. From the following financial data of Company A and Company B: Prepare their income Statements.

	Company A	Company B
Variable Cost	56,000	60% of sales
Fixed Cost	20,000	-
Interest Expenses	12,000	9,000
Financial Leverage	5:1	-
Operating Leverage	-	4:1
Income Tax Rate	30%	30%
Sales	-	1,05,000

**Hint:** EBIT ₹ 15,000, 10,500, EAT: 2,100, 1,050



# Study Note - 6

## COST OF CAPITAL & CAPITAL STRUCTURE



### This Study Note includes

- 6.1 Cost of Capital
- 6.2 Capital Structure
- 6.3 Dividend policy

### 6.1 COST OF CAPITAL

#### INTRODUCTION:

The Cost of Capital is the most important and controversial area in Financial Management. Capital Budgeting decisions have a major impact on the firm, and Cost of Capital is used as a criterion to evaluate the capital Budgeting decisions i.e., whether to accept or reject a project. Knowledge about cost of capital, and how it is influenced by financial leverage, is useful in making capital structure decisions. The cost of capital is the most important concept in financial decision making. The chief objective of measuring the cost of capital is its use as a decision criterion in capital budgeting.

**Definition:** According to professor I.M.Pandy "Cost of Capital is th discount rate used in evaluating the desirability of the investment project. The cost of capital is the minimum rate of return required for investment project. The cost of capital is the minimum rate of return which will maintain the market value per share at its current level. If the firm earns more than the cost of capital, the market value per share is expected to increase. In other words, it is the rate that suppliers of funds expect to get. It is determined by the cost of the various sources of finance. It is also referred to as the weighted average cost of capital or composite / combined cost of capital.

**James C. Van Horne:** The cost of Capital is "a cut-off rate for the allocation of capital to investments of projects. It is the rate of return on a project that will leave unchanged the market price of the stock".

**Soloman Ezra:** "Cost of Capital is the minimum required rate of earinings or the cut-off rate of capital expenditure".

It is clear from the above definitions that the cast of capital is that minimum rate of return which a firm is expected to earn on its investments so that the market value of its share is maintained. We can also conclude from the above definitions that there are three basic aspects of the concept of cost of capital:

- (i) Not a cost as such: In fact the cost of capital is not a cost as such, it is the rate of return that a firm requires to earn from its projects.
- (ii) It is the minimum rate of return: A firm's cost of capital is that minimum rate of return which will at least maintain the market value of the share.
- (iii) It comprises three components:

$$K=r_0+b+f$$

Where, k = Cost of Capital;

$r_0$  = Return at zero risk level:

b = Premium for business risk, which refers to the variability in operating profit (EBIT) due to change in sales.

f = Premium for financial risk which is related to the pattern of capital structure.

### Importance of Cost of Capital

The Cost of Capital is very important in Financial Management and plays a crucial role in the following areas:

- (i) **Capital budgeting decisions:** The cost of capital is used for discounting cash flows under Net Present Value method for investment proposals. So, it is very useful in capital budgeting decisions.
- (ii) **Capital structure decisions:** An optimal capital is that structure at which the value of the firm is maximum and cost of capital is the lowest. So, cost of capital is crucial in designing optimal capital structure.
- (iii) **Evaluation of final Performance:** Cost of capital is used to evaluate the financial performance of top management. The actual profitability is compared with the actual cost of capital of funds and if profit is greater than the cost of capital the performance may be said to be satisfactory.
- (iv) **Other financial decisions:** Cost of capital is also useful in making such other financial decisions as dividend policy, capitalization of profits, making the rights issue, etc.

### Classification of Cost of Capital:

**Cost of Capital can be classified as follows:**

- (i) **Historical Cost and Future Cost:** Historical costs are book costs relating to the past, while future costs are estimated costs act as guide for estimation of future costs.
- (ii) **Specific Costs and Composite Costs:** Specific cost is the cost of a specific source of capital, while composite cost is combined cost of various sources of capital. Composite cost, also known as the weighted average cost of capital, should be considered in capital and capital budgeting decisions.
- (iii) **Explicit and Implicit Cost:** Explicit cost of any source of finance is the discount rate which equates the present value of cash inflows with the present value of cash outflows. It is the internal rate of return and is calculated with the following formula;

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

$I_0$  = Net cash inflow received at zero of time

C = Cash outflows in the period concerned

K = Explicit cost of capital

N = Duration of time period

Implicit cost also known as the opportunity cost is the of the opportunity foregone in order to take up a particular project. For example, the implicit cost of retained earnings is the rate of return available to shareholders by investing the funds elsewhere.

- (iv) **Average Cost and Marginal Cost:** An average cost is the combined cost or weighted average cost of various sources of capital. Marginal cost refers to the average cost of new or additional funds required by a firm. It is the marginal cost which should be taken into consideration in investment decisions.

## Computation of Cost of Capital:

Computation of cost capital of a firm involves the following steps:

- I. Computation of cost of specific sources of a capital, viz., debt, preference capital, equity and retained earnings, and
- II. Computation of weighted average cost of capital.

### I. Computation of specific sources of capital

#### Cost of Debt ( $k_d$ )

Debt may be perpetual or redeemable debt. Moreover, it may be issued at par, at premium or discount. The computation of cost debt in each case is explained below.

#### Perpetual / Irredeemable debt:

It is the rate of return which the lenders expect. A firm may issue perpetual bonds or it may have a policy of having a fixed amount of debt in the capital structure. In the case, when the old debt is repaid, it would be replaced by a new debt of same amount. In such a case debt is regarded as perpetual debt. The bonds of debentures can be issued at par, (face value), discount (below face value) and premium (more than the face value). Thus, cost of perpetual debt is equal to the rate of return expected by the lenders. It is the coupon rate of interest which is adjusted for tax effect.

Cost of perpetual debt can be determined as before tax cost of debt and after tax cost of debt. Symbolically:

$$= \frac{\text{Interest}}{\text{Sale price of debenture of bond (p)}}$$

$$\text{After tax cost of debt (K}_d) = \frac{I}{P} (1 - t)$$

I – Interest payment

P - Sale price of bond or debenture

t – Tax rate

#### Cost of Redeemable debt:

While calculating the cost of redeemable debt, it is necessary to consider the repayment of the principal in addition to interest payments. The cost of redeemable debt can be calculated by using the following formula.

$$\text{After - tax cost of debt, } K_d = \frac{I(1 - t) + \frac{(F - S)}{n}}{\frac{(F + S)}{2}}$$

Where

I = Annual Interest charges

t = Tax rate

n = Number of years

F = Redeemable value of the debt at the time of maturity.

S = Net sale proceeds from the issue of debt (face value – expenses)

#### Cost of Preference Capital ( $K_p$ )

The computation of cost of preference shares is conceptually difficult when compared to the cost of debt. Preference share holders have a preference regarding the payment of dividend as well as return of principal amount over the ordinary shares. Preference capital carries a fixed rate of dividend.

Preference dividend is an appropriation of earnings after the payment of taxes. Therefore, there is no need to make any adjustment for taxes while determining the cost of preference shares (K<sub>p</sub>).

**Perpetual Preference Capital:**

$$K_p = \frac{D - (1 + dt)}{NS}$$

Where

D = Preference dividend

dt = Dividend tax

NS = Net Sale proceeds i.e., Issue Price – Flotation Cost.

Redeemable preference shares: It is calculated with the following formula:

$$K_p = \frac{D(1 + dt) + \frac{RV - NS}{n}}{\frac{RV + NS}{2}} \times 100$$

Where, K<sub>p</sub> = Cost of preference capital

D = Annual preference dividend

RV = Maturity value of preference shares

NS = Net proceeds of preference shares

N = Number of years to maturity

**Cost of Equity Capital**

The cost of Equity Capital is most difficult to compute. Some people argue that the equity capital is cost free as the Company is not legally bound to pay the dividends to Equity shareholders. But this is not true. Shareholders will invest their funds with the expectation of dividends. The market value of Equity Share depends in the dividends expected by shareholders. Thus the required rate of return which equates the present value of the expected dividends with the market value of Equity share is the cost of Equity Capital. The cost of Equity Capital may be expressed as the minimum rate of return that must be earned on New Equity Share Capital financed investment in order to keep the earnings available to the existing Equity shareholders of the firm unchanged.

It may be computed in the following 4 methods.

**a) Dividend method (no growth model):**

As stated above, the market price per share depends on the dividends expected by the Equity Shareholders.

Formula:

$$P_0 = \frac{D_1}{(1 + K_e)} + \frac{D_2}{(1 + K_e)^2} + \dots + \frac{D_n}{(1 + K_e)^n}$$

Or

$$K_e = \frac{D_1}{NS}$$

Where

K<sub>e</sub> = Cost of Equity

D = Dividend

NS = Net Sale Proceeds i.e., Issue Price – Flotation Cost

**b) Constant growth model (Gordan Model):**

When the dividends are expected to grow at a rate of 'g' annually, the following formula is used:

$$P_0 = \frac{D_0(1+g)}{(1+K_e)} + \frac{D_2(1+g)^2}{(1+K_e)^2} + \dots + \frac{D_n(1+g)^n}{(1+K_e)^n}$$

Or

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

Where

$K_e$  = Cost of Equity

D = Dividend

P0 = Issue price of share or current market price.

g = Growth rate

**Note:** If flotation costs such as underwriting commission, brokerage fees etc. is considered  $P_0$  is replaced with NS.

NS = Current market price or cost of issue – flotation cost

**c) Earning Model:**

The cost of equity is also measured by Earnings / Price ratio. It is the ratio of EPS to market price per share.

**Formula:**

$$K_e = \frac{EPS}{NS}$$

Where

$K_e$  = Cost of Equity

NS = Net Sale Proceeds i.e., Issue Price – Flotation Cost

**d) Capital Asset Pricing Model:**

Another technique that can be used to estimate the cost of equity is the capital asset pricing model approach. The capital asset pricing model explains the behaviour of security prices and provides a mechanism whereby investors could assess the impact of a proposed security investment on their overall portfolio risk and return. In other words, CAPM formally describes the risk –required return trade off for securities. The assumptions for CAPM approach are:

- i) The efficiency of the security
- ii) Investor preferences.

The capital asset pricing model describes the relationship between the required rate of return, or the cost of equity capital and the non-diversifiable or relevant risk of the firm as reflected in its index of non-diversifiable risk. Symbolically,

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

Where

$K_e$  = Cost of equity capital

$R_f$  = Risk – free rate of return

$R_m$  = Return on market portfolio

$\beta$  = Beta of Security

### Cost of Retained Earnings ( $K_r$ ):

Retained earnings refer to undistributed profits of a firm. Out of the total earnings, firms generally distribute only part of them in the form of dividends and the rest will be retained within the firms. Since no dividend is required to be paid on retained earnings, some people feel that 'retained earnings carry no cost'. But this approach is not appropriate. Retained earnings has the opportunity cost of dividends from alternative investment. Hence, shareholders expect a return on retained earnings at least equity.

$$K_r = K_e$$

However, while calculating cost of retained earnings, flotation cost need not be considered.

### Cost of Rights Issue

When the shares are offered to the existing shareholders in proportion to the existing shareholding, it is called "Rights issue". Then the existing shareholders will have right to subscribe first. Balance, if any left over, will be offered to public for subscription or private placement, etc.

#### Formula:

When he sells ex-rights (i.e. after exercising the option):

$$P = \frac{MN + Sr}{N + r}$$

When

P = Theoretical market price of the share when he sells ex-rights

M = market price of the share when it is sold cum – rights

N = Number of existing shares

S = Subscription price per share

r = No. of right shares

### Value of right = Cum-right share price – Ex- right share price

### Weighted Average Cost of Capital:

It is the average of the costs of various sources of financing. It is also known as composite or overall or Average Cost of Capital.

After computing the cost of individual sources of finance, the Weighted Average Cost of Capital is calculated by putting weights in the proportion of the various sources of funds to the total.

Weighted average cost of capital is computed by using either of the following two types of weights:

- 1) Market value
- 2) Book Value

Market value weights are sometimes preferred to the book value weights as the market value represents the true value of the investors. However, market value weights suffer from the following limitations:

- (i) Market values are subject to frequent fluctuations.
- (ii) Equity capital gets more importance, with the use of market value weights.

Moreover, book values are readily available.

Average cost of capital is computed as followings:

$$K_w = W_e K_e + W_d K_d + W_p K_p + W_r K_r$$

Where,

$K_w$  = Weighted Average Cost of Capital

$K_e$  = Cost of Equity

$K_r$  = Cost of Reserves

$K_d$  = Cost of Debt

$K_p$  = Cost of preference share capital

W = weights (proportions of specific sources of finance in the total)

The following steps are involved in the computation of Weighted Average Cost of Capital:

- i) Multiply the cost of each sources with the corresponding weight.
- ii) Add all these weighted costs so that weighted average cost of capital is obtained.

### Marginal Cost of Capital:

The weighted average cost of capital can be worked out on the basis of marginal cost of capital than the historical costs. The weighted average cost of new or incremental capital is known as the marginal cost of capital. This concept is used in capital budgeting decisions. The marginal cost of capital is derived, when we calculate the weighted average cost of capital using the marginal weights. The marginal cost of capital would rise whenever any component cost increases. The marginal cost of capital should be used as the cut off rate. The average cost of capital should be used to evaluate the impact of the acceptance or rejection of the entire capital expenditure on the value of the firm.

### Illustration 1

Assuming the corporate tax rate of 35%, compute the after tax cost of capital in the following situations:

- (i) Perpetual 15% Debentures of ₹.1,000, sold at a premium of 10% with no flotation costs.
- (ii) 10-year 14% Debentures of ₹.2,000, redeemable at par, with 5% flotation costs.

### Solution:

- i. Computation of cost of Capital

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

Where,

I = Interest Payment

P = Sale price of debenture

t = Tax rate

$$K_d = \frac{150(1 - 0.35)}{1100} \times 100 = 8.86\%$$

- ii. Computation of Cost of Capital

$$K_d = \frac{I(1 - t) + \frac{RV - NS}{n}}{\frac{RV + NS}{2}} \times 100$$

$$K_d = \frac{280(1 - 0.35) + \frac{2000 - 1900}{10}}{\frac{2000 + 1900}{2}} \times 100 = 9.85\%$$

Where,

I = Interest Payment

t = Tax rate

RV = Value of debenture Redeemable

NS = Net Sale proceeds

n = No. of years

**Illustration 2**

Calculate the Cost of Capital from the following cases:

- (i) 10-year 14% Preference shares of ₹.100, redeemable at premium of 5% and flotation costs 5%. Dividend tax is 10%.
- (ii) An equity share selling at ₹.50 and paying a dividend of ₹.6 per share, which is expected to continue indefinitely.
- (iii) The above equity share if dividends are expected to grow at the rate of 5%.
- (iv) An equity share of a company is selling at ₹.120 per share. The earnings per share is ₹.20 of which 50% is paid in dividends. The shareholders expect the company to earn a constant after tax rate of 10% on its investment of retained earnings.

**Solution:**

$$i. \quad K_p = \frac{\text{Preference dividend} (1 + \text{dividend}) + \frac{RV - NS}{N}}{\frac{RV - NS}{2}} \times 100 = 8.86\%$$

$$K_p = \frac{14(1 + 0.1) + \frac{105 - 95}{10}}{\frac{105 - 95}{2}} \times 100 = 16.4\%$$

$$ii. \quad K_e (\text{no growth model}) = \frac{\text{Dividend}}{\text{Net Sale Proceeds}} \times 100$$

$$K_e = \frac{6}{50} \times 100 = 12\%$$

$$iii. \quad K_e (\text{no growth model}) = \frac{D_1}{\text{Net Sale Proceeds}} + \text{Growth } (g)$$

$$K_e = \frac{6.3}{50} + 0.05 = 0.176 \text{ (or) } 17.6\%$$

iv. Market price = ₹. 120

EPS = ₹. 20

Dividend pay out ratio = 50% & DPS = ₹. 10

r = 10%

g = Rate of return on retention funds = b x r = 10% x 50% = 5%

where,

b = 1 - Payout ratio

r = Return on investment

$$K_e = \frac{D_1}{\text{Net Sale Proceeds}} \times 100 + \text{Growth } (g)$$

$$K_e = \frac{10}{120} \times 100 + 5\% = 13.33\%$$

### Illustration 3

From the following information, determine the appropriate weighted average cost of capital, relevant for evaluating long-term investment projects of the company.

Cost of equity	0.18
After tax cost of long-term debt	0.08
After tax cost of short-term debt	0.09
Cost of Reserve	0.15

Sources of capital	Book Value (BV)	Market Value (MV)
Equity:		
Capital	₹3,00,000	₹ 7,50,000
Reserve	2,00,000	-
Long-term debt	4,00,000	3,75,000
Short-term debt	1,00,000	1,00,000
	10,00,000	12,25,000

**Solution:**

**Calculation of Weighted Average Cost of Capital (WACC) or overall Cost of Capital:**

**Alternative 1: - Book value as weights:**

Element	Amount (₹)	Weight	Specific cost of capital	Over all cost of capital
Capital	3,00,000	0.3333	0.18	0.06
Reserve	2,00,000	0.2222	0.15	0.03
L/T debt	4,00,000	0.4445	0.08	0.04
	<b>9,00,000</b>	<b>1.0000</b>		<b>0.13</b>

Therefore, WACC = 13%

**Alternative 2: - Market value as weights:**

Element	Amount (₹)	Weight	Specific cost of capital	Over all cost of capital
Capital	4,50,000	0.40	0.18	0.0720
*Reserve	3,00,000	0.27	0.15	0.0405
L/T debt	3,75,000	0.33	0.08	0.0264
	<b>11,25,000</b>	<b>1.00</b>		<b>0.1389</b>

Therefore, WACC = 13.89%

\*Note: Market Value of equity share capital apportioned between capital and reserve in book value weightage.

### Illustration 4

In considering the most desirable capital structure of a company, the following estimates of the cost of debt and equity capital (after tax) have been made at various levels of debt-equity mix:

Debt as percentage of total capital employed	Cost of debt %	Cost of equity %
0	5.0	12.0
10	5.0	12.0
20	5.0	12.5
30	5.5	13.0
40	6.0	14.0
50	6.5	16.0
60	7.0	20.0

You are required to determine the optimal debt-equity mix for the company by calculating composite cost of capital.

**Solution:**

Statement showing computation of composite cost of capital ( $K_0$ ) at different levels of debt-equity mix:-

Debt as percentage of total capital employed	Cost of debt %	Cost of equity %	$K_0 = W_e K_e + W_d K_d$
0	5.0	12.0	$(1 \times 12) + (0 \times 5) = 12\%$
10	5.0	12.0	$(0.9 \times 12) + (0.1 \times 5) = 11.30\%$
20	5.0	12.5	$(0.8 \times 12.5) + (0.2 \times 5) = 11\%$
30	5.5	13.0	$(0.7 \times 13) + (0.3 \times 5.5) = 10.75\%$
40	6.0	14.0	$(0.6 \times 14) + (0.4 \times 6) = 10.80\%$
50	6.5	16.0	$(0.5 \times 16) + (0.5 \times 6.5) = 11.25\%$
60	7.0	20.0	$(0.4 \times 20) + (0.6 \times 7) = 12.20\%$

The most desirable or optimal capital structure of the company is 70% equity and 30% debt, as there is overall cost is minimum.

**Illustration 5**

Determine the weighted average cost of capital using (i) book value weights; and (ii) market value weights based on the following information:

Book value structure:	₹
Debentures (₹. 100 per debenture)	8,00,000
Preference share (₹.100 per share)	2,00,000
Equity shares (₹. 10 per share)	10,00,000
	<b>20,00,000</b>

**Recent market prices of all these securities are:**

Debentures: ₹. 110 per debenture;

Preference share: ₹. 120 per share; and

Equity shares: ₹. 22 per share

**External financing opportunities are:**

- ₹. 100 per debenture redeemable at par, 10 year maturity, 13% coupon rate, 4% flotation cost and sale price ₹. 100;
- ₹. 100 per preference share redeemable at par, 10 year maturity, 14% dividend rate, 5% flotation cost and sale price ₹. 100; and
- Equity share – ₹. 2 per share flotation costs and sale price ₹. 22 Dividend expected on equity share at the end of the year is ₹. 2 per share; anticipated growth rate in dividend is 7%. Company pays all its earnings in the form of dividends. Corporate tax rate is 50%.

**Solution:**

**Specific cost of capital**

$$K_d = \frac{I(1-t) + \frac{RV-NS}{N}}{\frac{RV-NS}{2}} \times 100$$

$$K_d = \frac{13(1-0.5) + \frac{100-96}{10}}{\frac{100+96}{2}} \times 100 = 7.04\%$$

$$K_p = \frac{\text{Preference dividend} + \left(\frac{RV - NS}{N}\right)}{\frac{RV - NS}{2}} \times 100$$

$$K_p = \frac{14 + \left(\frac{100 - 95}{10}\right)}{\frac{100 + 95}{2}} \times 100 = 14.87\%$$

$$K_e = \frac{D_1}{\text{Net Sale Proceeds}} \times 100 + \text{Growth (g)}$$

$$K_p = \frac{2}{20} \times 100 + 7\% = 17\%$$

### WACC:

#### Book value basis:

Source	₹	Weight	Cost of capital	K <sub>o</sub>
Debentures	8,00,000	0.40	7.04%	2.816
Preference	2,00,000	0.10	14.87%	1.487
Equity	10,00,000	0.50	17.00%	8.500
	<b>20,00,000</b>			<b>12.803%</b>

#### Market value basis:

Source	₹	Weight	Cost of capital	K <sub>o</sub>
Debentures	8,80,000	0.2649	7.04%	1.865
Preference	2,40,000	0.0722	14.87%	1.074
Equity	22,00,000	0.6629	17.00%	11.270
	33,20,000			14.209%

### Illustration 6

The present capital structure of a company is as follows:

	₹ (million)
Equity share (Face value = ₹. 10)	240
Reserves	360
11% Preference Shares (Face value = ₹. 10)	120
12% Debentures	120
14% Term Loans	360
	<b>1,200</b>

Additionally the following information are available:

Company's equity beta	1.06
Yield on long-term treasury bonds	10%
Stock market risk premium	6%
Current ex-dividend equity share price	₹. 15
Current ex-dividend preference share price	₹. 12
Current ex-interest debenture market value	₹. 102.50 per ₹. 100
Corporate tax rate	40%

The debentures are redeemable after 3 years and interest is paid annually. Ignoring flotation costs, calculate the company's weighted average cost of capital (WACC).

**Solution:**

**Specific cost of capital:**

$$K_e \text{ (CAPM)} = R_f + \beta (R_m - R_f) = 16.36\%$$

$$R_m - R_f = 6\%$$

$$R_f = 10\%, R_m = 16\%$$

$$K_p = (\text{Dividend} / \text{NS}) \times 100 = (1.1 / 12) \times 100 = 9.17\%$$

$$K_d = \frac{12 + (1 - 0.4) + \frac{100 - 102.5}{3}}{\frac{100 + 102}{2}} \times 100 = 6.29\%$$

Alternatively,

$$K_d = \left[ \frac{12 + \frac{100 - 102.5}{3}}{\frac{100 + 102.5}{2}} \times 100 \right] \times (1 - 0.4) = 6.61\%$$

$$K_l = 14\% (1 - 0.4) = 8.4\%$$

$$K_r = K_e = 16.36\% \text{ (as there is no flotation costs)}$$

**WACC**

**Book value basis:**

Source	₹ in millions	Weight	Cost of Capital	$K_o$
Equity capital	240	0.20	16.36%	3.272
Reserves	360	0.30	16.36%	4.908
Preference	120	0.10	9.17%	0.917
Debentures	120	0.10	6.61%	0.661
Term loans	360	0.30	8.40%	2.520
	<b>1200</b>	<b>1.00</b>		<b>12.28%</b>

**Market value basis:**

Source	₹ in millions	Weight	Cost of Capital	$K_o$
Equity	360	0.3647	16.36%	5.967
Preference	144	0.1459	9.17%	1.338
Debentures	123	0.1246	6.61%	0.824
Term loans	360	0.3648	8.40%	3.064
	<b>987</b>	<b>1.0000</b>		<b>11.18%</b>

**Illustration 7**

Bombay Cotton Mills Limited makes a rights issue at ₹.5 a share of one new share for every four shares held. Before the issue, there were 10 million shares outstanding and the share price was ₹, 6. Based on the above information you are required to compute-

- The total amount of new money raised
- How many value of one rights are required to buy one new share?
- What is the value of one right?
- What is the prospective ex-rights price?



**b) Calculation of Average Cost of additional debt:**

Post Tax Cost of 10% debt = 10% (1-0.5) = 5%

Post Tax Cost of 16% debt = 16% (1-0.5) = 8%

Average cost (after tax) of total debt =  $5 \times \frac{1,80,000}{3,00,000} + 8 \times \frac{1,20,000}{3,00,000} = 6.2\%$

**c) Computation of Cost of equity and cost of retained earnings:**

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

$$= \frac{2 \times 1.10}{44} + 0.10 = 0.15 \text{ or } 15\%$$

**Cost of Retained Earnings (K<sub>r</sub>)**

K<sub>r</sub> = K<sub>e</sub> (as there is no flotation cost)

K<sub>r</sub> = 15%

**d) Calculation of Weighted Cost of Capital**

Element	Amount (₹)	Weight	Specific Cost	Overall cost
Equity Share Capital	4,90,000	0.49	0.15	0.0735
Reserves	2,10,000	0.21	0.15	0.0315
10% Debt	1,80,000	0.18	0.05	0.0090
16% Debt	1,20,000	0.12	0.08	0.0096
<b>Total</b>	<b>10,00,000</b>	<b>1.00</b>		<b>0.1236</b>

**WACC = 12.36%**

**6.2 CAPITAL STRUCTURE:**

A firm needs funds for long term requirements and working capital. These funds are raised through different sources both short term and long term. The long term funds required by a firm are mobilized through owners funds (equity share, preference shares and retained earnings) and long term debt (debentures and bonds). A mix of various long term sources of funds employed by a firm is called capital structure.

According to Gerestenberg, "Capital structure of a company refers to the composition or make-up of its capitalization and it includes all long term capital resources, viz, loans, bonds, shares and reserves". Thus capital structure is made up of debt and equity securities and refers to permanent financing of a firm.

Financial Manager has to plan the appropriate mix of different securities in total capitalization in such a way as to minimize the cost of capital and maximize the earnings per share to the equity shareholders. There may be four fundamental patterns of capital structure as follows:

- (i) Equity capital only (including Reserves and Surplus)
- (ii) Equity and preference capital
- (iii) Equity, preference and long term debt i.e. debentures, bonds and loans from financial institutions etc.
- iv. Equity and long term debt.

Some authors use capital structure and financial structure interchangeably. But, both are different concepts. Financial structure refers to the way in which the total assets of a firm are financed. In other words, financial structure refers to the entire liabilities side of the Balance Sheet. But, capital structure represents only long term sources of funds and excludes all short term debt and current liabilities. Thus, financial structure is a broader one and capital structure is only part of it.

## Features of An Appropriate Capital Structure

A capital structure will be considered to be appropriate if it possesses following features:

- (i) **Profitability:** The capital structure of the company should be most profitable. The most profitable capital structure is one that tends to minimize cost of financing and maximize earnings per equity share.
- (ii) **Solvency:** The pattern of capital structure should be so devised as to ensure that the firm does not run the risk of becoming insolvent. Excess use of debt threatens the solvency of the company. The debt content should not, therefore, be such that which increases risk beyond manageable limits.
- (iii) **Flexibility:** The capital structure should be flexible to meet the requirements of changing conditions. Moreover, it should also be possible for the company to provide funds whenever needed to finance its profitable activities.
- (iv) **Conservatism:** The capital structure should be conservative in the sense that the debt content in the total capital structure does not exceed the limit which the company can bear. In other words, it should be such as is commensurate with the company's ability to generate future cash flows.
- (v) **Control:** The capital structure should be so devised that it involves minimum risk of loss of control of the company.

## Determinants of Capital Structure

The following are the factors influencing the Capital Structure

The capital structure of a firm depends on a number of factors and these factors are of different importance. Generally, the following factors should be considered while determining the capital structure of a company.

### i. Trading on equity and EBIT-EPS analysis

The use of long term debt and preference share capital, which are fixed income bearing securities, along with equity share capital is called financial leverage or trading on equity. The use of long term debt capital increases the earnings per share as long as the return on investment is greater than the cost of debt. Preference share capital will also result in increasing EPS. But the leverage effect is more pronounced in case of debt because of two reasons:

- (a) Cost of debt is usually lower than the cost of preference share capital.
- (b) The interest paid on debt is tax deductible.

Because of its effects on the earnings per share, financial leverage is one of the important considerations in planning the capital structure of a company. The companies with high level of Earnings Before Interest and Taxes (EBIT) can make profitable use of the high degree of leverage to increase the return on the shareholders equity. The EBIT-EPS analysis is one important tool in the hands of the financial manager to get an insight into the firms capital structure planning. He can analyse the possible fluctuations in EBIT and their impact on EPS under different financing plans.

Under favorable conditions, financial leverage increases EPS, however it can also increase financial risk to shareholders. Therefore, the firm should employ debt to such an extent that financial risk does not spoil the leverage effect.

### (ii) Growth and stability of sales

This is another important factor which influences the capital structure of a firm. Stability of sales ensures stable earnings, so that the firm will not face any difficulty in meeting its fixed commitments of interest payment and repayment of debt. So the firm can raise a higher level of debt. In the same way, the rate of growth in sales also affects the capital structure decision. Usually, greater the rate of growth of sales, greater can be the use of the debt in the financing of a firm. On the other hand, the firm should be very careful in employing debt capital if its sales are highly fluctuating and declining.

### **(iii) Cost of Capital**

Cost of capital is another important factor that should be kept in mind while designing the capital structure of a firm. The capital structure should be designed in such a way that the firm's overall cost of capital is the minimum. Cost of capital is the minimum return expected by its suppliers. Of all the sources of capital, equity capital is the costliest as the equity shareholders bear the highest risk. On the other hand, debt capital is the cheapest source because the interest is paid on it by the firm whether it makes profits or not. Moreover, interest on debt capital is tax deductible which makes it further cheaper. Preference share capital is also cheaper than equity capital as the dividends are paid at a fixed rate on preference shares. So, the overall cost of capital depends on the proportion in which the capital is mobilized from different sources of finance. Hence, capital structure should be designed carefully so that overall cost of capital is minimized.

### **(iv) Control**

Sometimes, the designing of capital structure of a firm is influenced by the desire of the existing management to retain the control over the firm. Whenever additional funds are required, the management of the firm wants to raise the funds without any loss of control over the firm. If equity shares are issued for raising funds, the control of the existing shareholders is diluted. Because of this, they may raise the funds by issuing fixed charge bearing debt and preference share capital, as preference shareholders and debt holders do not have any voting right. The Debt financing is advisable from the point of view of control. But overdependence on debt capital may result in heavy burden of interest and fixed charges and may lead to liquidation of the company.

### **(v) Flexibility**

Flexibility means the firm's ability to adapt its capital structure to the needs of the changing conditions. Capital structure should be flexible enough to raise additional funds whenever required, without much delay and cost. The capital structure of the firm must be designed in such a way that it is possible to substitute one form of financing for another to economise the use of funds. Preference shares and debentures offer the highest flexibility in the capital structure, as they can be redeemed at the discretion of the firm.

### **(vi) Marketability and timing**

Capital market conditions may change from time to time. Sometimes there may be depression and at other times there may be boom condition in the market. The firm should decide whether to go for equity issue or debt capital by taking market sentiments into consideration. In the case of depressed conditions in the share market, the firm should not issue equity shares but go for debt capital. On the other hand, under boom conditions, it becomes easy for the firm to mobilise funds by issuing equity shares.

The internal conditions of a firm may also determine the marketability of securities. For example, a highly levered firm may find it difficult to raise additional debt. In the same way, a firm may find it very difficult to mobilise funds by issuing any kind of security in the market merely because of its small size.

### **(vii) Floatation costs:**

Floatation costs are not a very significant factor in the determination of capital structure. These costs are incurred when the funds are raised externally. They include cost of the issue of prospectus, brokerage, commissions, etc. Generally, the cost of floatation for debt is less than for equity. So, there may be a temptation for debt capital. There will be no floatation cost for retained earnings. As is said earlier, floatation costs are not a significant factor except for small companies.

Floatation costs can be an important consideration in deciding the size of the issue of securities, because these costs as a percentage of funds raised will decline with the size of the issue. Hence, greater the size of the issue, more will be the savings in terms of floatation costs. However, a large issue affects the firm's financial flexibility.

### **(viii) Purpose of financing**

The purpose for which funds are raised should also be considered while determining the sources of capital structure. If funds are raised for productive purpose, debt capital is appropriate as the interest can be paid out of profits generated from the investment. But, if it is for unproductive purpose, equity should be preferred.

### **(ix) Legal requirements**

The various guidelines issued by the Government from time to time regarding the issue of shares and debentures should be kept in mind while determining the capital structure of a firm. These legal restrictions are very significant as they give a framework within which capital structure decisions should be made.

### **Theories of Capital Structure**

But, the existence of an optimum capital structure is not accepted by all. There are two extreme views or schools of thought regarding the existence of an optimum capital structure. As per one view, capital structure influences the value of the firm and cost of capital and hence there exists an optimum relevance and hence there exists an optimum capital structure. On the other hand, the other school of thought advocates that capital structure has no relevance and it does not influence the value of the firm and cost of capital. Reflecting these views, different theories of capital structure have been developed. The main contributors to the theories are David Durand, Ezra Solomon, Modigliani and Miller.

The important theories of capital structure are:

1. Net Income Approach
2. Net Operating Income Approach
3. The Traditional view
4. Modigliani and Miller hypothesis

### **Assumptions Underlying the Theories:**

In order to have a clear understanding of these theories and the relationship between capital structure and value of the firm or cost of capital, the following assumptions are made:

- (i) Firms employ only debt and equity.
- (ii) The total assets of the firm are given.
- (iii) The firm's total financing remains constant. The degree of leverage can be changed by selling debt to repurchase shares or selling shares to retire debt.
- (iv) The firm has 100% payout ratio, i.e., it pays 100% of its earnings as dividends.
- (v) The operating earnings (EBIT) of the firm are not expected to grow.
- (vi) The business risk is assumed to be constant and independent of capital structure and financial risk.
- (vii) Investors have the same subjective probability distribution of expected future operating earnings for a given firm.
- (viii) There are no corporate and personal taxes. This assumption is relaxed later.

In analysing the capital structure theories the following basic definitions are used:

S = Market value of common shares

D = Market value of debt

V = S + D = Market value of the firm

$NOI = X =$  Expected net operating income, i.e., Earnings before interest and taxes (EBIT)

$NI = NOI - \text{Interest} =$  Net Income or shareholders earning.

### 1. Net Income Approach

This approach was identified by David Durand. According to this approach, capital structure has relevance, and a firm can increase the value of the firm and minimise the overall cost of capital by employing debt capital in its capital structure. According to this theory, greater the debt capital employed, lower shall be the overall cost of capital and more shall be the value of the firm.

This theory is subject to the following assumptions:

- (i) The cost of debt is less than cost of equity.
- (ii) The risk perception of investors is not affected by the use of debt. As a result, the equity capitalisation rate ( $k_e$ ) and the debt - capitalisation rate ( $k_d$ ) don't change with leverage.
- (iii) There are no corporate taxes.

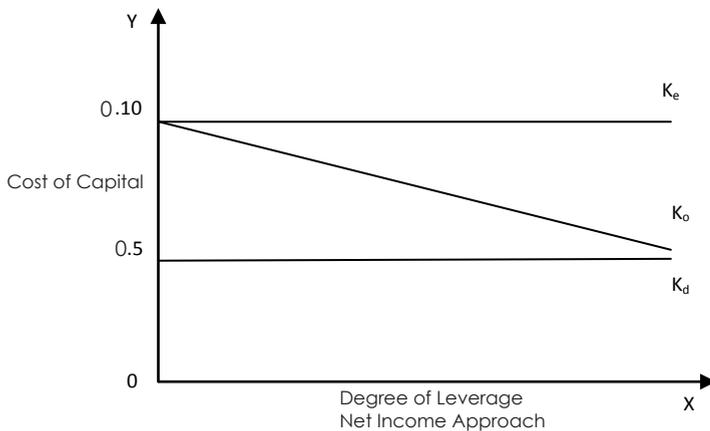
According to the above assumptions, cost of debt is cheaper than cost of equity and they remain constant irrespective of the degree of leverage. If more debt capital is used because of its relative cheapness, the overall cost of capital declines and the value of the firm increases.

According to this approach:

$$V = S + D$$

$$S = \text{market value of equity} = \frac{NI}{K_e}$$

$$K_o \text{ Overall cost of Capital} = \frac{EBIT}{V}$$



It is evident from the above diagram that when degree of leverage is zero (i.e. no debt capital employed), overall cost of capital is equal to cost of equity ( $K_o = K_e$ ). If debt capital is employed further and further which is relatively cheap when compared to cost of equity, the overall cost of capital declines, and it becomes equal to cost of debt ( $k_d$ ) when leverage is one (i.e. the firm is fully debt financed). Thus, according to this theory, the firm's capital structure will be optimum, when degree of leverage is one.

### 2. Net Operating Income Approach

This net operating income (NOI) approach is also suggested by David Durand. This represents another extreme view that capital structure and value of the firm are irrelevant. This capital structure of the firm does not influence cost of capital and value of the firm. The value of the firm (V) is determined as follows:

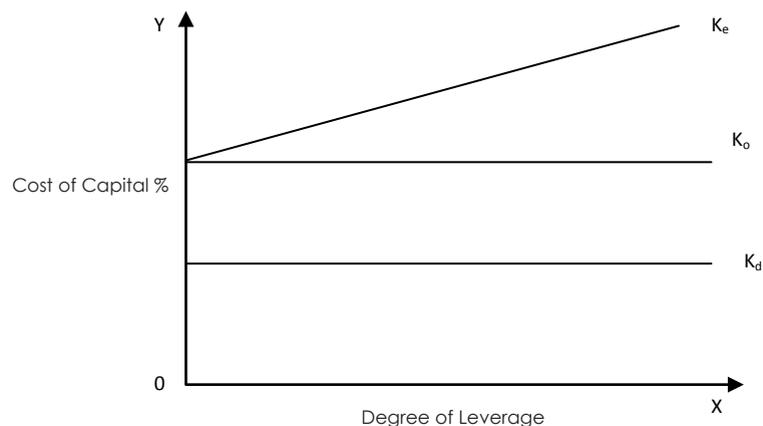
$$V = S + D = \frac{NOI}{K_e}$$

$K_o$  The overall cost of capital and depends on the business risk of the firm. It is not affected by financing mix.

The critical assumptions of this theory are:

1. The market capitalises the value of the firm as a whole. Thus, the split between debt and equity is not important.
2. The business risk remains constant at every level of debt – equity mix.
3. There are no corporate taxes.
4. The debt capitalisation rate ( $K_d$ ) is constant.

According to this theory, the use of less costly debt increases the risk to equity shareholders. This causes the equity capitalisation rate ( $K_e$ ) to increase. As a result, the low cost advantage of debt is exactly offset by the increase in the equity capitalisation rate. Thus, the overall capitalisation rate ( $K_o$ ) remains constant and consequently the value of the firm does not change.



### NOI Approach

The above diagram shows that  $K_o$  and  $K_d$  are constant and  $K_e$  increases with leverage continuously. The increase in cost of equity ( $K_e$ ) exactly offsets the advantage of low cost debt, so that overall cost of capital ( $K_o$ ) remains constant, at every degree of leverage. It implies that every capital structure is optimum and there is no unique optimum capital structure.

### 3. The Traditional View

This approach, which is also known as intermediate approach, has been popularised by Ezra Solomon. It is a compromise between the two extremes of Net Income Approach and Net Operating Income Approach. According to this approach, cost of capital can be reduced or the value of the firm can be increased with a judicious mix of debt and equity. This theory says that cost of capital declines with increase in debt capital upto a reasonable level, and later it increases with a further rise in debt capital.

The way in which the overall cost of capital reacts to changes in capital structure can be divided into three stages under traditional position.

#### Stage I

In this stage, the cost of equity ( $K_e$ ) and the cost of debt ( $K_d$ ) are constant and cost of debt is less than cost of equity. The employment of debt capital upto a reasonable level will cause the overall cost of capital to decline due to the low cost advantage of debt.

#### Stage II

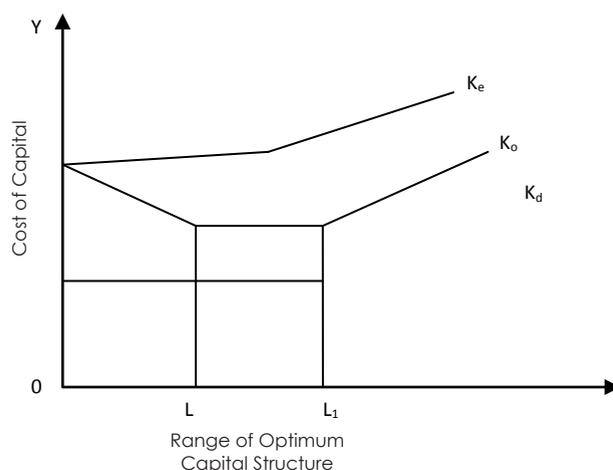
Once the firm has reached a reasonable level of leverage, a further increase in debt will have no effect on the value of the firm and the cost of capital. This is because of the fact that a further rise in debt

capital increases the risk to equity shareholders which leads to a rise in equity capitalisation rate ( $K_e$ ). This rise in cost of equity exactly offsets the low – cost advantage of debt capital so that the overall cost of capital remains constant.

### Stage III

If the firm increases debt capital further and further beyond reasonable level, it will cause an increase in risk to both equity shareholders and debt – holders, because of which both cost of equity and cost of debt start rising in this stage. This will in turn will cause an increase in overall cost of capital.

If the overall effect of all the three stages is taken, it is evident that cost of capital declines and the value of the firm increases with a rise in debt capital upto a certain reasonable level. If debt capital is further increased beyond this level, the overall cost of capital ( $K_o$ ) tends to rise and as a result the value of the firm will decline.



### Traditional View

It is evident from above graph that the overall cost of capital declines with an increase in leverage upto point L and it increases with rise in the leverage after point L1. Hence, the optimum capital structure lies in between L and L1.

## 4. Modigliani – Miller (MM) Hypothesis

The Modigliani – Miller hypothesis is identical with the Net Operating Income Approach. Modigliani and Miller argued that, in the absence of taxes the cost of capital and the value of the firm are not affected by the changes in capital structure. In other words, capital structure decisions are irrelevant and value of the firm is independent of debt – equity mix.

### Basic Propositions:

M -M Hypothesis can be explained in terms of two propositions of Modigliani and Miller. They are :

- (i) The overall cost of capital ( $K_o$ ) and the value of the firm are independent of the capital structure. The total market value of the firm is given by capitalising the expected net operating income by the rate appropriate for that risk class.
- (ii) The financial risk increases with more debt content in the capital structure. As a result cost of equity ( $K_e$ ) increases in a manner to offset exactly the low – cost advantage of debt. Hence, overall cost of capital remains the same.

### Assumptions of the MM Approach:

1. There is a perfect capital market. Capital markets are perfect when
  - (i) Investors are free to buy and sell securities,

- (ii) They can borrow funds without restriction at the same terms as the firms do,
  - (iii) They behave rationally,
  - (iv) They are well informed, and
  - (v) There are no transaction costs.
2. Firms can be classified into homogeneous risk classes. All the firms in the same risk class will have the same degree of financial risk.
  3. All investors have the same expectation of a firm's net operating income (EBIT).
  4. The dividend payout ratio is 100%, which means there are no retained earnings.
  5. There are no corporate taxes. This assumption has been removed later.

### Proposition I

According to M – M, for the firms in the same risk class, the total market value is independent of capital structure and is determined by capitalising net operating income by the rate appropriate to that risk class. Proposition I can be expressed as follows:

$$V = S + D = \frac{X}{K_0} = \frac{NOI}{K_0}$$

Where, V = The market value of the firm

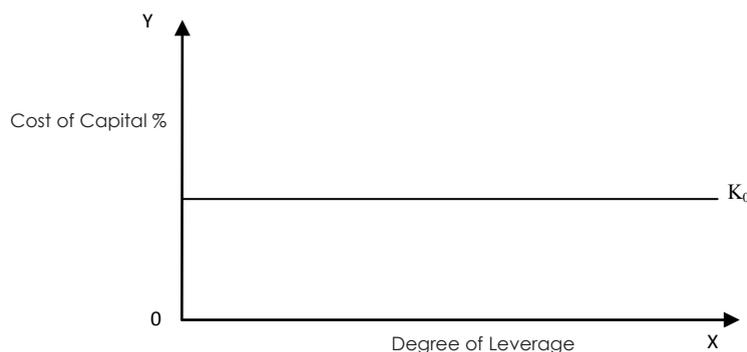
S = The market value of equity

D = The market value of debt

According to Proposition I the average cost of capital is not affected by degree of leverage and is determined as follows:

$$K_0 = \frac{X}{V}$$

According to M – M, the average cost of capital is constant as shown in the following Figure.



**MM Approach**

### Arbitrage Process

According to M – M, two firms identical in all respects except their capital structure, cannot have different market values or different cost of capital. In case, these firms have different market values, the arbitrage will take place and equilibrium in market values is restored in no time. Arbitrage process refers to switching of investment from one firm to another. When market values are different, the investors will try to take advantage of it by selling their securities with high market price and buying the securities with low market price. The use of debt by the investors is known as personal leverage or homemade leverage.

Because of this arbitrage process, the market price of securities in higher valued market will come down and the market price of securities in the lower valued market will go up, and this switching process is

continued until the equilibrium is established in the market values. So, M – M, argue that there is no possibility of different market values for identical firms.

**Reverse Working of Arbitrage Process**

Arbitrage process also works in the reverse direction. Leverage has neither advantage nor disadvantage. If an unlevered firm (with no debt capital) has higher market value than a levered firm (with debt capital) arbitrage process works in reverse direction. Investors will try to switch their investments from unlevered firm to levered firm so that equilibrium is established in no time.

Thus, M – M proved in terms of their proposition I that the value of the firm is not affected by debt-equity mix.

**Proposition II**

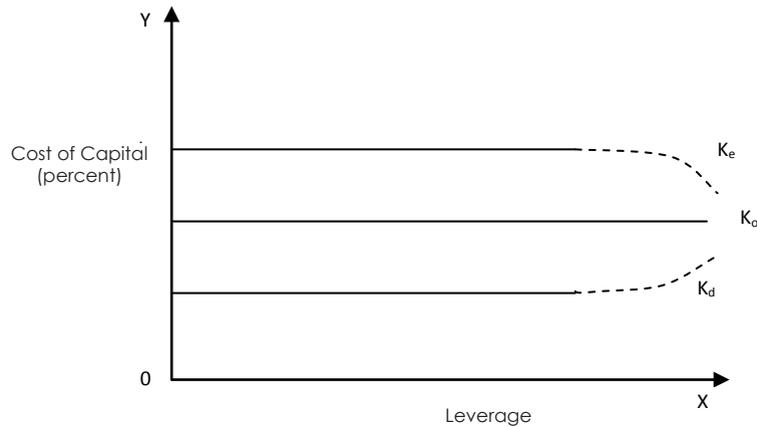
M – M’s proposition II defines cost of equity. According to them, for any firm in a given risk class, the cost of equity is equal to the constant average cost of capital (K<sub>o</sub>) plus a premium for the financial risk, which is equal to debt – equity ratio times the spread between average cost and cost of debt. Thus, cost of equity is:

$$K_e = K_o + (K_o - K_d) \frac{D}{S}$$

Where, K<sub>e</sub> = Cost of equity      K<sub>o</sub> = Average cost of capital

D/S = Debt – Equity ratio      K<sub>d</sub> = Cost of debt

M – M argue that K<sub>o</sub> will not increase with the increase in the leverage, because the low – cost advantage of debt capital will be exactly offset by the increase in the cost of equity as caused by increased risk to equity shareholders. The crucial part of the M – M Thesis is that an excessive use of leverage will increase the risk to the debt holders which results in an increase in cost of debt (K<sub>d</sub>). However, this will not lead to a rise in K<sub>o</sub>. M – M maintain that in such a case K<sub>e</sub> will increase at a decreasing rate or even it may decline. This is because of the reason that at an increased leverage, the increased risk will be shared by the debt holders. Hence K<sub>o</sub> remain constant. This is illustrated in the Figure given below:



M M Hypothesis and Cost of Capital

**Criticism on MM Hypothesis**

The arbitrage process is the behavioural and operational foundation for M M Hypothesis. But this process fails the desired equilibrium because of the following limitations.

- (i) Rates of interest are not the same for the individuals and firms. The firms generally have a higher credit standing because of which they can borrow funds at a lower rate of interest as compared to individuals.

- (ii) Home – Made leverage is not a perfect substitute for corporate leverage. If the firm borrows, the risk to the shareholder is limited to his shareholding in that company. But if he borrows personally, the liability will be extended to his personal property also. Hence, the assumption that personal or home – made leverage is a perfect substitute for corporate leverage is not valid.
- (iii) The assumption that transaction costs do not exist is not valid because these costs are necessarily involved in buying and selling securities.
- (iv) The working of arbitrage is affected by institutional restrictions, because the institutional investors are not allowed to practice home – made leverage.
- (v) The major limitation of M – M hypothesis is the existence of corporate taxes. Since the interest charges are tax deductible, a levered firm will have a lower cost of debt due to tax advantage when taxes exist.

### M – M Hypothesis Corporate Taxes

Modigliani and Miller later recognised the importance of the existence of corporate taxes. Accordingly, they agreed that the value of the firm will increase or the cost of capital will decrease with the use of debt due to tax deductibility of interest charges. Thus, the optimum capital structure can be achieved by maximising debt component in the capital structure.

According to this approach, value of a firm can be calculated as follows:

$$\text{Value of Unlevered firm } (V_u) = \frac{EBIT}{K_o}(1 - t)$$

- Where, EBIT = Earnings before interest and taxes  
 $K_o$  = Overall cost of capital  
 D = Value of debt capital  
 t = Tax rate.

Value of levered firm (Vl) = Value of Unlevered firm + Debt (tax rate)

### Illustration 9

A company's expected annual net operating income (EBIT) is ₹50,000. The company has ₹2,00,000, 10% debentures. The equity capitalisation rate ( $K_e$ ) of the company is 12.5%. Find the value of the firm and over all cost of capital under Net Income approach.

**Solution : Calculation of value of firm and overall cost of capital under Net Income approach**

Value of firm = MV of Equity + MV of Debt
---

EBIT	50,000
Less: Interest (2,00,000 x 10%)	20,000
Equity earnings	30,000
Equity Capitalisation Rate ( $K_e$ )	12.5%

Therefore

Value of Equity = $\frac{30,000}{12.5\%}$	= ₹2,40,000
Value of Debt (given)	= ₹2,00,000
Value of Firm	= ₹4,40,000

### Overall Cost of Capital ( $K_o$ )

$$K_o = 12.5 \times \left[ \frac{2,40,000}{4,40,000} \right] + 10 \times \left[ \frac{2,00,000}{4,40,000} \right]$$

$$K_o = 11.36\%$$

**Illustration 10**

Assuming no taxes and given the earnings before interest and taxes (EBIT), interest (I) at 10% and equity capitalisation rate ( $K_e$ ) below, calculate the total market value of each firm under Net Income Approach:

Firms	EBIT	I	$K_e$
	₹	₹	
X	2,00,000	20,000	12.0%
Y	3,00,000	60,000	16.0%
Z	5,00,000	2,00,000	15.0%
W	6,00,000	2,40,000	18.0%

Also determine the weight average cost of capital for each firm.

**Solution:**

**Calculation of valuation of each firm under Net Income Approach**

Value of firm = Value of equity + Value of debt
---

FIRM	X (₹)	Y (₹)	Z (₹)	W (₹)
EBIT	2,00,000	3,00,000	5,00,000	6,00,000
Less: Interest	20,000	60,000	2,00,000	2,40,000
Equity Earnings	1,80,000	2,40,000	3,00,000	3,60,000
Cost of Equity ( $K_e$ )	12%	16%	15%	18%
Capitalised value of equity	15,00,000	15,00,000	20,00,000	20,00,000
Add: MV of Debt	2,00,000	6,00,000	20,00,000	24,00,000
Value of firm	17,00,000	21,00,000	40,00,000	44,00,000
WACC ( $K_o$ )	11.76%	14.19%	12.50%	13.64%

Note 1: Value of debt =  $\frac{\text{Interest}}{K_d}$

Note 2:  $K_o = \frac{\text{EBIT}}{\text{Value of firm}}$

**Illustration No. 11**

The existing capital structure of XYZ Ltd. is as under:

Equity Shares of ₹100 each	40,00,000
Retained Earnings ₹	10,00,000
9% Preference Shares ₹	25,00,000
7% Debentures ₹	25,00,000

The existing rate of return on the company's capital is 12% and the income-tax rate is 50%.

The company requires a sum 25,00,000 to finance an expansion programme for which it is considering the following alternatives:

- i) Issue of 20,000 equity shares at a premium of ₹.25 per share.
- ii) Issue of 10% preference shares.
- iii) Issue of 8% debentures

It is estimated that the PE ratios in the cases of equity preference and debenture financing would be 20,17 and 16 respectively.

Which of the above alternatives would you consider to be the best?

**Solution:**
**Evaluation of various financial alternatives**

₹

	Plan I (Equity)	Plan II (Preference Shares)	Plan III (Debentures)
1. EBIT	15,00,000	15,00,000	15,00,000
2. Interest:			
Existing	1,75,000	1,75,000	1,75,000
Additional	-	-	2,00,000
Total Interest	1,75,000	1,75,000	3,75,000
3. PBT (1-2)	13,25,000	13,25,000	11,25,000
4. TAX 50%	6,62,500	6,62,500	5,62,500
5. PAT (3-4)	6,62,500	6,62,500	5,62,500
6. Preference dividend			
Existing	2,25,000	2,25,000	2,25,000
Additional	-	2,50,000	-
Total Preference Dividend	2,25,000	4,75,000	2,25,000
7. Equity earnings (5-6)	4,37,500	1,87,500	3,37,500
8. No. of equity shares	*60,000	40,000	40,000
9. EPS $\left[\frac{7}{8}\right]$	7.29	4.69	8.44
10. P/E Ratio (Given)	20	17	16
11. Market Price per share	145.80	79.73	135.04

\* Note 1: No. of shares under Plan I

Existing shares	40,000
Additional shares	20,000
Total shares	60,000

**Illustration 12**

XL Limited provides you with following figures:

	₹.
Profit	2,60,000
Less: Interest on Debentures @ 12%	60,000
	<b>2,00,000</b>
Income tax @ 50%	1,00,000
<b>Profit after tax</b>	<b>1,00,000</b>
Number of Equity shares (of ₹10 each)	40,000
EPS (Earning per share)	2.50
Ruling price in market	25
PE Ratio (i.e. Price/EPS)	10

The Company has undistributed reserves of ₹6,00,000. The company needs ₹2,00,000 for expansion. This amount will earn at the same rate as funds already employed. You are informed that a debt equity ratio Debt/ (Debt+ Equity) more than 35% will push the P/E Ratio down to 8 and raise the interest rate on additional amount borrowed to 14%. You are required to ascertain the probable price of the share.

- If the additional funds are raised as debt; and
- If the amount is raised by issuing equity shares.

**Solution:**

**Computation of existing capital and return on capital employed: -**

		₹
Equity share Capital	40,000 x 10	4,00,000
12% debentures	$\frac{60,000}{12\%}$	5,00,000
Undistributed Reserves		6,00,000
Existing Capital		15,00,000
Return on Capital employed	$\frac{2,60,000}{15,00,000} \times 100$	= 17.33%

**Calculation of Debt Equity Ratio**

	Plan I (Debt Plan)	Plan II (Equity Plan)
Existing Equity (Capital + Reserve)	10,00,000	10,00,000
Additional equity	-	2,00,000
Total equity (A)	10,00,000	12,00,000
Existing Debt	5,00,000	5,00,000
Additional Debt	2,00,000	-
Total Debt (B)	7,00,000	5,00,000
Debt Equity Ratio $\frac{Debt}{Debt + Equity}$	$\frac{7,00,000}{15,00,000} \times 100$	$\frac{5,00,000}{5,00,000 + 12,00,000}$
	= 41.18%	= 29.41%
Applicable P/E Ratio	8	10

**Computation of probable market price of share after expansion:-**

	Plan I (Debt)	Plan II (Equity)
1. EBIT (17,00,000 x 17.33%)	2,94,610	2,94,610
2. Interest (Existing + Additional)	88,000	60,000
3. PBT (1-2)	2,06,610	2,34,610
4. Tax @ 50%	1,03,305	1,17,305
5. PAT (3-4)	1,03,305	1,17,305
6. Preference Dividend	-	-
7. Equity Earnings (5-6)	1,03,305	1,17,305
8. No. of equity shares (Existing + Additional)	40,000	*48,000
9. EPS (= 7/8)	2.58	2.44
10. P/E Ratio	8	10
11. Market Price [= EPS x P/E Ratio]	20.64	24.40

The Market Price is higher at Plan II. So, the company has to adopt Plan II i.e., raising additional funds by issuing equity shares preferable.

\*Note: Additional equity issued at prevailing market price i.e., ₹ 25/-

**Illustration 13**



From the following data find out the value of each firm and value of each equity share as per the Modigliani-Miller approach:

	X	Y	Z
EBIT	₹13,00,000	13,00,000	13,00,000
No. of shares	3,00,000	2,50,000	2,00,000
12% debentures		9,00,000	10,00,000

Every firm expect 12% return on investment.

**Solution:**

**Calculation of value of each firm under Modigliani – Miller approach:**

$$\text{Value of firm} = \frac{EBIT}{K_o}$$

Firm	X	Y	Z
1. EBIT	13,00,000	13,00,000	13,00,000
2. ROI = $K_o$	12%	12%	12%
3. Value of Firm $\left[\frac{1}{2}\right]$	1,08,33,333	1,08,33,333	1,08,33,333

**Calculation of value of each equity share for each firm**

Firm	X	Y	Z
1. Value of Firm	1,08,33,333	1,08,33,333	1,08,33,333
2. Debt	-	9,00,000	10,00,000
3. Value of equity (1-2)	1,08,33,333	99,33,333	98,33,333
4. No. of equity shares	3,00,000	2,50,000	2,00,000
5. Market Price $\left[\frac{3}{4}\right]$	36.11	39.73	49.17

#### Illustration 14

Z Co. has a capital structure of 30% debt and 70% equity. The company is considering various investment proposals costing less than ₹ 30 Lakhs. The company does not want to disturb its present capital structure. The cost of raising the debt and equity are as follows:

Project Cost	Cost of Debt	Cost of Equity
Above ₹ 5 Lakhs	9%	13%
Above ₹ 5 Lakhs and upto ₹ 20 Lakhs	10%	14%
Above ₹ 20 Lakhs and upto ₹ 40 Lakhs	11%	15%
Above ₹ 40 Lakhs and upto ₹ 1 Crore	12%	15.55%

Assuming the tax rate is 50%, compute the cost of two projects A and B, whose fund requirements are ₹. 8 Lakhs and ₹. 22 Lakhs respectively. If the project are expected to yield after tax return of 11%, determine under what conditions it would be acceptable.

**Solution:**

Capital Structure: (given) = 30% Debt and 70% Equity

**Calculation of overall cost of capital at different investment outlays**

Project Cost	$K_d (1-t)$	$K_e$	$K_o = W_d K_d + K_e W_e$
Upto ₹ 5 lakhs	9% (1-0.5)=4.5%	13%	(0.3 x 4.5) + (0.7 x 13) = 10.450%
₹ 5 lakhs to 20 lakhs	10% (1-0.5)= 5%	14%	(0.3 x 5) + (0.7 x 14) = 11.300%
₹ 20 lakhs to 40 lakhs	11% (1-0.5)= 5.5%	15%	(0.3 x 5.5) + (0.7 x 15) = 12.150%
₹ 40 lakhs to 1 crore	12% (1-0.5)= 6%	15.55%	(0.3 x 6) + (0.7 x 15.55) = 12.685%

**Evaluation of given projects:**

Project	Investment	$K_o$	Project Return	Result
A	8 lakhs	11.3%	11%	Return < $K_o$
B	22 lakhs	12.15%	11%	Return < $K_o$

**Comment:** Both the projects, A and B, are not acceptable as the Cost of Capital is more than the Expected yield of the project. In order to accept the project the Expected return should always greater than the cost of capital.

**Illustration 15**

Company X and Company Y are in the same risk class, and are identical in every fashion except that Company X uses debt while Company Y does not. The levered firm has ₹ 9,00,000 debentures, carrying 10% rate of interest. Both the firms earn 20% before interest and taxes on their total assets of ₹15 lakhs. Assume perfect capital markets, rational investors and so on; a tax rate of 50% and capitalisation rate of 15% for an all equity company.

- (i) Compute the value of firms X and Y using the net income (NI) approach.
- (ii) Compute the value of each firm using the net operating income (NOI) approach.
- (iii) Using the NOI approach, calculate the overall cost of capital ( $k_o$ ) for firms X and Y.
- (iv) Which of these two firms has an optimal capital structure according to the NOI approach? Why?

**Solution:**

**i) Computation of value of firms X and Y using NI approach:**

NI approach assumes no taxes. Since, the tax rate is given in the problem, we have to work out of NI approach.

$$\text{Value of Firm} = \text{MV of Equity} + \text{MV of Debt}$$

₹

	<b>X</b>	<b>Y</b>
EBIT	3,00,000	3,00,000
Less: Interest	90,000	-
PBT	2,10,000	3,00,000
Less: Tax @ 50%	1,05,000	1,50,000
PAT	1,05,000	1,50,000
$K_e$	15%	15%
Capitalised Value of equity	7,00,000	10,00,000
MV of Debt	9,00,000	-
value of firm	16,00,000	10,00,000

**ii) Computation of value of firms X and Y using NOI approach:**

Net operating Income approach assumes no taxes. Since the tax rate is given in the problem, we have to work out using MM approach, which is an extension of NOI approach.

$$\begin{aligned} \text{Value of unlevered firm (Y)} &= \frac{EBIT(1-t)}{K_e} \\ &= \frac{3,00,000(1-0.05)}{0.15} = ₹ 10,00,000 \end{aligned}$$

$$\begin{aligned} \text{Value of levered firm (X)} &= \text{Value of unlevered firm} + \text{Debt (Tax rate)} \\ &= \text{Value of Y Ltd} + \text{Debt (Tax rate)} \\ &= 10,00,000 + (9,00,000 \times 50\%) \\ &= ₹ 14,50,000 \end{aligned}$$

**iii) Computation of overall cost of capital (K<sub>o</sub>) using NOI approach:**

For Y Ltd:

$$K_o = K_e = 15\% \text{ (as there is no debt)}$$

For X Ltd:

₹	
Value of firm	14,50,000
Less: Value of debt	9,00,000
Market value of equity	5,50,000

$$K_e = \frac{\text{Equity Earning}}{\text{Market Value of equity}} \times 100$$

$$= \frac{1,05,000}{5,50,000} \times 100 = 19\%$$

$$K_d = 0.10 (1-0.50) = 5\%$$

$$K_o = 19 \times \frac{5,50,000}{14,50,000} + 5 \times \frac{9,00,000}{14,50,000} = 10.31\%$$

Comment: Out of two firms Firm Y seems to have optimum capital structure as it has lower cost of capital higher value of firm.

**Illustration No. 16**

A Company's current operating income is ₹.4 lakhs. The firm has ₹.10lakhs of 10% debt outstanding. Its cost of equity capital is estimated to be 15%.

- (i) Determine the current value of the firm using traditional valuation approach.
- (ii) Calculate the firm's overall capitalisation ratio as well as both types of leverage ratios (a) B/s (b) B/V.

**Solution:**

**i) Calculation of value of firm (Vf) under Traditional approach:**

Value of firm = Value of Debt + Value of equity
---

1.	EBIT	4,00,000
2.	Interest (10,00,000 x 10%)	1,00,000
3.	Equity Earnings (1-2)	3,00,000
4.	Equity Capitalisation rate	15%
5.	Value of Equity $\left[ \frac{3}{4} \right]$	20,00,000
6.	Value of Debt	10,00,000
7.	Value of firm(5+6)	30,00,000

**ii) Calculation overall capitalization rate and leverage ratios**

$$\begin{aligned} \text{Overall Capital Rate (K}_o\text{)} &= \frac{\text{EBIT}}{\text{Value of firm}} \times 100 \\ &= \frac{4,00,000}{30,00,000} \times 100 \\ &= 13.33\% \end{aligned}$$

**Leverage Ratios**

$$\begin{aligned} \text{a) B/S Ratio} &= \frac{\text{Borrowing}}{\text{Share holders funds}} \\ &= \frac{10,00,000}{20,00,000} \\ &= 0.5 \end{aligned}$$

$$\text{b) B/V Ratio} = \frac{\text{Borrowing}}{\text{Share holders funds}} = \frac{10,00,000}{30,00,000} = 0.33$$

## 6.3 DIVIDEND POLICY

### Introduction :

Dividend are a major cash outlay for many corporations. At first glance it would appear that a company could distribute as much as possible to please its shareholders. it might seem equally obvious that a firm could invest money for its shareholders instead of paying dividends.

A firm's decisions about dividends are often mixed up with other financing and investment decisions. Some firms pay low dividends because management is optimistic about a firm's future and wishes to retain earnings for expansion. Another firm might finance capital expenditures largely by borrowing. This releases cash for dividends.

The firm's dividend policy must be isolated from other problems of financial management. The dividend policy is a trade-off between retained earnings on the one hand and paying out cash and issuing shares on the other.

There are many firms that pay dividends and also issue stock from time to time. They could avoid the stock issues (where costs are highest for the firm) by paying lower dividends. Many other firms restrict dividends so that they do not have issue shares. They on the other hand could occasionally issue stock and increase dividends. Thus both firms face dividend policy trade-off.

There are many reasons for paying dividends and there are many reasons for not paying any dividends. **As a result, dividend policy is always controversial.**

### What are dividends ? What are the various types ?

The term *dividend* usually refers to a cash distribution of earnings. If it comes from other sources, it is called a *liquidating dividend*. It mainly has the following types:

- (i) Regular dividends are those the company expects to maintain, paid half-yearly (sometimes monthly, quarterly or annually).
- (ii) Extra dividends are those that may not be repeated.
- (iii) Special dividends are those that are unlikely to be repeated.
- (iv) Stock dividends are sometimes paid in shares of stocks. Similar to stock splits, both increase the number of shares outstanding and reduce the stock price.

### Why a dividend policy is important?

The dividend policy of a company determines what proportion of earnings is distributed to the shareholders by way of dividends, and what proportion is ploughed back for reinvestment purposes. Since the main objective of financial management is to maximize the market value of equity shares, one key area of study is the relationship between the dividend policy and market price of equity shares. In this regard dividend policy assumes significance.

### Dividend Models:

#### Graham & Dodd Model (Traditional model)

According to this model founded by Graham and Dodd, the market price of the shares will increase when a company declares a dividend rather than when it does not. Base of their arguments was that investors are rational and under conditions of uncertainty they turn risk averse. In this model weight attached to dividends is four times of weight attached to retained earnings.

**Quantitatively**

$$P = m \left( D + \frac{A}{Q} \right)$$

Where :

P is the market price per share

M is a multiplier

D is the dividend per share

E is the earning per share

Critics argue that Graham and Dodd provided weight subjectively and did not derive them from any empirical analysis.

**Walter model :**

According to this model founded by Jame Walter, the dividend policy of a company has an impact on the share valuation, i.e., dividends are relevant. The key argument is support of the relevance proposition of Walter's model is the relationship between the return on a firm's investment (its internal rate of return) 'r' and its cost of capital (i.e. the required arte of return) 'k'. If the return on investments exceeds the cost of capital, the firm should retain the earnings, whereas it should distribute the earnings to the shareholders in cash the required rate of return exceeds the expected return on the firm's investments. The rationale is that if  $r > k$ , the firm is able to earn more than what the shareholders could by reinvesting, if the earnings are paid to them. The implication of  $r < k$  is that shareholders can earn a higher return by reinvesting elsewhere.

**Quantitatively**

$$P = m \frac{(D + \frac{r}{k}(e - d))}{k}$$

Where :

P is the market price per share

D is the dividend per share

E is the earning per share

r is the internal rate of return on the investments and

k is the cost of capital.

**Assumptions :**

- a. All financing is done through retained earnings; external sources of funds like debt or new equity capital are not used.
- b. With addition investments undertaken, the firm's business risk does not change. It implies that 'r' and 'k' are constant.
- c. There is no charge in the key variable namely EPS & DPS. The values D and E may be changed in the model to determine results, but, any given value of E and D are assumed to remain constant in determining a given value.
- d. The firm has a perpetual (very long) life.



The impact of dividend payment on the share price is studied by comparing the rate of return with the cost of capital.

- (i) When  $r > k$ , the price per share increases as the payout ratio decreases (optimal payout ratio is nil)
- (ii) When  $r = k$ , the price per share does not vary with the changes in the payout ratio (optimal payout ratio does not exist)
- (iii) When  $r < k$ , the price per share increases as the payout ratio increases (optimal payout ratio is 100%)

### **Gordon model :**

According to this model founded by Myron Gordon, the dividend policy of the company has an impact on share valuation i.e. dividends are relevant. Myron J Gordon (1962) said that "... investors prefer the early resolution of uncertainty and are willing to pay a higher price of the shares that offer the greater current dividends." Gordon suggested (i) The higher the earnings retention rate, the greater the required future return from investments to compensate for risk. (ii) the risk attitude of investors will ensure that  $r$  will rise for each successive year in the future to reflect growth uncertainty.

This is based on the following assumptions :

- a. The firm is an all equity firm. No external financing is used and only retained earnings finance investments programs.
- b. 'r' & 'k' are constant.
- c. The firm has perpetual life.
- d. The retention ratio, once decided upon is constant. Thus the growth rate, ( $g = br$ ) is also constant.
- e.  $k > br$

### **Quantitatively**

$$P = \left( \frac{Y(1-b)}{k-br} \right)$$

Where :

P is the price per share

Y is the earnings per share

b is the retention ratio

1-b is the payout ratio

br is the growth rate

r is the return on investment

k is the rate of return required by shareholders (also called capitalization rate)

On comparing  $r$  and  $k$ , the relationship between market price and the payout ratio is exactly the same as compared to the Walter model. The crux of Gordon's arguments is a two-fold assumption : (i) investors are risk averse, and (ii) they put a premium on a certain return and discount/penalize uncertain returns. In other words the rational investors prefer current dividend. A company which retains earnings is perceived as risky as the future payment of dividend amount and timing is uncertain. Thus they would discount future dividends, that is, they would place less importance on it as compared to current dividend. The above argument underlying Gordon's model of dividend relevance is also described as

a *bird-in-hand* argument. i.e. what is available at present is preferable to what may be available in the future. Gordon argues the more distant the future is, the more uncertain it is likely to be.

### MM model [Dividend Irrelevancy Model]

According to this model, as founded by Miller and Modigliani, the market price of the share does not depend on the dividend payout, i.e. the dividend policy is irrelevant. This model explains the irrelevance of the dividend policy in the following manner.

When profits are used to declare dividends, the market price increases. But at the same time there is a fall in the reserves for reinvestment. Hence for expansion, the company raises additional capital by issuing new shares. Increase in the overall number of shares, will lead to a fall in the market price per share. Hence the shareholders would be indifferent towards the dividend policy.

According to the MM Model the market price of a share after dividend declared is calculated by applying the following formula :

$$P_0 = \left( \frac{Y(1-b)}{(k-br)} \right)$$

where,

$P_0$  is the prevailing market price

$k$  is the cost of equity capital

$D_1$  is the dividend to be received at the end of period one

$P_1$  is the market price at the end of period one

The number of shares to be issued for new projects, in lieu of dividend payments is given by the following formula :

$$m = \frac{I - (E - nD_1)}{P_1}$$

$n$  – is the number of shares outstanding at the beginning of the period.

$m$  – is no. of new shares issued

$I$  – Total investment amount required for the new project

$E$  – Earnings of net income of the firm during the period

#### Proof :

Let  $n$  represent the original number of outstanding shares of the company,  $D$  be the dividend distributed to the 'n' shareholders,  $I$  be the total investment amount required for the new project, and  $E$  be the Earnings (net income) of the firm during the period. And let  $m$  represent the number of new shares issued to meet the shortfall in investment issued at a current market price of  $P_1$ .

According to the MM Model the market price of a share after dividend declared is calculated by applying the following formula :

$$P_0 = \frac{P_1 + D_1}{1+k}$$

The current market capitalization is given by

$$nP_0 = \frac{np_1 + nD_1}{1 + k}$$

Adding and subtracting  $mP_1$  on numerator in the RHS of the equation we have,

$$nP_0 = \frac{(m + n)P_1 + nD_1 - mP_1}{1 + k}$$

$$\begin{aligned} \text{Now, } mP_1 &= \text{Amount raised} = \text{Investment} - [\text{Earnings} - \text{Dividends distributed}] \\ &= I - [E - nD_1] \end{aligned}$$

Substituting in the above equation, we have

$$nP_0 = \frac{(m + n)P_1 + E - I}{1 + k}$$

As no dividend term appear on the right hand side of the equation, it is proved that dividends are irrelevant.

#### **Assumptions & Criticisms or M-M Model :**

The critics of the MM model argue that the assumptions underlying the model are unrealistic and vulnerable and have disputed the validity of dividend irrelevance.

#### **Residual model**

If a firm wishes to avoid issue of shares, then it will have to rely on internally generated funds to finance new positive NPV projects. Dividends can only be paid out of what is left over. This leftover is called a residual and such a dividend policy is called residual dividend approach.

When we treat dividend policy as strictly a **financing decision**, the payment of cash dividends is a passive residual. The amount of dividend pay-out will fluctuate from period to period in keeping with fluctuations in the number of acceptable investment opportunities available to the firm. If these opportunities abound, the percentage of dividend payout is likely to be zero. On the other hand if the firm is unable to find profitable investment opportunities, dividend payout will be 100%.

**With a residual dividend policy, the firm's objective is to meet its investment needs and mostly to maintain its desired debt equity ratio before paying dividends.** To illustrate imagine that a firm has Rs. 1000 in earnings and a debt equity ratio of 0.5. Thus the firm has 0.5 of debt for every 1.5 of the total value. The firm's capital structure is 1/3 of debt and 2/3 of equity.

The first step in implementing a residual dividend policy is to determine the amount of funds that can be generated without selling new equity. If the firm reinvests the entire Rs. 1000 and pays no dividend, then equity will increase by Rs. 1000. To keep the debt equity ratio constant, the firm must borrow Rs. 500.

The second step is to decide whether or not the dividend will be paid. If funds needed are less than the funds generated then a dividend will be paid. The amount of dividend will be the residual after meeting investment needs. Suppose we require Rs. 900 for a project. Then 1/3 will be contributed by debt (i.e. Rs. 300) and the balance by equity/retained earnings. Thus the firm would borrow Rs. 300 and fund Rs. 600 from the retained earnings. The residual i.e. Rs. 1000 – Rs. 600 = Rs. 400 would be distributed as dividend.

More clarity can be had from the data given below:

New Invst.	Debt portion	Retained	Additional Earnings	Dividends Equity	
1000	3000	1000	1000	1000	0
1000	2000	667	1000	333	0
1000	1500	500	1000	0	0
1000	1000	333	667	0	333
1000	500	167	333	0	667
1000	0	0	0	0	1000

### DIVIDEND DISCOUNT MODEL

The dividend discount model is a more conservative variation of discounted cash flows, that says a share of stock is worth the present value of its future *dividends*, rather than its earnings. This model was popularized by John Burr Williams in ***The Theory of Investment Value***.

... a stock is worth the present value of all the dividends ever to be paid upon it, no more, no less... Present earnings, outlook, financial condition, and capitalization should bear upon the price of a stock only as they assist buyers and sellers in estimating future dividends.

The dividend discount model can be applied effectively only when a company is already distributing a significant amount of earnings as dividends. But in theory it applies to all cases, since even retained earnings should eventually turn into dividends. That's because once a company reaches its "mature" stage it won't need to reinvest in its growth, so management can begin distributing cash to the shareholders. As Williams puts it.

If earnings not paid out in dividends are all successfully reinvested... then these earnings should produce dividends later; if not, then they are money lost... In short, a stock is worth only *what you can get out of it*.

The dividend discount model (DDM) is a widely accepted stock valuation tool found in most introductory finance and investment textbooks. The model calculates the present value of the future dividends that a company is expected to pay to its shareholders. It is particularly useful because it allows investors to determine an absolute or "intrinsic" value of a particular company that is not influenced by current stock market conditions. The DDM is also useful because the measurement of future dividends (as opposed to earnings for example) facilitates an "apples-to-apples" comparison of companies across different industries by focusing on the actual cash investors can expect to receive.

**There are three alternative dividend discount models used to determine the intrinsic value of a share of stock :**

- the constant (or no-growth) dividend model;
- the constant growth dividend model; and
- the two-stage (or two-phase) dividend growth model.

#### Constant dividends :

$$P = D_1 / K_e \quad \text{where :} \quad P = \text{intrinsic value}$$

$$D_1 = \text{expected dividend}$$

$$k_e = \text{appropriate discount factor for the investment}$$

This method is useful for analyzing preferred shares where the dividend is fixed. However, the constant dividend model is limited in that it does not allow for future growth in the dividend payments for growth industries. As a result the constant growth dividend model may be more useful in examining a firm.

### Constant dividend growth :

$$P = D_1 / (k_e - g) \quad \text{where :} \quad \begin{aligned} P &= \text{intrinsic value} \\ D_1 &= \text{expected dividend} \\ k_e &= \text{appropriate discount factor for the investment} \\ g &= \text{constant dividend growth rate} \end{aligned}$$

The constant dividend growth model is useful for mature industries, where the dividend growth is likely to be steady. Most mature blue chip stocks may be analyzed quickly with the constant dividend growth model. This model has its limitations when considering a firm which is in its growth phase and will move into a mature phase at some time the future. A two stage growth dividend model may be utilized in such situations. This model allows for adjustment to the assumptions of timing and magnitude of the growth of the firm.

For initial dividend growth & then steady growth:

$$P = \sum_{t=1}^n \left[ \frac{D_0(1+g_1)^t}{(1+k_e)^t} \right] + \frac{D_0(1+g_2)}{k_e - g_2} \left[ \frac{1}{(1+k_e)^n} \right]$$

where :

$$\begin{aligned} P &= \text{intrinsic value} = \text{PV of dividends} + \text{PV of price} \\ D_t &= \text{expected dividend} \\ k_e &= \text{appropriate discount factor for the investment} \\ g_1 &= \text{initial dividend growth rate} \\ g_2 &= \text{steady dividend growth rate} \end{aligned}$$

### LINTNER MODEL

John Linter surveyed dividend behaviour of several corporate and showed that

- Firms set long run target payout ratios.
- managers are concerned more about change in the dividend than the absolute level
- Dividends tend to follow earnings, but dividends follow a smoother path than earnings
- Dividends are sticky in nature because managers have a reluctance to effect dividend changes that may have to be reversed.

Linter expressed corporate dividend behaviour in the form of a following model :

$$D_t = cr \text{ EPS}_t + (1-c)D_{t-1}$$

$D_t$  = DPS for year t

c = Adjustment rate or Speed or Adjustment

r = Target Payout Rate

$\text{EPS}_t$  = EPS for year t

$D_{t-1}$  = DPS for year t-1

The Linter model shows that the current dividend depends partly on current earnings and partly on previous years dividend. Likewise the dividend for the previous year depends on the earnings of that year and the dividend for the year preceding that year, so on and so forth. Thus as per the Linter Model, dividends can be described in terms of a weighted average of past earnings.

## DIVIDEND DATES

### What is a declaration, Record, Ex-Dividend & Payment dates?

**Declaration date** : The date on which board of directors declare dividend is called a declaration date.

**Record date** : Record date, is that date when the company closes its stock transfer books and makes up a list of the shareholders for payment of dividends.

**Ex-dividend date** : It is that date notified by the stock exchange, as a date which will entail a buyer of shares, **the dividend**, if bought before the ex-dividend date. This date sets up the convention of declaring that the right to the dividend remains with the stock until 'x' days prior to the Record date. Thus whoever buys share on or beyond the ex-dividend date are not entitled to dividend.

**Payment date** : The date on which the company mails the checks to the recorded holders.

### Example :

Let us say, settlement of stocks follows "T+3", which means that, when you buy a stock, it takes three days from the transaction date (T) for the change to be entered into the company's record books. As mentioned, if you are not in the company's recorded books on the date of record, you won't receive the dividend payment. To ensure that you are in the record books, you need to buy stock at least three days before the date of record, **which also happens to be the day before the ex-dividend date.**

As you can see by the diagram above, if you buy on the ex-dividend date, which is only two days before the date of record, you will not receive the dividend because your name will not appear in the company's record books until Friday. If you want to buy the stock and receive the dividend, you need to buy it on the Monday the 5th. (When the stock is trading with the dividend the term "cum dividend" is used). If you want to sell the stock and still receive the dividend, you need to sell on or after Tuesday the 6th.

## BONUS SHARES OR STOCK DIVIDEND

Because a corporation's dividends are sometimes not paid regularly, a company may choose to pay dividends in the form of stock. Assume a corporation declares a 10% stock dividend. what happens is that for every 10 shares of stock a person owns he gets one new share as a dividend. If a corporation has 1,000,000 share of common stock outstanding and declares a 10% stock dividend, the corporation will have 1,100,000 shares of stock outstanding after the stock dividend is paid.

The individual investor maintains his proportionate share and the same total book value in the company. Book value per share will be less. However, his investment in the company remains the same.

When a company issues a stock dividend, it retains its accumulated earnings. Therefore, some companies may want to issue a stock dividend to avoid paying out cash. They may want to use the cash elsewhere. Basically, the company is capitalizing their earnings. When the stock dividend is declared a transfer is made from earned capital to contributed or permanent capital.

### Advantages :

- a. It preserves the company's liquidity as no cash is used.
- b. The shareholders can liquidate these shares whenever they require.
- c. It is excellent way to bring the paid capital of the company in line with actual capital employed by the company in the business.
- d. It broadens the capital base and improves the image of the company.
- e. It is inexpensive method of raising the capital by which the cash resources of the company are conserved.
- f. It reduces the market price of the shares, rendering the shares more marketable.
- g. It is perceived as an indication by the market that the company financial position is sound.

### Disadvantages :

- a. Since the reserves have been used to issue bonus shares, it indicates that future dividend would decline.
- b. Issue of bonus shares involve lengthy legal procedures and approvals.

### Determining the maximum Bonus Ratio

Keeping in mind the two rules applicable for issue of bonus shares viz.

- a. **Residual Reserve Requirement** : Reserves after the proposed bonus issue should be at least 40% of the increased paid up capital.
- b. **Profitability Requirement** : 30% of the average amount of pre-tax profits of the company in the previous three years should yield a return of at least 10% on the increased capital.

We can form two equations for calculating 'b', the maximum bonus ratio as

$$\text{Equation 1 (Constant I)} \quad (R-Sb) \geq 0.4S(1+b)$$

$$\text{Equation 2 (Constant II)} \quad 0.3\overline{PBT} > 0.1S(1+b)$$

### MEASURES OF DIVIDEND POLICY

**Dividend Payout** : measures the percentage of earnings the company pays in dividends =  $\frac{\text{Dividends}}{\text{Earnings}}$ .

**Dividend Yield** : measures the return that an investor can make from dividends alone =  $\frac{\text{Dividends}}{\text{Stock Price}}$ .

**Earnings Yield** : measures how earnings are reflected in the share price =  $\frac{\text{Earnings}}{\text{Stock Price}}$ .

### SHARE BUYBACK (REPURCHASE)

When companies have sufficient liquid assets they resort to share buy-back or share repurchase, wherein they cancel or retire a part of its outstanding shares by purchasing from the market or directly from the shareholders. This is particularly relevant when the shares are available in the market much below its book value. When the shares are repurchased, the underlying motive is to distribute the excess cash to the shareholders. The cancellation of shares mean the shareholders will receive cash for their shares, reduces outstanding number of shares in the books of the company, earnings per share increase and also market price of the share increases.

There are **THREE** methods of shares repurchase :

- a. **Repurchase Tender Offer** : Here the firm specifies the number of shares it proposes to buy back, the price it would pay and the time period for which the offer would be open for the shareholders to tender their shares. The firm may retain the flexibility to withdraw the offer if insufficient number of shares are submitted for repurchase.
- b. **Open Market Repurchase** : Here the firm buys from the market at the prevailing price. The time period is generally longer than that is adopted for Tender Offers. In terms of flexibility, the open market repurchase provides the firm more freedom in deciding when to repurchase and how many shares to be repurchased.
- c. **Negotiated Repurchase** : In this case the firm may buy shares from a large shareholder at a negotiated price. This is adopted only when a large shareholder groups viz. promoters, are willing to sell their stake.

Let  $S$  denote the number of outstanding shares.  $P_0$  be the current market price and let  $N$  be the number of shares that would be bought back by the company then

Theoretical post Buy Back price ( $P_1$ ) is given as . As it can be seen the price after buy back would increase, as the number of shares outstanding gets reduced.

#### **Advantages of Shares Repurchase over Dividends**

1. Cash dividend implies a commitment on the part of company to continue payments in future, as investors keep expecting them. However, share repurchase is a one time affair.
2. The decision to repurchase the shares offers a company more flexibility as to number of shares, the period etc.
3. Share repurchase are more focused in terms of paying out cash only to those shareholders who need it. However, dividends are paid to all.
4. Share buy back provide a way of increasing insiders control in the firm. If only outsiders tender their shares, automatically insiders control increases.

#### **When Share buyback is adopted by the companies?**

- a. If excess cash flows are temporary, share repurchase can be adopted. If cash flows are stable, then the firm may prefer to give dividends.
- b. Firms uncertain about their future investment opportunities in the business are more likely to use share repurchase as a means of returning cash to shareholders.
- c. The share repurchase is relevant especially when the shares of the firm are undervalued.
- d. When the promoters want to increase their control in the firm they use share buyback to the maximum effect.

#### **Is Share Buyback is a financing decision or an investment decision?**

When the shares are undervalued in the market and the firm does not have an alternate business opportunity, then the excess cash is returned to shareholders and thus the management prefers to invest in its own business by buying back their shares. Yes, the management has more faith in its own business. Thus it can be argued as an **investment decision** even though excess cash with the firm is given to shareholders in a different form.

Secondly, share buy-back reduces the equity portion of the firm, thereby increasing the debt portion in the overall capital structure. Moreover, for further expansion the firm may borrow thereby further increasing the leverage and risk. Thus share repurchase is a kind of **financing decision** too.

## Capital Asset Pricing Model (CAPM)

The capital asset pricing model is also used in the valuation of shares. The following illustration will explain the procedure in using this method for valuation ( A detailed discussion on this topic is made in Chapter 30 on 'Modern Portfolio Theory').

$$E(R_i) = R_f + B_i [R_m - R_f]$$

Where,

$E(R_i)$  = Expected rate of return on individual security

$R_m$  = Market rate of return expected

$R_f$  = Risk free return

$B_i$  = Beta factor of investment

ABC Ltd. is intending to acquire substantial shares in Z Ltd. to acquire control in the company. The beta factor of Z Ltd.'s shares is 1.60 and its current market price is Rs. 1.90 and the company is consistently paying dividend of Rs. 46 p.a. The risk free market rate of interest is 12% and the rate of return expected on such security in the market is 18%.

You are required to value the share of Z Ltd.

$$E(R_i) = 12\% + 1.60(18\% - 12\%) = 12\% + 1.60(6\%) = 12\% + 9.6\% = 21.6\%$$

$$= \text{Rs. } 213$$

The share price is value at Rs.213 as per CAPM Model and the current market price is Rs.190.

ABC Ltd. can put extra price over the market price is = Rs.213 – Rs.190 = Rs.23

## Modigliani and Miller - Irrelevancy Theory

Modigliani and Miller has argued that a firm's dividend policy has no effect on its value of assets. For example, if the rate of dividend declared by a company is less, its retained earnings will increase and also the net worth and vice-versa. Their argument is that the value of the firm is unaffected on a number of assumptions the most important of which were:

- There are no personal or corporate income taxes.
- There are no stock floatation or transaction costs.
- Dividend policy has no effect on the firm's cost of equity.
- The firm's capital investment policy is independent of its dividend policy.
- Investors and managers have the same set of information (symmetric information) regarding future opportunities.

The reason given by MM is that the value of the firm is determined by its basic earnings power and its risk class, and therefore, that the firm's value depend on its asset investment policy rather than on how earnings are split between dividends , and retained earnings. MM demonstrated, under a particular set of assumptions, that if a firm pays higher dividends, then it must sell more stocks to new investors, and that the share of the value of the company given up to new investors is exactly equal to the dividends paid out .The value of the firm was not determined by the amount of dividends paid, but rather by the earnings power of the projects in which the firm invested its money.

The argument used by MM to support this key assumption is referred to as the '*Clientele effect*'. The clientele effect states that a firm will attract stockholders whose preferences with respect to the payment pattern and stability of dividends corresponds to the firm's payment and stability of dividends. Since the shareholders, or the clientele of the firm get what they expect, the value of the firm's stocks unaffected by changes in its dividend policy.

According to M.M Model the market price of a share after dividend declared is calculated by applying the following formula:

$$P_o = \frac{P_i + D_i}{1 + K_e}$$

Where,

$P_o$  = The prevailing market price of a share

$K_e$  = The cost of Equity Capital

$D_i$  = Dividend to be received at the end of period one

$P_i$  = Market price of a share at the end of period one

The number of shares to be issued to implement the new projects is ascertained with the help of the following formula:

$$\Delta N = \frac{I - (E - nD_i)}{P_i}$$

Where,

$n$  = Number of Shares outstanding at the beginning of the period

= Change in the number of Shares outstanding during the period

(i.e., No. of new shares to be issued)

$I$  = Total investment amount required for capital budget

$E$  = Earnings of net income of the firm during the period

Agile Ltd. belongs to a risk class of which the appropriate capitalization rate is 10%. It currently has 1,00,000 shares selling at Rs. 100 each. The firm is contemplating declaration of a dividend of Rs.6 per share at the end of the current fiscal year which has just begun. Answer the following questions based on Modigliani and Miller Model and assumption of no taxes:

- (i) What will be the price of the shares at the end of the year if a dividend is not declared?
- (ii) What will be the price if dividend is declared?
- (iii) Assuming that the firm pays dividend, has net income of Rs. 10 lakh and new investments of Rs. 20 lakhs during the period, how many new shares must be issued?

### **Modigliani and Miller - Dividend Irrelevancy Model**

$$P_o = \frac{P_i + D_i}{1 + K_e}$$

Where,

$D_1$  = Contemplated dividend per share i.e., Rs. 6

$P_1$  = Market price of share at the year-end (to be determined)

$P_0$  = Existing market price of share i.e., Rs. 100

$K_e$  = Cost of equity capital or rate of capitalisation i.e., 10% or 0.10

### Determinants of dividend policy

Many factors determine the dividend policy of a company. The factors determining the dividend policy can be classified into:

- (i) Dividend payout ratio
- (ii) Stability of dividends
- (iii) Legal, contractual and internal constraints and restriction.
- (iv) Owners considerations
- (v) Capital market conditions
- (vi) Inflation
- (vii) General corporate behaviour regarding dividend or the practices of the Industry.

Each of the above points are further discussed as given here in below:

- (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 and, therefore, depletion of assets. In order to maintain the desired level of assets as well as to finance the investment opportunities, the company has to decide upon the payout ratio. D/P ratio should be determined with two bold objectives – maximising the wealth of the firms' owners and providing sufficient funds to finance growth.
- (ii) **Stability of Dividends:** Generally investors favour a stable dividend policy. The policy should be consistent and there should be a certain minimum dividend that should be paid regularly. The liability can take any form, namely, constant dividend per share; stable D/P ratio and constant dividend per share plus something extra. Because this entails – the investor's desire for current income, it contains the information content about the profitability or efficient working of the company; creating interest for institutional investor's etc.
- (iii) **Legal, contractual and internal constraints and restriction:** Legal and Contractual requirements have to be followed. All requirements of Companies Act, SEBI guidelines, capital impairment guidelines, net profit and insolvency etc., have to be kept in mind while declaring dividend. For example, insolvent firm is prohibited from paying dividends; before paying dividend accumulated losses have to be set off, however, the dividends can be paid out of current or previous years' profit. Also there may be some contractual requirements which are to be honoured. Maintenance of certain debt equity ratio may be such requirements. In addition, there may be certain internal constraints which are unique to the firm concerned. There may be growth prospects, financial requirements, availability of funds, earning stability and control etc.
- (iv) **Owner's considerations:** This may include the tax status of shareholders, their 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. The extent to which a firm has access to capital market, also affects the dividend policy. A firm having easy access to capital market will follow

a liberal dividend policy as compared to the firm having limited access. Sometime dividends are paid to keep the firms 'eligible' for certain things in the capital market. In inflation, rising prices eat into the value of money of investors which they are receiving as dividends. Good companies will try to compensate for rate of inflation by paying higher dividends. Replacement decision of the companies also affects the dividend policy.

### Dividend Decision and Tax Considerations

Traditional theories might have said that distribution of dividend being from after-tax profits, tax considerations do not matter in the hands of the payer-company. However, with the arrival of Corporate Dividend Tax on the scene in India, the position has changed. Since there is a clear levy of such tax with related surcharges, companies have a consequential cash outflow due to their dividend decisions which has to be dealt with as and when the decision is taken.

In the hands of the investors too, the position has changed with total exemption from tax being made available to the receiving-investors. In fact, it can be said that such exemption from tax has made the equity investment and the investment in Mutual Fund Schemes very attractive in the market.

Broadly speaking Tax consideration has the following impacts on the dividend decision of a company:

**Before introduction of dividend tax:** Earlier, the dividend was taxable in the hands of investor. In this case the shareholders of the company are corporates or individuals who are in higher tax slab, it is preferable to distribute lower dividend or no dividend. Because dividend will be taxable in the hands of the shareholder @ 30% plus surcharges while long term capital gain is taxable @ 10%. On the other hand, if most of the shareholders are the people who are in no tax zone, then it is preferable to distribute more dividend.

We can conclude that before distributing dividend, company should look at the shareholding pattern.

**After introduction of dividend tax:** Dividend tax is payable @ 12.5% - surcharge + education cess, which is effectively near to 14%. Now if the company were to distribute dividend, shareholder will indirectly bear a tax burden of 14% on their income. On the other hand, if the company were to provide return to shareholder in the form of appreciation in market price – by way of Bonus shares – then shareholder will have a reduced tax burden. For securities on which STT is payable, short term capital gain is taxable @ 10% while long term capital gain is totally exempt from tax.

Therefore, we can conclude that if the company pays more and more dividend (while it still have reinvestment opportunities) then to get same after tax return shareholders will expect more before tax return and this will result in lower market price per share.

**Walter's approach to Dividend Policy:** Walter's approach to Dividend Policy supports the doctrine that the investment policy of a firm cannot be separated from its dividend policy and both are according to him interlinked. He argues that in the long run, share prices reflect only the present value of expected dividends. Retention influences stock prices only through their effect on future dividends.

The relationship between dividend and share price on the basis of Walter's formula is shown below:

$$V_c = \frac{D + R_a \frac{(E - D)}{R_c}}{R_c}$$

Where,

$V_c$  = Market value of ordinary shares of the company.

$R_o$  = Return on internal retention, i.e. the rate company earns on retained profits.

$R_c$  = 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.

Prof. Walter's formula is based on the relationship between the firm's (i) return on investment or internal rate of return ( $R_o$ ) and (ii) Cost of Capital or required rate of return (i.e.  $R_c$ ).

The optimum dividend policy of a firm is determined by the relationship of  $R_o$  and  $R_c$ . If  $R_o > R_c$  i.e. the firm can earn higher return than what the shareholders can earn on their investments, the firm should retain the earning. Such firms are termed as growth firms, and in their case the optimum dividend policy would be to plough back the earnings. If  $R_o < R_c$  i.e. the firm does not have profitable investment opportunities, the optimum dividend policy would be to distribute the entire earnings as dividend.

In case of firms, where  $R_o = R_c$ , it does not matter whether the firm retains or distribute its earning.

*Assumptions:* Walter's dividend policy is based on the following assumptions:

- (i) The firm does the entire financing through retained earnings. It does not use external sources of funds such as debt or new equity capital.
- (ii) The firm  $R_c$  and  $R_o$  remain constant with additional investment.
- (iii) There is no change in the key variables, namely, beginning E, D.
- (iv) The firm has a very long life.

### Illustration 17

The Beta Co-efficient of Target Ltd. is 1.4. The company has been maintaining 8% rate of growth in dividends and earnings. The last dividend paid was ₹ 4 per share. Return on Government securities is 10%. Return on market portfolio is 15%. The current market price of one share of Target Ltd. is ₹ 36.

- (i) What will be the equilibrium price per share of Target Ltd.?
- (ii) Would you advise purchasing the share?

### Answer

- (i) CAPM formula =  $E(R_s) = R_f + b [E(R_m) - R_f]$ .

Where,

$E(R_s)$  = Expected rate of return of the security (OR) the cost of equity

$R_f$  = risk free returns

$E(R_m)$  = market rate of return

b = Beta co-efficient given 1.4

Substituting the values

$E(R_s) = 10 + 1.4 (15\% - 10\%)$

$E(R_s) = 17\%$

Dividend Growth Model =  $\frac{D_1}{P_0} + g$ , Where  $D_1$ , is dividend per share in year 1,  $g$  is growth rate of dividends,  $P_0$  = Market price/share in year 0.

$E(R_s)$  being .17, we can make the equation as

$$.17 = \frac{4(1.08)}{P_0} + 0.08$$

$$.09 = \frac{4(1.08)}{P_0}$$

$$P_0 = \frac{4(1.08)}{.09}$$

$$= ₹ 48$$

**Illustration 18**

Z Ltd. is foreseeing a growth rate of 12% per annum in the next 2 years. The growth rate is likely to fall to 10% for the third year and fourth year. After that the growth rate is expected to stabilize at 8% per annum. If the last dividend paid was ₹ 1.50 per share and the investors' required rate of return is 16%, find out the intrinsic value per share of Z Ltd. as of date. You may use the following table:

Years	0	1	2	3	4	5
Discounting Factor at 16%	1	0.86	0.74	0.64	0.55	0.48

**Answer**

Present value of dividend stream for first 2 years

$$₹ 1.50 (1.12) \times .86 + 1.50 (1.12)^2 \times .74$$

$$₹ 1.68 \times .86 + 1.88 \times .74$$

$$₹ 1.45 + 1.39 = 2.84 \tag{A}$$

Present value of dividend stream for next 2 years

$$₹ 1.88 (1.1) \times .64 + 1.88 (1.1)^2 \times .55$$

$$₹ 2.07 \times .64 + 2.28 \times .55$$

$$₹ 1.33 + 1.25 = 2.58 \tag{B}$$

Market value of equity share at the end of 4th year computed by using the constant dividend growth model, would be:

$$P_4 = \frac{D_5}{K_s - g_n}$$

Where  $D_5$  is dividend in the fifth year,  $g_n$  is the growth rate and  $K_s$  is required rate of return.

$$\text{Now } D_5 = D_4 (1 + g_n)$$

$$\therefore D_5 = ₹ 2.28 (1 + 0.08)$$

$$= ₹ 2.46$$

$$\begin{aligned} \therefore P_4 &= \frac{\text{₹ } 2.46}{0.16 - 0.08} \\ &= \text{₹ } 30.75 \end{aligned}$$

Present market value of  $P_4 = 30.75 \times .55 = \text{₹ } 16.91$  (C)

Hence, the intrinsic value per share of Z Ltd. would be

A + B + C i.e.  $\text{₹ } 2.84 + 2.58 + 16.91 = \text{₹ } 22.33$

### Illustration 19

Piyush Loonker and Associates presently pay a dividend of Re. 1.00 per share and has a share price of ₹ 20.00.

- (i) If this dividend were expected to grow at a rate of 12% per annum forever, what is the firm's expected or required return on equity using a dividend-discount model approach?
- (ii) Instead of this situation in part (i), suppose that the dividends were expected to grow at a rate of 20% per annum for 5 years and 10% per year thereafter. Now what is the firm's expected, or required, return on equity?

### Answer

#### (i) Firm's expected or required return on equity

##### *(Using a dividend discount model approach)*

According to Dividend discount model approach the firm'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 or (Firm's expected or required return on 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.

Now,  $D_1 = D_0 (1 + g)$  or ₹ 1 (1 + 0.12) or ₹ 1.12,  $P_0 = \text{₹ } 20$  and  $g = 12\%$  per annum

Therefore,  $K_e = \frac{\text{₹ } 1.12}{\text{₹ } 20} + 12\%$

or  $K_e = \text{₹ } 17.6\%$

#### (ii) Firm's expected or required return on equity

*(if dividends were expected to grow at a rate of 20% per annum for 5 years and 10% per year thereafter)*

Since in this situation if dividends are expected to grow at a super normal growth rate  $g_s$ , for  $n$  years and thereafter, at a normal, perpetual growth rate of  $g_n$  beginning in the year  $n + 1$ , then the cost of equity can be determined by using the following formula:

$$P_0 = \sum_{t=1}^n \frac{\text{Div}_0(1+g_s)^t}{(1+K_e)^t} + \frac{\text{Div}_n+1}{K_e-g_n} \times \frac{1}{(1+K_e)^n}$$

Where,

$g_s$  = Rate of growth in earlier years

$g_n$  = Rate of constant growth in later years

$P_0$  = Discounted value of dividend stream

$K_e$  = Firm's expected, required return on equity (cost of equity capital).

Now,

$$g_s = 20\% \text{ for 5 years, } g_n = 10\%$$

Therefore,

$$P = \sum_{t=1}^5 \frac{D_0(1+0.02)^t}{(1+K_e)^t} + \frac{\text{Div}_5+1}{K_e-0.10} \times \frac{1}{(1+K_e)^5}$$

$$P_0 = \frac{1.20}{(1+k_e)^1} + \frac{1.44}{(1+k_e)^2} + \frac{1.73}{(1+k_e)^3} + \frac{2.07}{(1+k_e)^4} + \frac{2.49}{(1+k_e)^5} + \frac{2.49(1+0.10)}{k_e-0.10} \times \frac{1}{(1+k_e)^5}$$

$$\text{or } P_0 = ₹ 1.20 (\text{PVF}_{1, K_e}) + ₹ 1.44 (\text{PVF}_{2, K_e}) + ₹ 1.73 (\text{PVF}_{3, K_e}) + ₹ 2.07$$

$$(\text{PVF}_{4, K_e}) + ₹ 2.49 (\text{PVF}_{5, K_e}) + \frac{₹ 2.74 (\text{PVF}_{5, K_e})}{K_e-0.10}$$

By trial and error we are required to find out  $K_e$

Now, assume  $K_e = 18\%$  then we will have

$$\begin{aligned} P_0 &= ₹ 1.20 (0.8475) + ₹ 1.44 (0.7182) + ₹ 1.73 (0.6086) + ₹ 2.07 (0.51589) + ₹ 2.49 (0.43710) + ₹ 2.74 \\ &\quad (0.4371) \times \frac{1}{0.18-0.10} \\ &= ₹ 1.017 + ₹ 1.034 + ₹ 1.052 + ₹ 1.067 + ₹ 1.09 + ₹ 14.97 \\ &= ₹ 20.23 \end{aligned}$$

Since the present value of dividend stream is more than required it indicates that  $K_e$  is greater than 18%.

Now, assume  $K_e = 19\%$  we will have

$$\begin{aligned} P_0 &= ₹ 1.20 (0.8403) + ₹ 1.44 (0.7061) + ₹ 1.73 (0.5934) + ₹ 2.07 (0.4986) + ₹ 2.49 (0.4190) + ₹ 2.74 \\ &\quad (0.4190) \times \frac{1}{0.19-0.10} \\ &= ₹ 1.008 + ₹ 1.016 + ₹ 1.026 + ₹ 1.032 + ₹ 1.043 + ₹ 12.76 \\ &= ₹ 17.89 \end{aligned}$$

Since the market price of share (expected value of dividend stream) is ₹ 20. Therefore, the discount rate is closer to 18% than it is to 19%, we can get the exact rate by interpolation by using the following formula:

$$K_e = \frac{r - (PV_s - PV_D)}{\Delta PV} \times \Delta r$$

Where,

$r$  = Either of two interest rates

$PV_s$  = Present value of share

$PV_D$  = Present value of dividend stream

$\Delta r$  = Difference in value of dividend stream

$\Delta PV$  = Difference in calculated present value of dividend stream.

$$K_e = \frac{18\% - (\text{₹ } 20 - \text{₹ } 20.23)}{\text{₹ } 20.23 - \text{₹ } 17.89} \times 0.01$$

$$= \frac{18\% - (-\text{₹ } 0.23)}{\text{₹ } 2.34} \times 0.01$$

$$= \frac{18\% + (\text{₹ } 0.23)}{\text{₹ } 2.34} \times 0.01$$

$$= 18\% + 0.10\%$$

$$= 18.10\%$$

Therefore, the firm's expected, or required, return on equity is 18.10%. At this rate the present discounted value of dividend stream is equal to the market price of the share.

### Illustration 20

Sahu & Co. earns ₹ 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 per cent dividend payout ratio? Is this the optimum payout ratio as per Walter?

### Solution:

$$\text{Walter Model is } V_c = \frac{D + \frac{R_a}{R_c}(E - D)}{R_c}$$

Where:

$V_c$  = Market value of the share

$R_o$  = Return on Retained earnings

$R_c$  = Capitalisation Rate

$E$  = Earning per share

$D$  = Dividend per share

Hence, if Walter model is applied

$$\text{Market value of the share } P = \frac{1.80 + \frac{.20}{.10}(6 - 1.80)}{.10}$$

$$= \frac{1.80 + \frac{.20}{.10}(6 - 1.80)}{.10}$$

$$P = ₹ 102$$

This is not the optimum pay out ratio because  $R_o > R_c$  and therefore  $V_c$  can further go up if payout ratio is reduced.

### Illustration 21

X Ltd., has 8 lakhs equity shares outstanding at the beginning of the year 2003. The current market price per share is ₹ 120. The Board of Directors of the company is contemplating ₹ 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 ₹ 3.20 crores by the end of the year assuming net income for the year will be ₹ 1.60 crores?

### Answer

#### Modigliani and Miller ( M-M) – Dividend Irrelevancy Model:

$$P_0 = \frac{P_1 + D_1}{1 + k_e}$$

Where  $P_0$  = Existing market price per share i.e. ₹ 120

$P_1$  = Market price of share at the year end (to be determined)

$D_1$  = Contemplated dividend per share i.e. ₹ 6.4

$K_e$  = Capitalisation rate i.e. 9.6%.

**(i) (a)** Calculation of share price when dividend is declared:

$$P_0 = \frac{P_1 + D_1}{1 + k_e}$$

$$120 = \frac{P_1 + 6.4}{1 + 0.096}$$

$$120 \times 1.096 = P_1 + 6.4$$

$$P_1 = 120 \times 1.096 - 6.4$$

$$= 125.12$$

**(b)** Calculation of share price when dividend is not declared:

$$P_0 = \frac{P_1 + D_1}{1 + k_e}$$

$$120 = \frac{P_1 + 0}{1 + 0.096}$$

$$120 \times 1.096 = P_1 + 0$$

$$P_1 = 131.52$$



(ii) Calculation of No. of shares to be issued:

(₹ in lakhs)

Particulars	If dividend declared	If dividend not declared
Net Income	160	160
Less: Dividend paid	<u>51.20</u>	—
Retained earnings	108.80	160
Investment budget	<u>320</u>	<u>320</u>
Amount to be raised by issue of new shares (i)	<u>211.20</u>	<u>160</u>
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

### Illustration 22

Capital structure of Sun Ltd., as at 31.3.2003 was as under:

	(₹ in lakhs)
Equity share capital	80
8% Preference share capital	40
12% Debentures	64
Reserves	32

Sun Ltd., earns a profit of ₹ 32 lakhs annually on an average before deduction of income-tax, which works out to 35%, and interest on debentures.

Normal return on equity shares of companies similarly placed is 9.6% provided:

- Profit after tax covers fixed interest and fixed dividends at least 3 times.
- Capital gearing ratio is 0.75.
- Yield on share is calculated at 50% of profits distributed and at 5% on undistributed profits. Sun Ltd., has been regularly paying equity dividend of 8%.

Compute the value per equity share of the company.

### Answer

#### Calculation of Profit after tax (PAT)

		₹
Profit before interest and tax (PBIT)		32,00,000
Less: Debenture interest (₹ 64,00,000 × 12/100)		<u>7,68,000</u>
Profit before tax (PBT)		24,32,000
Less: Tax @ 35%		<u>8,51,200</u>
Profit after tax (PAT)		15,80,800
Less: Preference Dividend		
(₹ 40,00,000 × 8/100)	3,20,000	
Equity Dividend (₹ 80,00,000 × 8/100)	<u>6,40,000</u>	<u>9,60,000</u>
Retained earnings (Undistributed profit)		6,20,800

### Calculation of Interest and Fixed Dividend Coverage

$$= \frac{\text{PAT} + \text{Debenture interest}}{\text{Debenture interest} + \text{Preference interest}}$$

$$= \frac{15,80,800 + 7,68,000}{7,68,000 + 3,20,000} = \frac{23,48,800}{10,88,000} = 2.16 \text{ times}$$

### Calculation of Capital Gearing Ratio

$$\text{Capital Gearing Ratio} = \frac{\text{Fixed interest bearing funds}}{\text{Equity shareholders' funds}}$$

$$= \frac{\text{Preference Share Capital} + \text{Debentures}}{\text{Equity Share Capital} + \text{Reserves}}$$

$$= \frac{40,00,800 + 65,00,000}{80,00,000 + 32,00,000} = \frac{1,04,00,000}{1,12,00,000}$$

$$= 0.93$$

### Calculation of Yield on Equity Shares:

Yield on equity shares is calculated at 50% of profits distributed and 5% on undistributed profits:

	(₹)
50% on distributed profits (₹ 6,40,000 × 50/100)	3,20,000
5% on undistributed profits (₹ 6,20,800 × 5/100)	<u>31,040</u>
Yield on equity shares	<u>3,51,040</u>

$$\text{Yield on equity shares \%} = \frac{\text{Yield on shares}}{\text{Equity share capital}} \times 100$$

$$= \frac{3,51,040}{80,00,000} \times 100 = 4.39\% \text{ or, } 4.388\%$$

### Calculation of Expected Yield on Equity shares

**Note:** There is a scope for assumptions regarding the rates (in terms of percentage for every one time of difference between Sun Ltd. and Industry Average) of risk premium involved with respect to Interest and Fixed Dividend Coverage and Capital Gearing Ratio. The below solution has been worked out by assuming the risk premium as:

- (i) 1% for every one time of difference for Interest and Fixed Dividend Coverage.
- (ii) 2% for every one time of difference for Capital Gearing Ratio.
- (i) Interest and fixed dividend coverage of Sun Ltd. is 2.16 times but the industry average is 3 times. Therefore, risk premium is added to Sun Ltd. Shares @ 1% for every 1 time of difference.

$$\text{Risk Premium} = 3.00 - 2.16 (1\%)$$

$$= 0.84 (1\%) = 0.84\%$$

- (ii) Capital Gearing ratio of Sun Ltd. is 0.93 but the industry average is 0.75 times. Therefore, risk premium is added to Sun Ltd. shares @ 2% for every 1 time of difference.



$$\begin{aligned}\text{Risk Premium} &= 0.75 - 0.93 \text{ (2\%)} \\ &= 0.18 \text{ (2\%)} \\ &= 0.36\%\end{aligned}$$

	(%)
Normal return expected	9.60
Add: Risk premium for low interest and fixed dividend coverage	0.84
Add: Risk premium for high interest gearing ratio	<u>0.36</u>
	<u>10.80</u>

### Value of Equity Share

$$\begin{aligned}\frac{\text{Actual yield}}{\text{Expected yield}} \times \text{Paid-up value of share} \\ = \frac{4.39}{10.80} \times 100 = ₹ 40.65\end{aligned}$$

### Illustration 23

Mr. A is contemplating purchase of 1,000 equity shares of a Company. His expectation of return is 10% before tax by way of dividend with an annual growth of 5%. The Company's last dividend was ₹ 2 per share. Even as he is contemplating, Mr. A suddenly finds, due to a budget announcement dividends have been exempted from tax in the hands of the recipients. But the imposition of dividend Distribution tax on the Company is likely to lead to a fall in dividend of 20 paise per share. A's marginal tax rate is 30%.

Required:

Calculate what should be Mr. A's estimates of the price per share before and after the Budget announcement?

### Answer

The formula for determining value of a share based on expected dividend is:

$$P_0 = \frac{D_0(1+g)}{(k-g)}$$

Where

$P_0$  = Price (or value) per share

$D_0$  = Dividend per share

$g$  = Growth rate expected in dividend

$k$  = Expected rate of return

Hence,

Price estimate before budget announcement:

$$P_0 = \frac{2 \times (1 + 0.05)}{(0.10 - 0.05)} = ₹ 42.00$$

Price estimate after budget announcement:

$$P_0 = \frac{1.80 \times (1.05)}{(0.07 - 0.05)} = ₹ 94.50$$

**Illustration 24**

A Company pays a dividend of ₹ 2.00 per share with a growth rate of 7%. The risk free rate is 9% and the market rate of return is 13%. The Company has a beta factor of 1.50. However, due to a decision of the Finance Manager, beta is likely to increase to 1.75. Find out the present as well as the likely value of the share after the decision.

**Answer**

In order to find out the value of a share with constant growth model, the value of  $K_e$  should be ascertained with the help of 'CAPM' model as follows:

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

Where,

$K_e$  = Cost of equity

$R_f$  = Risk free rate of return

$\beta$  = Portfolio Beta i.e. market sensitivity index

$K_m$  = Expected return on market portfolio

By substituting the figures, we get

$$\begin{aligned} K_e &= 0.09 + 1.5 (0.13 - 0.09) \\ &= 0.15 \text{ or } 15\% \end{aligned}$$

and the value of the share as per constant growth model is

$$P_0 = \frac{D_1}{(k_e - g)}$$

Where

$P_0$  = Price of a share

$D_1$  = Dividend at the end of the year 1

$K_e$  = Cost of equity

$G$  = growth

$$P_0 = \frac{2.00}{(k_e - g)}$$

$$P_0 = \frac{2.00}{0.15 - 0.07}$$

$$= ₹ 25.0$$

However, if the decision of finance manager is implemented, the beta ( $\beta$ ) factor is likely to increase to 1.75 therefore,  $K_e$  would be

$$\begin{aligned} K_e &= R_f + \beta (K_m - R_f) \\ &= 0.09 + 1.75 (0.13 - 0.09) \\ &= 0.16 \text{ or } 16\% \end{aligned}$$

The value of share is

$$P_0 = \frac{D_1}{(k_e - g)}$$

$$P_0 = \frac{2.00}{0.16 - 0.07}$$

$$= ₹ 22.22$$

### Illustration 25

The following figures are collected from the annual report of XYZ 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 ₹ 42 by using Walter model?

### Answer

₹ in lakhs

Net Profit	30
Less: Preference dividend	12
Earning for equity shareholders	18
Therefore earning per share	18/3 = ₹ 6.00
Cost of capital i.e. ( $k_e$ )	
(Assumed)	16%

Let, the dividend pay-out ratio be X and so the share price will be:

$$P = \frac{D}{K_e} + \frac{r(E-D)}{K_e}$$

Here  $D = 6x$ ;  $E = ₹ 6$ ;  $r = 0.20$  and  $K_e = 0.16$  and  $P = ₹ 42$

$$\text{Hence } ₹ 42 = \frac{6x}{0.16} + \frac{0.2(6 - 6x)}{0.16 \times 0.16}$$

$$\text{or } ₹ 42 = 37.50X + 46.875 (1 - x)$$

$$= 9.375x = 4.875$$

$$x = 0.52$$

So, the required dividend payout ratio will be = 52%

### Illustration 26

The following information pertains to M/s XY 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**

(a) M/s X Y Ltd.

- (i) Walter's model is given by

$$P = \frac{D + (E - D) (r/k_e)}{K_e}$$

Where P = Market price per share.

E = Earnings per share = ₹5

D = Dividend per share = ₹3

r = Return earned on investment = 15%

$K_e$  = Cost of equity capital = 12%

$$P = \frac{2 + (5 - 3) \times \frac{0.15}{0.12}}{0.12} = \frac{3 + 2.0 \times \frac{.15}{.12}}{0.12} = ₹52.08$$

- (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:

$$\frac{0 + (5 - 0) \frac{0.15}{0.12}}{0.12} =$$

**Illustration 27**

ABC Ltd. has 50,000 outstanding shares. The current market price per share is ₹100 each. It hopes to make a net income of ₹5,00,000 at the end of current year. The Company's Board is considering a dividend of ₹5 per share at the end of current financial year. The company needs to raise ₹10,00,000 for an approved investment expenditure. The company belongs to a risk class for which the capitalization rate is 10%. Show, how does the M-M approach affect 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,  $P_1 = ₹105/-$ .

Value of firm

$$= ₹([50,000/- + 7,50,000/- / 105/-) \times 105/- - 10,00,000/- + 5,00,000/-) / 1.10$$

$$= ₹(60,00,000/- - 5,00,000/-) / 1.10$$

$$= ₹50,00,000/-.$$

When dividend is not paid

$$100 = 1/1.1 \times P_1$$

Therefore,  $P_1 = ₹110/-$ .

Value of firm

$$= ₹([50,000/- + (5,00,000/-/110/-) \times 110/-] - 10,00,000/- + 5,00,000/-)/1.10$$

$$= ₹(60,00,000/- - 5,00,000/-) / 1.10$$

$$= ₹50,00,000/-$$

M.M. approach indicates that the value of the firm in both the situations will be the same.

### Illustration 28

The following information are supplied to you:

	₹
Total Earnings	2,00,000
No. of equity shares (of ₹100 each)	20,000
Dividend paid	1,50,000
Price/Earning ratio	12.5

- (i) Ascertain whether the company is the following an optimal dividend policy.
- (ii) Find out what should be the P/E ratio at which the dividend policy will have no effect on the value of the share.
- (iii) Will your decision change, if the P/E ratio is 8 instead of 12.5?

### Answer

- (i) The EPS of the firm is ₹10 (i.e., ₹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 ₹1,50,000 among 20,000 shares, giving a dividend per share of ₹7.50. the value of the share as per Walter's model may be found as follows:

$$\begin{aligned}
 P &= \frac{D}{K_e} + \frac{(r/K_e)(E - D)}{K_e} \\
 &= \frac{7.50}{.08} + \frac{(.10/.08)(10 - 7.5)}{.08} \\
 &= ₹132.81
 \end{aligned}$$

The firm has a dividend payout of 75% (i.e., ₹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

$$\begin{aligned}
 P &= \frac{D}{k_e} + \frac{(r/K_e)(E - D)}{K_e} \\
 &= \frac{0}{.08} + \frac{(.10/.08)(10 - 0)}{.08} \\
 &= ₹156.25
 \end{aligned}$$

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 the firm. 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

$$P = \frac{D}{K_e} + \frac{(r/K_e)(E - D)}{K_e}$$

$$= \frac{7.50}{.125} + \frac{(.1/.125)(10 - 7.5)}{.125}$$

$$= ₹76$$

**Illustration 29**

M 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 ₹ 100. It expects a net profit of ₹ 2,50,000 for the year and the Board is considering dividend of ₹ 5 per share.

M Ltd. requires to raise ₹ 5,00,000 for an approved investment expenditure. Show, how does the MM approach affect the value of M Ltd., if dividends are paid or not paid.

**Answer**

A	When dividend is paid
(a)	Price per share at the end of year 1
	$100 = \frac{1}{1.10} (\₹5 + P_1)$
	$110 = \₹5 + P_1$
	$P_1 = 105$
(b)	Amount required to be raised from issue of new shares
	$\₹5,00,000 - (2,50,000 - 1,25,000)$
	$\₹5,00,000 - 1,25,000 = \₹3,75,000$
(c)	Number of additional shares to be issued
	$\frac{3,75,000}{105} = \frac{75,000}{21}$ shares or say 3572 shares
(d)	Value of M Ltd.
	(Number of shares × Expected Price per share)
	i.e., $(25,000 + 3,572) \times \₹105 = \₹30,00,060$
B	When dividend is not paid
(a)	Price per share at the end of year 1
	$100 = \frac{P_1}{1.10}$
	$P_1 = 110$

(b)	Amount required to be raised from issue of new shares ₹5,00,000 – 2,50,000 = 2,50,000
(c)	Number of additional shares to be issued
	$\frac{2,50,000}{110} = \frac{25,000}{11}$ shares or say 2273 shares.
(d)	Value of M Ltd.,
	$(25,000 + 2273) \times ₹110$
	= ₹ 30,00,030
	Whether dividend is paid or not, the value remains the same.

**Illustration 30-** The Balance Sheet of Universal Ltd. as on 31st March, 2013 is given below:

Liabilities	₹	Assets	₹
Equity share capital		Fixed assets	16,00,000
1,00,000 shares of 10 each fully paid	10,00,000	Current assets	9,00,000
General Reserve	15,00,000		
	25,00,000		25,00,000

Net profit after tax is Rs. 9,00,000 during 2012 - 2013. On 5th April, 2013 the company has issued one Bonus Share for every two shares held. Draw a revised balance sheet after the Bonus issue, and show its impact on EPS.

#### XYZ Ltd.

#### Balance sheet as at 5th April, 2013 (After Bonus Issue)

Liabilities	₹	Assets	₹
Equity share capital		Fixed assets	16,00,000
1,50,000 shares of	15,00,000	Current assets	9,00,000
Rs. 10 each fully paid up			
General Reserve	10,00,000		
	25,00,000		25,00,000

Calculation of EPS

= Net Profit after taxes/ No. of Equity Shares

EPS prior to Bonus Issue = Rs.9,00,000 / 1,00,000 Equity Shares = Rs. 9 per share

EPS after Bonus issue = Rs.9,00,000/ 1,50,000 Equity Shares = Rs. 6 per share

The EPS has declined from Rs.9 to Rs.6 per share after the bonus issue.

#### SEBI Guidelines for Bonus Issues

A listed company proposing to issue bonus shares shall comply with the following:

- No company shall, pending conversion of FCDS/PCDs, issue any shares by way of bonus unless similar benefit is extended to the holders of such FCDS/PCDs, through reservation of shares in proportion to such convertible part of the FCDS or PCDs.

- (ii) The shares so reserved may be issued at the time of conversion(s) of such debentures on the same terms on which the bonus issues were made.
- (iii) The bonus issue shall be made out of free reserves built out of the genuine profits or share premium collected in cash only.
- (iv) Reserves created by revaluation of fixed assets are not capitalised.
- (v) The declaration of bonus issue, in lieu of dividend, if not made.
- (vi) The bonus issue is not made unless the partly - paid shares, if any existing, are made fully paid-up.
- (vii) The company has not defaulted in payment of interest or principal respect of fixed deposits and interest on existing debentures or principal on redemption thereof.
- (viii) The company has sufficient reason to believe that has not defaulted in respect of the payment of statutory dues of the employees such as contribution to provident fund, gratuity, bonus, etc.
- (ix) A company which announces its bonus issue after the approval of the Board of Directors must implement the proposal within a period of six months from the date of such approval and shall not have the option of changing the decision.
- (x) The Articles of Association of the company shall contain a provision for capitalisation of reserves, etc.
- (xi) If there is no such provision in the Articles, the company shall pass a Resolution at its general body meeting making provisions in the Articles of Association for capitalisation.
- (xii) Consequent to the issue of bonus shares if the subscribed and paid-up capital exceed the authorised share capital, a resolution shall be passed by the company at its general body meeting for increasing the authorised capital.

### SELF EXAMINATION QUESTIONS:

1. Define Cost of Capital. Explain its importance.
2. Explain the determinants of Capital Structure.
3. Explain Modigliani – Miller hypothesis
4. Write short notes on
  - a) Weighted average cost of capital.
  - b) Capital asset pricing model.
  - c) Marginal cost of capital.
  - d) Net income approach
  - e) Net operating income approach
  - f) Criticism on MM-Hypothesis
  - g) Arbitrage process

### PRACTICAL PROBLEMS

5. Calculate the cost of capital in the following cases:
  - i) X Ltd. issues 12% debentures of face value ₹ 100 each and realizes ₹ 95 per debentures are redeemable after 10 years at a premium of 10%.
  - ii) Y Ltd. issues preference shares of face value ₹ 100 each carrying 14% Dividend and here realizes ₹ 92 per share. The shares are repayable after 12 years at par.

Note: Both companies are paying income tax at 50%

Ans: i) Cost of Debentures = 6.58%; ii) Cost of Preference Capital = 15.28%

6. Calculate the approximate cost of companies Debenture Capital, when it decides to issue 10,000 No.s of 14% non-convertible debentures. Each of face value ₹ 100, at par. The debentures are redeemable at a premium of 10% after 10 years. The average realisation is expected to be ₹ 92 per debenture and the tax rate applicable to the company is 40%
 

Ans: i) Cost of Debentures = 9.39%;
7. JKL Ltd. has the following book-value capital structure as on March, 31, 2012

	₹
Equity share capital (2,00,000 shares)	40,00,000
11.5% Preference shares	10,00,000
10% Debentures	30,00,000
	80,00,000

The equity share of the company sells for ₹. 20. It is expected that the company will pay next year a dividend of ₹. 2 per equity share, which is expected to grow at 5% p.a. forever. Assume a 35% corporate tax rate.

#### Required:

- i) Compute weighted average cost of capital (WACC) of the company based on the existing capital structure.
- ii) Compute the new WACC, if the company raises an additional ₹. 20 lakhs debt by issuing 12% debentures. This would result in increasing the expected equity dividend to ₹. 2.40 and leave the growth rate unchanged, but the price of equity share will fall to ₹. 10 per share.

Ans: i)  $K_e = 15\%$ ;  $K_p = 11.5\%$ ;  $K_d = 6.5\%$ ;  $WACC = 11.38\%$

ii)  $K_e = 20\%$ ;  $K_p = 11.5\%$ ;  $K_d = 6.5\%$ ;  $K_d (12\%) = 7.8\%$ ;  $WACC = 12.66\%$

8. Three companies A, B & C are in the same type of business and hence have similar operating risks. However, the capital structure of each of them is different and the following are the details:

Particulars	A	B	C
Equity share capital (Face value ₹. 10 per share)	4,00,000	2,50,000	5,00,000
Market value per share	15	20	12
Dividend per share	2.70	4	2.88
Debentures (face value per debenture ₹. 100)	Nil	1,00,000	2,50,000
Market value per debenture	-	125	80
Interest rate	-	10%	8%

Assume that the current levels of dividends are generally expected to continue indefinitely and the income-tax rate at 50%. You are required to compute the weighted average cost of capital of each company.

**Ans:**

	$K_e$	$K_d$	$K_o$
Company A	10%	-	18%
Company B	20%	4%	16.8%
Company C	24%	5%	19.25%

9. Merry Ltd. has earning before interest and taxes (EBIT) of ₹. 30,00,000 and a 40% tax rate. Its required rate of return on equity in the absence of borrowing is 18%. In the absence of personal taxes. What is the value of the company in an MM world (i) with no leverage; ii) with ₹. 40,00,000 in debt, and iii) with ₹. 70,00,000 in debt?

**Ans:**

i) Value of Unlevered Company	1,00,00,000
ii) Value of levered Company	1,16,00,000
iii) Value of levered Company	1,28,00,000

10. Companies X and Y are identical in all respects including risk factors except for debt / equity. Company X having issued 10% debentures of ₹. 18 lakhs while Company Y has issued only equity. Both the companies earn 20% before interest and taxes on their total assets of ₹. 30 lakhs.

Assuming a tax rate of 50% and capitalisation rate of 15% for an all-equity company, compute the value of companies X and Y using i) Net Income Approach and ii) Net Operating Income Approach.

**Ans:** i) Value of X Ltd. ₹. 32,00,000; Value of Y Ltd. ₹. 20,00,000  
 ii) Value of X Ltd. ₹. 29,00,000; Value of Y Ltd. ₹. 20,00,000

# Study Note - 7

## CAPITAL BUDGETING



### This Study Note includes

- 7.1 Capital Budgeting
- 7.2 Need of Capital Budgeting Decision
- 7.3 Significance of Capital Budgeting Decision
- 7.4 Process of Capital Budgeting
- 7.5 Investment Criterion - Method of Appraisal

### 7.1 CAPITAL BUDGETING

One of the important aspects of Financial Management is proper decision making in respect of investment of funds. Successful operation of any business depends upon the investment of resources in such a way as to bring in benefits or best possible returns from any investment. An investment can be simply defined as an expenditure in cash or its equivalent during one or more time periods in anticipation of enjoying a net inflow of cash or its equivalent in some future time period or periods. An appraisal of investment proposals is necessary to ensure that the investment of resources will bring in desired benefits in future. If the financial resources were in abundance, it would be possible to accept several investment proposals which satisfy the norms of approval or acceptability. Since resources are limited a choice has to be made among the various investment proposals by evaluating their comparative merit. It is apparent that some techniques should be followed for making appraisal of investment proposals. Capital Budgeting is one of the appraising techniques of investment decisions. Capital Budgeting is defined as the firm's decision to invest its current funds most efficiently in long term activities in anticipation of an expected flow of future benefits over a series of years. It should be remembered that the investment proposal is common both for fixed assets and current assets.

Capital budgeting decision may be defined as "Firms decisions to invest its current funds most efficiently in long term activities in anticipation of an expected flow of future benefits over a series of year. The firm's capital budgeting decisions will include addition, disposition, modification and replacement of fixed assets".

**Definitions:** Charles. T.Horngreen defined capital budgeting as "Long term planning for making and financing proposed capital out lay".

According to Keller and Ferrara, "Capital Budgeting represents the plans for the appropriation and expenditure for fixed asset during the budget period".

Robert N. Anthony defined as "Capital Budget is essentially a list of what management believes to be worthwhile projects for the acquisition of new capital assets together with the estimated cost of each product".

### 7.2 NEED OF CAPITAL BUDGETING DECISION

The selection of the most profitable project of capital investment is the key function of Financial Manager. The decisions taken by the management in this area affect the operations of the firm for many years. Capital budgeting decisions may be generally needed for the following purposes:

- a) Expansion; b) Replacement; c) Diversification; d) Buy or lease and e) Research and Development.
- a) Expansion:** The firm requires additional funds to invest in fixed assets when it intends to expand the production facilities in view of the increase in demand for their product in near future. Accordingly the current assets will increase. In case of expansion the existing infrastructure – like plant, machinery and other fixed assets is inadequate, to carry out the increased production volume. Thus the firm needs funds for such project. This will include not only expenditure on fixed assets (infrastructure) but also an increase in working capital (current assets).
- b) Replacement:** The machines and equipment used in production may either wear out or may be rendered obsolete due to new technology. The productive capacity and competitive ability of the firm may be adversely affected. The firm needs funds or modernisation of a certain machines or for renovation of the entire plant etc., to make them more efficient and productive. Modernization and renovation will be a substitute for total replacement, where renovation or modernization is not desirable or feasible, funds will be needed for replacement.
- c) Diversification:** If the management of the firm decided to diversify its production into other lines by adding a new line to its original line, the process of diversification would require large funds for long-term investment. For example ITC and Philips company for their diversification.
- d) Buy or Lease:** This is a most important decision area in Financial Management whether the firm acquire the desired equipment and building on lease or buy it". If the asset is acquired on lease, there have to be made a series of annual or monthly rental payments. If the asset is purchased, there will be a large initial commitment of funds, but not further payments. The decision – making area is which course of action will be better to follow? The costs and benefits of the two alternative methods should be matched and compared to arrive at a conclusion.
- e) Research and Development:** The existing production and operations can be improved by the application of new and more sophisticated production and operations management techniques. New technology can be borrowed or developed in the laboratories. There is a greater need of funds for continuous research and development of new technology for future benefits or returns from such investments.

### 7.3 SIGNIFICANCE OF CAPITAL BUDGETING DECISIONS

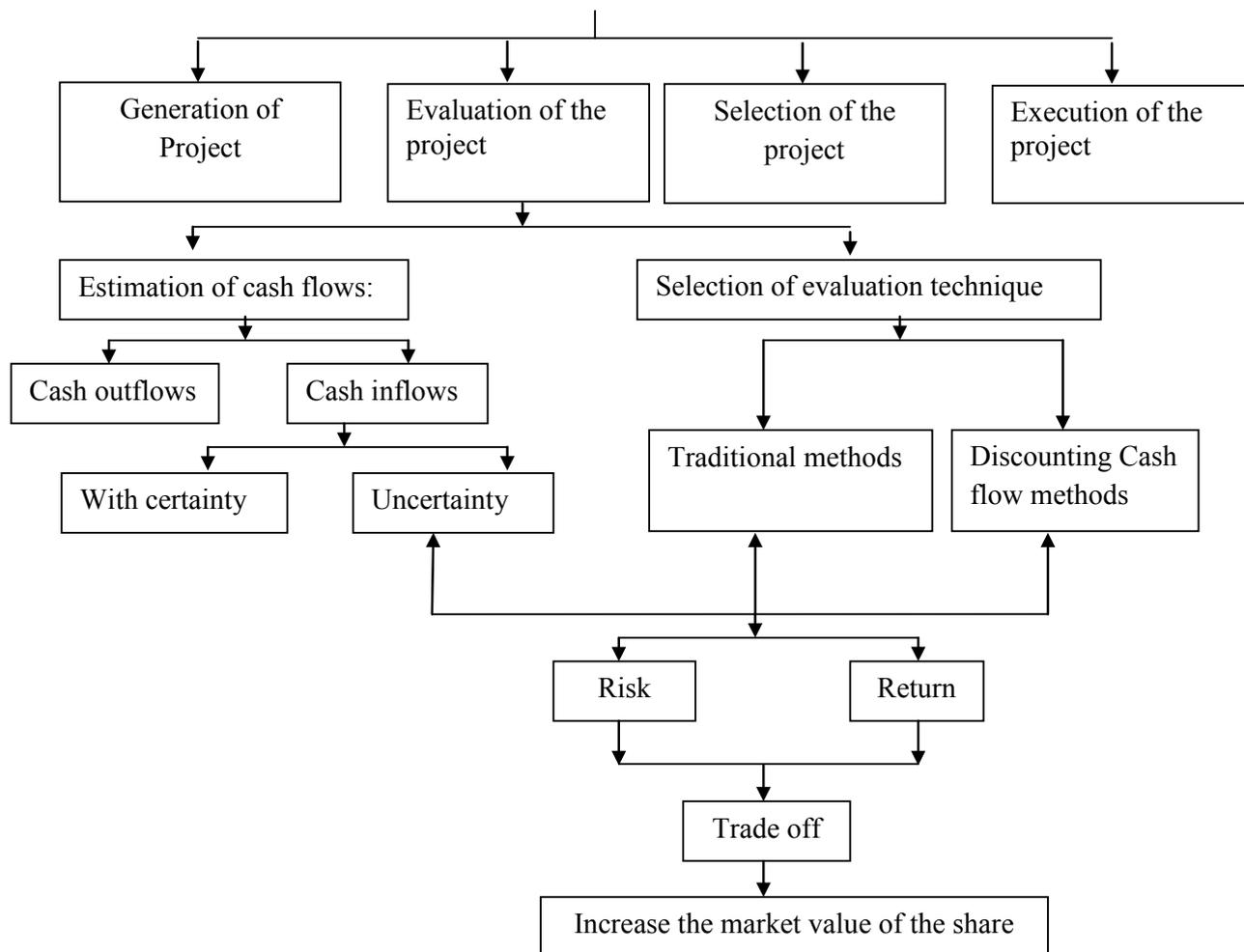
Capital Budgeting decisions are considered important for a variety of reasons. Some of them are the following:

- 1) Crucial decisions:** Capital budgeting decisions are crucial, affecting all the departments of the firm. So the capital budgeting decisions should be taken very carefully.
- 2) Long-run decisions:** The implications of capital budgeting decisions extend to a longer period in the future. The consequences of a wrong decision will be disastrous for the survival of the firm.
- 3) Large amount of funds:** Capital budgeting decisions involve spending large amount of funds. As such proper care should be exercised to see that these funds are invested in productive purchases.
- 4) Rigid:** Capital budgeting decision can not be altered easily to suit the purpose. Because of this reason, when once funds are committed in a project, they are to be continued till the end, loss or profit no matter.

### 7.4 PROCESS OF CAPITAL BUDGETING

The major steps in the capital budgeting process are given below. They are a) Generation of project; b) Evaluation of the project; c) Selection of the project and d) Execution of the project. The capital budgeting process may include a few more steps. As each step is significant they are usually taken by top management.

## PROCESS OF CAPITAL BUDGETING



**a) Generation of Project:** Depending upon the nature of the firm, investment proposals can emanate from a variety of sources. Projects may be classified into five categories.

- (i) New products or expansion of existing products.
- (ii) Replacement of equipment or buildings.
- (iii) Research and development.
- (iv) Exploration.
- (v) Others like acquisition of a pollution control device etc.

Investment proposals should be generated for the productive employment of firm's funds. However, a systematic procedure must be evolved for generating profitable proposals to keep the firm healthy.

**b) Evaluation of the project:** The evaluation of the project may be done in two steps. First the costs and benefits of the project are estimated in terms of cash flows and secondly the desirability of the project is judged by an appropriate criterion. It is important that the project must be evaluated without any prejudice on the part of the individual. While selecting a criterion to judge the desirability of the project, due consideration must be given to the market value of the firm.

- c) **Selection of the project:** After evaluation of the project, the project with highest return should be selected. There is no hard and fast rule set for the purpose of selecting a project from many alternative projects. Normally the projects are screened at various levels. However, the final selection of the project vests with the top level management.
- d) **Execution of project:** After selection of a project, the next step in capital budgeting process is to implement the project. Thus the funds are appropriated for capital expenditures. The funds are spent in accordance with appropriations made in the capital budget funds for the purpose of project execution should be spent only after seeking format permission for the controller. The follow – up comparison of actual performance with original estimates ensure better control.

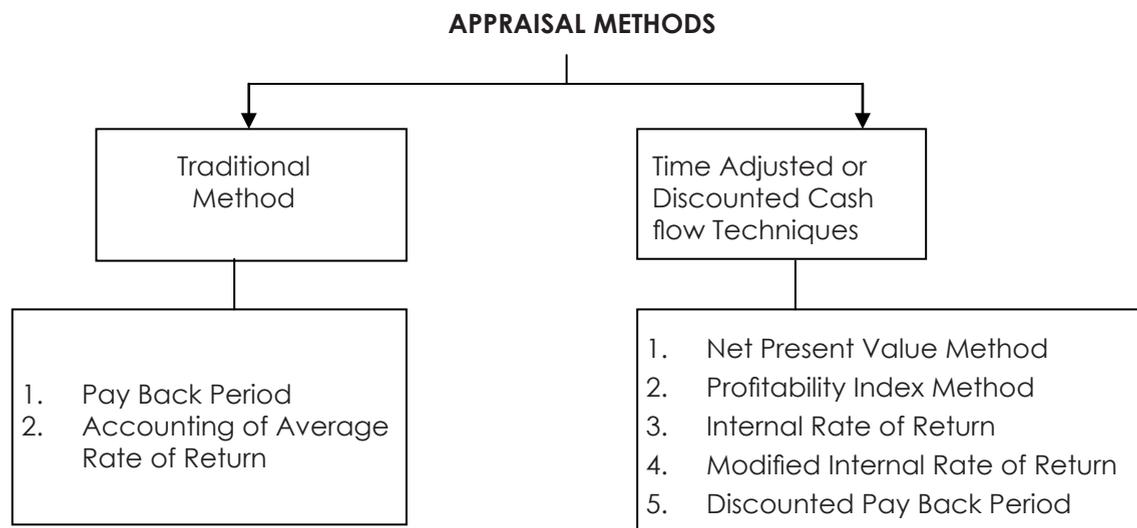
Thus the top management should follow the above procedure before taking acaital expenditure decision.

### 7.5 INVESTMENT CRITERION-METHODS OF APPRAISAL

The capital budgeting appraisal methods or techniques for evaluation of investment proposals will help the company to decide the desirability of an investment proposal, depending upon their relative income generating capacity and rank them in order if their desirability. These methods provide the company a set of normal method should enable to measure the real worth of the investment proposal. The appraisal methods should posses several good characteristics, which are mentioned as under.

#### Characteristics of a Sound Appraisal Method

- (i) It should help the company to rank the investment proposals in order of their desirability.
- (ii) It should provide a technique for distinguishing between an acceptable and non-acceptable project.
- (iii) It should provide a criteria to solve the problem of choosing among alternative projects.
- (iv) It should recognize the importance of time value of money i.e. bigger benefits are preferable to smaller ones and early benefits are preferable to later benefits.
- (v) It should provide the criteria for the selection of investment proposals.
- (vi) It should take into account the pattern of cash flows.



### 7.5.1 Traditional Methods

These methods are based on the principles to determine the desirability of an investment project on the basis of its useful life and expected returns. These methods depend upon the accounting information available from the books of accounts of the company. These will not take into account the concept of 'time value of money' which is a significant factor to desirability of a project in terms of present value.

#### 1. Pay-back Period

It is the most popular and widely recognized traditional method of evaluating the investment proposals. It can be defined as "the number of years to recover the original capital invested in a project". According to Weston and Brigham, "the pay back period is the number of years it takes for the firm to recover its original investment by net returns before depreciation, but after taxes:

**a) When cash flows are uniform:** If the proposed project's cash inflows are uniform the following formula can be used to calculate the payback period.

$$\text{Payback period} = \frac{\text{Initial Investment}}{\text{Annual Cash inflows}}$$

#### b) When cash flows are not uniform

When the project's cash inflows are not uniform, but vary from year to year pay back period is calculated by the process of cumulating cash inflows till the time when cumulative cash flows become equal to the original investment outlay.

The payback period can be used as an accept or reject criterion as well as a method of ranking projects. The payback period is the number of years to recover the investment made in a project. If the payback period calculated for a project is less than the maximum payback period set-up by the company, it can be accepted. As a ranking method it gives the highest rank to a project which has the lowest payback period, and the lowest rank to a project with the highest payback period. Whenever a company faces the problem of choosing among two or more mutually exclusive projects, it can select a project on the basis of payback period, which has shorter period than the other projects.

**Merits:** The following are the merits of the pay back period method:

- (i) Easy to calculate:** It is one of the easiest methods of evaluating the investment projects. It is simple to understand and easy to compute.
- (ii) Knowledge:** The knowledge of payback period is useful in decision-making, the shorter the period better the project.
- (iii) Protection from loss due to obsolescence:** This method is very suitable to such industries where mechanical and technical changes are routine practice and hence, shorter payback period practice avoids such losses.
- (iv) Easily availability of information:** It can be computed on the basis of accounting information, what is available from the books.

**Demerits:** However, the payback period method has certain demerits:

- (i) Failure in taking cash flows after payback period:** This method is not taking into account the cash flows received by the company after the payback period.
- (i) Not considering the time value of money:** It does not take into account the time value of money.
- (iii) Non-considering of interest factor:** It does not take into account the interest factor involved in the capital outlay.
- (iv) Maximisation of market value not possible:** It is not consistent with the objective of maximizing the market value of share.

- (v) **Failure in taking magnitude and timing of cash inflows:** It fails to consider the pattern of cash inflows i.e. the magnitude and timing of cash inflows.

## 2. Accounting or Average Rate of Return (ARR)

This technique uses the accounting information revealed by the financial statements to measure the profitability of an investment proposal. It can be determined by dividing the average income after taxes by the average investment. According to Solomon, Accounting Rate of Return can be calculated as the ratio, of average net income to the initial investment.

On the basis of this method, the company can select all those projects whose ARR is higher than the minimum rate established by the company. It can reject the projects with an ARR lower than the expected rate of return. This method also helps the management to rank the proposal on the basis of ARR.

$$\text{Accounting Rate of Return (ARR)} = \frac{\text{Average Net Income}}{\text{Original Investment}}$$

**OR**

$$\text{Accounting Rate of Return (ARR)} = \frac{\text{Average Net Income}}{\text{Average Investment}}$$

### Acceptance Rule:

The project which gives the highest rate of return over the minimum required rate of return is acceptable

**Merits:** The following are the merits of ARR method:

- (i) It is very simple to understand and calculate;
- (ii) It can be readily computed with the help of the available accounting data;
- (iii) It uses the entire stream of earnings to calculate the ARR.

**Demerits:** This method has the following demerits:

- (i) It is not based on cash flows generated by a project;
- (ii) This method does not consider the objective of wealth maximization;
- (iii) It ignore the length of the projects useful life;
- (iv) It does not take into account the fact that the profile can be re-invested; and
- (v) It ignores the time value of money.

### 7.5.2 Discounted Cash Flow Techniques:

The discounted cash flow methods provide a more objective basis for evaluating and selecting an investment project. These methods consider the magnitude and timing of cash flows in each period of a project's life. Discounted Cash Flows methods enable us to isolate the differences in the timing of cash flows of the project by discounting them to know the present value. The present value can be analysed to determine the desirability of the project. These techniques adjust the cash flows over the life of a project for the time value of money.

The popular discounted cash flows techniques are:

- (a) Net Present Value
- (b) Internal Rate of Return, and
- (c) Profitability Index

### Time Value of Money:

The value of money received today is more than the value of money received after some time in the future due to the following reasons:

- (i) **Inflation:** Under inflationary conditions the value of money expressed in terms of its purchasing power over goods and services declines.
- (ii) **Risk:** Having one rupee now is certain where as one rupee receivable tomorrow is less certain. That is a bird-in-the-hand principle is most important in the investment decisions.
- (iii) **Personal Consumption Preference:** Many individuals have a strong preference for immediate rather than delayed consumption. The promise of a bowl of rice next week counts for little to the starving man.
- (iv) **Investment Opportunities:** Money like any other commodity has a price. Given the choice of ₹ 1000/- now or the same amount in one year time, it is always preferable to take ₹ 1000/- now, because it could be invested over the next year @ 12% interest, to produce ₹ 1,120/- at the end of year. If the risk-free rate of return is 12%, then you would be indifferent in receiving ₹ 1000/- now or ₹ 1120/- in one year's time. In other words, the present value of ₹ 1120/- receivable one year hence is ₹ 1000/-.

### Present Value:

The value of a firm depends upon the net cash inflows generated by the firm assets and also on future returns. The amount of cash inflows and risk associated with the uncertainty of future returns forms the basis of valuation. To get the present value, cash inflows are to be discounted at the required rate of return i.e., minimum rate expected by the investor to account for their timing and risk. The cash inflows and outflows of an investment decision are to be compared at zero time period or at the same value by discounting them at required rate of return. The following formula can be used to discount the future inflows of a project to compare with its cash outflows.

$$I = \frac{C_1}{(1+K)^1} + \frac{C_2}{(1+K)^2} + \frac{C_3}{(1+K)^3} + \dots + \frac{C_n}{(1+K)^n}$$

Where  $V_0$  = Present value of cash inflows of the project during its life time.

$C_1, C_2, \dots, C_n$  = Expected cash inflows of the project during its life time.

$K$  = Discount rate.

$n$  = Expected life of the project.

### 1. Net Present Value (NPV):

The net present value method is a classic method of evaluating the investment proposals. It is one of the methods of discounted cash flow techniques, which recognizes the importance of time value of money. It correctly postulates that cash flows arising at time periods differ in value and are comparable only with their equivalents i.e. present values.

It is a method of calculating the present value of cash flows (inflows and outflows) of an investment proposal using the cost of capital as an appropriate discounting rate. The net present value will be arrived at by subtracting the present value of cash outflows from the present value of cash inflows. According to Ezra Solomon, "it is a present value of the cost of the investment."

#### Steps to compute net present value:

- (i) Estimation of future cash inflows
- (ii) An appropriate rate of interest should be selected to discount the cash flows. Generally, this will be the "cost of capital" of the company, or required rate of return.
- (iii) The present value of inflows and outflows of an investment proposal has to be computed by discounting them with an appropriate cost of capital.
- (iv) The net value is the difference between the present value of cash inflows and the present value of cash outflows.

The formula for the net present value can be written as:

$$NPV = \frac{C_1}{(1+K)^1} + \frac{C_2}{(1+K)^2} + \frac{C_3}{(1+K)^3} + \dots + \frac{C_n}{(1+K)^n} - I$$

Where

C = Annual Cash inflows,

$C_n$  = Cash inflow in the year n

K = Cost of Capital

I = Initial Investment

### Acceptance Rule:

If the NPV is positive or atleast equal to zero, the project can be accepted. If it is negative, the proposal can be rejected. Among the various alternatives, the project which gives the highest positive NPV should be selected.

NPV is positive = Cash inflows are generated at a rate higher than the minimum required by the firm.

NPV is zero = Cash inflows are generated at a rate equal to the minimum required.

NPV is negative = Cash inflows are generated at a rate lower than the minimum required by the firm.

The market value per share will increase if the project with positive NPV is selected.

The accept/reject criterion under the NPV method can also be put as:

**NPV > Zero**      Accept

**NPV < Zero**      Reject

**NPV = 0**          May accept or reject

**Merits:** The following are the merits of the net present value (NPV) methods:

- (i) **Consideration to total Cash Inflows:** The NPV methods considers the total cash inflows of investment opportunities over the entire life-time of the projects unlike the payback period methods.
- (ii) **Recognition to the Time Value of Money:** This methods explicitly recognizes the time value of money, which is investable for making meaningful financial decisions.
- (iii) **Changing Discount Rate:** Due to change in the risk pattern of the investor different discount rates can be used.
- (iv) **Best decision criteria for Mutually Exclusive Projects:** This Method is particularly useful for the selection of mutually exclusive projects. It serves as the best decision criteria for mutually exclusive choice proposals.
- (v) **Maximisation of the Shareholders Wealth:** Finally, the NPV method is instrumental in achieving the objective of the maximization of the shareholders' wealth. This method is logically consistent with the company's objective of maximizing shareholders' wealth in terms of maximizing market value of shares, and theoretically correct for the selections of investment proposals.

**Demerits:** The following are the demerits of the net present value method:

- (i) It is difficult to understand and use.
- (ii) The NPV is calculated by using the cost of capital as a discount rate. But the concept of cost of capital itself is difficult to understand and determine.
- (iii) It does not give solutions when the comparable projects are involved in different amounts of investment.

- (iv) It does not give correct answer to a question when alternative projects of limited funds are available, with unequal lives.

## 2. Profitability Index (PI)

This method is also known as 'Benefit Cost Ratio'. According to Van Horne, the profitability Index of a project is "the ratio of the present value of future net cash inflows to the present value of cash outflows".

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

**Decision criteria:** If the Profitability Index is greater than or equal to one, the project should be accepted otherwise reject.

**Merits:** The merits of this method are:

- (i) It takes into account the time value of money
- (ii) It helps to accept / reject investment proposal on the basis of value of the index.
- (iii) It is useful to rank the proposals on the basis of the highest /lowest value of the index.
- (iv) It takes into consideration the entire stream of cash flows generated during the life of the asset.

**Demerits:** However, this technique suffers from the following limitations:

- (v) It is some what difficult to compute.
- (vi) It is difficult to understand the analytical of the decision on the basis of profitability index.

## 3. Internal Rate of Return (IRR):

IRR method follows discounted cash flow technique which takes into account the time value of money. The internal rate of return is the interest rate which equates the present value of expected future cash inflows with the initial capital outlay. In other words, it is the rate at which NPV is equal zero.

Whenever a project report is prepared, IRR is to be worked out in order to ascertain the viability of the project. This is also an important guiding factor to financial institutions and investors.

**Formula:**

$$C = \frac{A_1}{(1+r)} + \frac{A_2}{(1+r)^2} + \frac{A_3}{(1+r)^3} + \dots + \frac{A_n}{(1+r)^n}$$

**Where**

C = Initial Capital outlay.

$A_1, A_2, A_3$  etc. = Expected future cash inflows at the end of year 1, 2, 3 and so on.

r = Rate of interest

n = Number of years of project

**In the above equation 'r' is to be solved in order to find out IRR.**

### Computation of IRR

The Internal rate of return is to be determined by trial and error method. The following steps can be used for its computation.

- (i) Compute the present value of the cash flows from an investment, by using arbitrary selected interest rate.
- (ii) Then compare the present value so obtained with capital outlay.
- (iii) If the present value is higher than the cost, then the present value of inflows is to be determined by using higher rate.

- (iv) This procedure is to be continued until the present value of the inflows from the investment are approximately equal to its outflow.
- (v) The interest rate that bring about equality is the internal rate if return.

In order to find out the exact IRR between two near rates, the following formula is to be used.

$$\text{IRR} = L + \frac{P_1 - C_0}{P_1 - P_2} \times D$$

Where,

- L = Lower rate of interest
- P<sub>1</sub> = Present value at lower rate of interest
- P<sub>2</sub> = Present value at higher rate of interest
- C<sub>0</sub> = Cash outlay
- D = Difference in rate of interest

### Acceptance Rule

If the internal rate of return exceeds the required rate of return, then the project will be accepted. If the project's IRR is less than the required rate of return, it should be rejected. In case of ranking the proposals the technique of IRR is significantly used. The projects with highest rate of return will be ranked as first compared to the lowest rate of return projects.

Thus, the IRR acceptance rules are

Accept if IRR > k

Reject if IRR < k

May accept or reject if IRR = k

Where

K is the cost of capital.

### MERITS

The following are the merits of the IRR method:

- (i) **Consideration of Time of Money:** It considers the time value of money.
- (ii) **Consideration of total Cash Flows:** It taken into account the cash flows over the entire useful life of the asset.
- (iii) **Maximising of shareholders' wealth:** It is in conformity with the firm's objective of maximizing owner welfare.
- (iv) **Provision for risk and uncertainty:** This method automatically gives weight to money values which are nearer to the present period than those which are distant from it. Conversely, in case of other methods like 'Payback Period' and 'Accounting Rate of Return', all money units are given the same weight which is unrealistic. Thus the IRR is more realistic method of project valuation. This method improves the quality of estimates reducing the uncertainty to minimum.
- (v) **Elimination of pre-determined discount rate:** Unlike the NPV method, the IRR method eliminates the use of the required rate of return which is usually a pre-determined rate of cost of capital for discounting the cash flow consistent with the cost of capital. Therefore, the IRR is more reliable measure of the profitability of the investment proposals.

## DEMERITS

### The following are the demerits of the IRR:

- (i) It is very difficult to understand and use
- (ii) It involves a very complicated computational work
- (iii) It may not give unique answer in all situations.
- (iv) The assumption of re-investment of cash flows may not be possible in practice.
- (v) In evaluating the mutually exclusive proposals, this method fails to select the most profitable project which is consistent with the objective of maximization of shareholders wealthy.

The result of this method may be inconsistent compare to NPV method, if the projects differ in their (a) expected lives (b) investment or (c) timing of cash inflows.

### IRR vs. NPV:

#### Comparison of both the techniques

- (i) Both techniques use Discounted Cash Flow (DCF) method.
- (ii) Both recognize the time value of money.
- (iii) Both take into account the cash flows over the entire life of the project.
- (iv) Both are consistent with the objective of maximizing the wealth of shareholders.
- (v) Both are difficult to calculate.
- (vi) Both techniques may often give contradictory result in the case of alternative proposals which are mutually exclusive.

#### Contrast, i.e. Points of difference

- (i) **Interest Rate:** NPV uses the firm's cost of capital as Interest Rate. Unless the cost of capital is known, NPV method cannot be used. Calculating cost of capital is not required for computing IRR.
- (ii) NPV may mislead when dealing with alternative projects or limited funds under the conditions of unequal lives. IRR allows a sound comparison of the project having different lives and different timings of cash inflows.
- (iii) NPV may give different ranking in case of complicated projects as compared to IRR method.
- (iv) NPV assumes that intermediate cash flows are re-invested at firm's cost of capital whereas IRR assumes that intermediate cash inflows are reinvested at the internal rate of the project.
- (v) The results of IRR method may be inconsistent compared to NPV method, if the projects differ in their (a) expected lives or (b) investment or (c) timing of cash inflow.
- (vi) IRR method favours short-lived project so long as it promises return in excess of cut-off rate whereas NPV method favours long-lived projects.
- (vii) Some times IRR may give negative rate or multiple rates. NPV does not suffer from the limitation of multiple rates.

#### Recommendation

The NPV method is generally considered to be superior theoretically because:

- (i) It is simple to calculate as compared to IRR.
- (ii) It does not suffer from the limitation of multiple rates.

- (iii) NPV assumes that intermediate cash flows are reinvested at firm's cost of capital. The reinvestment assumption of NPV is more realistic than IRR method.

But IRR method is favoured by some scholars because:

- (i) It is easier to visualize and to interpret as compared to NPV.
- (ii) Even in the absence of cost of capital, IRR gives an idea of project's profitability.

**Note:**

Unless the cost of capital is known, NPV cannot be used.

- (iii) IRR method is preferable to NPV in the evaluation of risky projects.

**6. Modified Internal Rate of Returns (MIRR)**

IRR assumes that interim positives cash flows are reinvested at the rate of returns as that of the project that generated them. This is usually an unrealistic scenario.. To overcome this draw back a new technique emerges. Under MIRR the earlier cash flows are reinvested at firm's rate of return and finding out the terminal value. MIRR is the rate at which present value of terminal values equal to outflow (Investment).

The procedure for calculating MIRR is as follows:

Step 1: Calculate the present value of the costs (PVC) associated with the project, using cost of capital (r) as the discount rate.

$$PVC = \sum_{t=0}^n \frac{Cash\ outflow_t}{(1+r)^t}$$

Step 2: Calculate the future value (FV) of the cash inflows expected from the project:

$$FV = \sum_{t=0}^n Cash\ outflow_t (1+r)^{n-t}$$

Step 3: Obtain MIRR by solving the following equation:

$$PVC = \frac{FV}{(1 + MIRR)^n} \text{ or } MIRR = \sqrt[n]{\frac{FV(\text{positive cash flows reinvestment rate})}{PV(\text{negative cash flows rate})}} - 1$$

n = Numbers of periods over which cashflows Occured

**5. Discounted Pay Back Method:**

Under this method the discounted cash inflows are calculated and where the discounted cash flows are equal to original investment then the period which is required is called discounting pay back period. While calculating discounting cash inflows the firm's cost of capital has been used.

**Formula:**

$$\text{Discounted payback period (DPP)} = \frac{\text{Investment}}{\text{Discounted Annual cash in flow}}$$

**DECISION CRITERIA:** Out of two projects, selection should be based on the period of discounting pay back period (Lesser pay back period should be preferred.)

**Illustration 1**

The directors of Alpha Limited are contemplating the purchase of a new machine to replace a machine which has been in operation in the factory for the last 5 years.

Ignoring interest but considering tax at 50% of net earnings, suggest which of the two alternatives should be preferred. The following are the details:



	OLD MACHINE	NEW MACHINE
Purchase price	₹40,000	₹60,000
Estimated life of machine	10 years	10 years
Machine running hours per annum	2,000	2,000
Units per hour	24	36
Wages per running hour	3	5.25
Power per annum	2,000	4,500
Consumables stores per annum	6,000	7,500
All other charges per annum	8,000	9,000
Materials cost per unit	0.50	0.50
Selling price per unit	1.25	1.25

You may assume that the above information regarding sales and cost of sales will hold good throughout the economic life of each of the machines. Depreciation has to be charged according to straight-line method.

**Solution:**

**Appraisal of replacement decision under Average Rate of Return Method (ARR)**

Particulars	Existing Machine	New Machine
Cost of Machine (₹)	40,000	60,000
Life of Machine	10 years	10 Years
Machine running hours	2,000	2,000
Depreciation [40,000 / 10] [60,000 / 10] (₹)	4,000	6,000
Production in units [2,000 x 24] [2000 x 36]	48,000	72,000

₹

Sales [48,000 x 1.25] [72,000 x 1.25] [A]	60,000	90,000
<b>Cost of sales:</b>		
Depreciation	4,000	6,000
Wages [2000 x 3] [2000 x 5.25]	6,000	10,500
Power	2,000	4,500
Consumables	6,000	7,500
Other charges	8,000	9,000
Material [48,000 x 0.50] [72,000 x 0.50]	24,000	36,000
<b>Total Cost [B]</b>	<b>50,000</b>	<b>73,500</b>
Profit Before Tax [A-B]	10,000	16,500
Less: Tax at 50%	5,000	8,250
Profit after tax	5,000	8,250

Investment	40,000	60,000
Average rate of return [On investment] = Profit after tax/original investment x 100	$\frac{5,000}{40,000} \times 100$	$\frac{8,250}{60,000} \times 100$
	= 12.5%	= 13.75%

**Comment:**

From the above computation, it is clear that new machine can be replaced in place of old machine because it has higher ARR.

**Illustration 2**

A limited company is considering investing a project requiring a capital outlay of ₹ 2,00,000. Forecast for annual income after depreciation but before tax is as follows:

Year	₹
1	1,00,000
2	1,00,000
3	80,000
4	80,000
5	40,000

Depreciation may be taken as 20% on original cost and taxation at 50% of net income.

You are required to evaluate the project according to each of the following methods:

- Pay-back method
- Rate of return on original investment method
- Rate of return on average investment method
- Discounted cash flow method taking cost of capital as 10%
- Net present value index method
- Internal rate of return method.
- Modified internal rate of return method.

**Solution:**

Working Notes:

Year	Profit before tax	Profit after tax @ 50%	Cash inflows after tax [PAT + Dep]	Cumulative cash inflows	Discounting factor @ 10%	Present Value	Discounting factor @ 20%	Present value @20%	Discounting factor @ 30%	Present Value @30%	Discounting factor @ 32%	Present value @32%
1	1,00,000	50,000	90,000	90,000	0.9091	81,819	0.8333	74,997	0.7692	69,228	0.7576	68,184
2	1,00,000	50,000	90,000	1,80,000	0.8264	74,376	0.6944	62,496	0.5917	53,253	0.5739	51,651
3	80,000	40,000	80,000	2,60,000	0.7513	60,104	0.5787	46,296	0.4552	36,416	0.4348	34,784
4	80,000	40,000	80,000	3,40,000	0.6830	54,640	0.4823	38,584	0.3501	28,008	0.3294	26,352
5	40,000	20,000	60,000	4,00,000	0.6209	37,254	0.4019	24,114	0.2693	16,158	0.2495	14,970
						<b>3,08,193</b>		<b>2,46,487</b>		<b>2,03,063</b>		<b>1,95,941</b>

**(a) Pay Back Method:**

$$\begin{aligned} \text{Pay back period} &= 2 + 20,000/80,000 \\ &= 2.25 \text{ years (or) 2 years 3 months} \end{aligned}$$

**(b) Rate of Return on Original Investment Method.**

$$\begin{aligned} \text{ARR} &= \text{Average Profit after Tax} / \text{Investment} \times 100 \\ &= 40,000 / 2,00,000 \times 100 \\ &= 20\% \end{aligned}$$

**(c) Rate of Return on Average Investment Method**

$$\begin{aligned} \text{ARR} &= \text{Average Profit after tax} / \text{Average investment} \times 100 \\ &= 40,000 / [2,00,000 + 0/2] \times 100 \\ &= 40\% \end{aligned}$$

**(d) Discounted Cash Flow Method taking Cost of Capital as 10%**

₹	
Present value of cash inflows after tax	3,08,193
Less: Outflow	2,00,000
Net Present Value	1,08,193

**(e) Profitability Index**

$$\begin{aligned} \text{Profitability Index} &= \text{P.V of Cash Inflows} / \text{Cash Outflow} \\ &= 3,08,193 / 2,00,000 \\ &= 1.54 \end{aligned}$$

Since PI is more than 1 it can accept the project.

**(f) Internal Rate of Return Method**

$$\begin{aligned} \text{IRR} &= L + [P1 - 1 / P1 - P2] \times d \\ &= 30 + [2,03,063 - 2,00,000 / 2,03,063 - 1,95,941] \times 2 \\ &= 30 + 0.8602 \\ &= 30.8602\% \end{aligned}$$

**(g) MIRR**

₹						
	1	2	3	4	5	Total
Cash inflow after tax	90,000	90,000	80,000	80,000	60,000	--
Re-investment period	4	3	2	1	0	
Re-investment at	10%	10%	10%	10%	10%	
Future value factor	(1.1) <sup>4</sup>	(1.1) <sup>3</sup>	(1.1) <sup>2</sup>	(1.1)	1	
Future value	1,31,769	1,19,790	96,800	88,000	60,000	4,96,359

$$\text{At MIRR} = 2,00,000 [1 + \text{MIRR}]^5 = 4,96,359$$

$$= [1 + \text{MIRR}]^5 = 4,96,359 / 2,00,000 = 2.48$$

MIRR = 20% (Refer Annuity tables)

**Illustration 3**

A company has just installed a machine Model A for the manufacture of a new product at capital cost of ₹.1,00,000. The annual operating costs are estimated at ₹.50,000 (excluding depreciation) and these costs are estimated on the basis of an annual volume of 1,00,000 units of production. The fixed costs at this volume of 1,00,000 units of output will amount to ₹.4,00,000 p.a. The selling price is ₹.5 per unit of output. The machine has a five year life with no residual value.

The company has now come across another machine called Super Model which is capable of giving, the same volume of production at an estimated annual operating costs of ₹.30,000 exclusive of depreciation. The fixed costs will however, remain the same in value. This machine also will have a five year life with no residual value. The capital cost of this machine is ₹.1,50,000.

The company has an offer for the sale of the machine Model A (which has just been installed) at ₹.50,000 and the cost of removal thereof will amount to ₹.10,000. Ignore tax.

In view of the lower operating cost, the company is desirous of dismantling of the machine Model A and installing the Super Model Machine. Assume that Model A has not yet started commercial production and that the time lag in the removal thereof and the installation of the Super Model machine is not material.

The cost of capital is 14% and the P.V. Factors for each of the five years respectively are 0.877, 0.769, 0.675, 0.592 and 0.519.

State whether the company should replace Model A machine by installing the Super Model machine. Will there be any change in your decision if the Model A machine has not been installed and the company is in the process of consideration of selection of either of the two models of the machine? Present suitable statement to illustrate your answer.

**Solution:**

**A) Appraisal of replacement decision under NPV method**

**Step 1:**

Calculation of Present value of net cash outflow or net investment required.

Cost of super model		1,50,000	
Less: Sale proceeds of Model A	50,000		
(-) Cost of removal	<u>10,000</u>	<u>40,000</u>	
Net investment required		<u>1,10,000</u>	

**Step 2:**

**Calculation of present value of incremental operating cash flows:**

Particulars		Model A	Super Model	Incremental
Sales p.a. (units)		1,00,000	1,00,000	
Sales p.a. [₹] [1,00,000 x 5]	[a]	5,00,000	5,00,000	
Less: Expenses				
Operating cost		50,000	30,000	
Fixed cost		4,00,000	4,00,000	
<b>Total Cost</b>	<b>[b]</b>	<b>4,50,000</b>	<b>4,30,000</b>	
<b>Cash Inflows</b>	<b>[a-b]</b>	<b>50,000</b>	<b>70,000</b>	<b>20,000</b>

**Step 3:**

Present value of terminal cash inflow [Salvage value] - NIL

**Step 4:**

Calculation of NPV	₹
*Present value of total cash inflows*	= 68,660
(Recurring + Salvage)	
Less: Outflow	= 1,10,000
Net Present Value	= <u>(41,340)</u>

**Comment:**

As net present value is negative, the replacement decision is not financially feasible.

**Working Notes:**

- \* 1. Total incremental cash inflows = ₹ 20,000  
Present value of incremental recurring cash inflows for 5 years  
= 20,000 x PVAF 5 years 14%  
= 20,000 x 3.433  
P.V of cash flows = ₹ 68,660

**B) Appraisal of mutually exclusive decision under NPV method****Alternative I – Model A****Calculation of NPV under Alternative I****Step 1:**

Calculation of Present value of cash outflow

Cost of machine = ₹. 1,00,000

**Step 2:**

Calculation of present value of recurring cash inflows or operating cash inflows

Cash inflows after tax (as above) – ₹. 50,000

PV of operating cash inflows for 5 years = 50,000 x PVAF 5 years 14%  
= 50,000 x 3.433  
= ₹ 1,71,650

**Step 3:**

Calculation of PV of terminal cash inflows = Nil

**Step 4:**

Calculation of NPV	₹
PV of total cash inflows	= 1,71,650
Less: Outflow	= 1,00,000
Net Present Value (under alternative I)	= <u>71,650</u>

**Alternative 2:- Super Model****Calculation of NPV under Alternative II****Step 1:**

Calculation of Present value of cash outflow

Cost of Machine = ₹ 1,50,000

**Step 2:**

Calculation of operating cash inflows or PV of recurring cash inflows

PV of operating cash inflows for 5 years = 70,000 x PVAF 5 years 14%  
= 70,000 x 3.433  
= ₹ 2,40,310

**Step 3:**

Calculation of PV of terminal cash inflow – NIL

**Step 4:**

Calculation of NPV	₹
PV of total cash inflow	= 2,40,310
[2,40,310 + 0]	
Less: Outflow	= 1,50,000
Net Present Value (under alternative II)	<u>= 90,310</u>

**Comment:**

As NPV of Super Model is more [₹. 90,310] than that of Model A [₹. 71,650], it is advised to Select Super Model.

**Illustration 4**

Techtronics Ltd., an existing company, is considering a new project for manufacture of pocket video games involving a capital expenditure of ₹.600 lakhs and working capital of ₹.150 lakhs. The capacity of the plant is for an annual production of 12 lakh units and capacity utilisation during the 6-year working life of the project is expected to be as indicated below.

Year	Capacity utilisation (%)
1	33 1/3 %
2	66 2/3 %
3	90 %
4-6	100 %

The average price per unit of the product is expected to be ₹.200 netting a contribution of 40%. Annual fixed costs, excluding depreciation, are estimated to be ₹.480 lakhs per annum from the third year onwards; for the first and second year it would be ₹.240 lakhs and ₹.360 lakhs respectively. The average rate of depreciation for tax purposes is 33 1/3% on the capital assets. No other tax reliefs are anticipated. The rate of income-tax may be taken at 50%.

At the end of the third year, an additional investment of ₹.100 lakhs would be required for working capital.

The company, without taking into account the effects of financial leverage, has targeted for a rate of return of 15%.

You are required to indicate whether the proposal is viable, giving your working notes and analysis.

Terminal value for the fixed assets may be taken at 10% and for the current assets at 100%. Calculation may be rounded off to lakhs of rupees. For the purpose of your calculations, the recent amendments to tax laws with regard to balancing charge may be ignored.



**Solution:**

**Evaluation of Expansion decision under NPV method**

<b>Step 1:</b>	₹ In lakhs
Calculation of PV of cash outflow	
Cost of fixed asset at [t0] – 600 x 1	= ₹ 600
Cost of working capital at [t0] – 150 x 1	= ₹ 150
Additional WC required at [t3] – 100 x PVF 3yrs 15%	
- 100 x 0.66	= ₹ 66
PV of cash outflow	<u>= ₹ 816</u>

**Step 2:**

Calculation of PV of operating cash inflow for six years (working notes) = ₹ 826 lakhs

**Step 3:**

Calculation of PV of terminal cash inflow	
Salvage value of fixed assets [600 x 10/100]	= 60
Less: Tax on profit at 50% [60-53] x 50/100 = 3.5 (rounded off)	<u>= 4</u>
	56
WC recovered [100%] [100 + 150]	= 250
	<u>= 306</u>
Its present value = 306 x PVAF 6 yrs 15%	
= 306 x 0.432	
= ₹. 132 lakhs	

**Step 4:**

Calculation of NPV	
PV of total cash inflows	= ₹. 958
[Recurring + Terminal i.e., 826 + 132]	
Less: Outflow	= ₹. 816
NPV =	<u>₹. 142 Lakhs</u>

**Comment:**

As NPV is positive, it is advised to implement the new project.

**Working Notes:**

**1. Calculation of Operating Cash Inflows**

Year	Production	Contribution	Fixed expenses	Depreciation (WDV)	PBT	PAT	CIAT	PV at 15%	PV
1	400	320	240	200	(120)	(60)	140	0.870	121.80
2	800	640	360	133	147	74	207	0.756	156.49
3	1080	864	480	89	295	148	237	0.658	155.95
4	1200	960	480	59	421	210	269	0.572	153.87
5	1200	960	480	40	440	220	260	0.497	129.22
6	1200	960	480	26	454	227	253	0.432	109.29
<b>PV of operating cash inflows for 6 years</b>									<b>826.62</b>

**Illustration 5**

A chemical company is considering replacing an existing machine with one costing ₹65,000. The existing machine was originally purchased two years ago for ₹28,000 and is being depreciated by the straight line method over its seven-year life period. It can currently be sold for ₹30,000 with no removal costs. The new machine would cost ₹10,000 to install and would be depreciate over five years. The management believes that the new machine would have a salvage value of ₹5,000 at the end of year 5. The management also estimates an increase in net working capital requirement of ₹10,000 as a result of expanded operations with the new machine. The firm is taxed at a rate of 55% on normal income and 30% on capital gains. The company's expected after-tax profits for next 5 years with existing machine and with new machine are given as follows:

Expected after-tax profits		
Year	With existing machine	With new machine
1	2,00,000	2,16,000
2	1,50,000	1,50,000
3	1,80,000	2,00,000
4	2,10,000	2,40,000
5	2,20,000	2,30,000

- a) Calculate the net investment required by the new machine.  
 b) If the company's cost of capital is 15%, determine whether the new machine should be purchased.

**Solution:****Appraisal of replacement decision under NPV method****Step 1:**

Calculation of present value of net investment required:	₹
Cost of new asset	65,000
Add: Installation cost	10,000
	75,000
Add: Additional WC	10,000
	85,000
Less: Sale proceeds of old machine	30,000
Less: Tax	5,000
[8,000 × 55/100 + 2000 × 30/100]	25,000
Net Investment required	60,000

**Step 2:**

Calculation of Present Value of Incremental Operating cash inflows for 5 years.

Year	CIAT (PAT + Dep)	New	Incremental	PV factor at 15%	Present Value
1	2,04,000	2,30,000	26,000	0.8696	22,609
2	1,54,000	1,64,000	10,000	0.7561	7,561
3	1,84,000	2,14,000	30,000	0.6575	19,725
4	2,14,000	2,54,000	40,000	0.5718	22,872
5	2,24,000	2,44,000	20,000	0.4972	9,944
<b>PV of cash inflows for 5 years</b>					<b>82,711</b>



### Step 3:

<b>Calculation of PV of terminal cash inflow</b>		₹
Salvage value of asset		5,000
[No tax because book value and salvage value are equal]		
Working capital recovered [100% recovered]		10,000
Terminal cash inflows		<u>15,000</u>
Its PV at the end of 5th year	$= 15,000 \times 0.4972 =$	7,458

### Step 4:

<b>Calculation of NPV</b>		₹
PV of total cash inflows	$= 90,169$	
[82,711 + 7,458]		
(-) Outflow	$= 60,000$	
<b>NPV</b>	<u><math>= 30,169</math></u>	

### Comment:

As NPV is positive, it is advised to replace.

### Note 1:

Depreciation for old Machine  $= 28,000 / 7 = ₹ 4,000$

Depreciation for new Machine  $\frac{65,000 + 10,000 - 5,000}{5} = ₹ 14,000$

### Illustration 6

A Company is considering two mutually exclusive projects. Project K will require an initial cash investment in machinery of ₹ 2,68,000. It is anticipated that the machinery will have a useful life of ten years at the end of which its salvage will realise ₹20,500. The project will also require an additional investment in cash, Sundry debtors and stock of ₹40,000. At the end of five years from the commencement of the project balancing equipment for ₹45,000 has to be installed to make the unit workable. The cost of additional machinery will be written off to depreciation over the balance life of the project. The project is expected to yield a net cash flow (before depreciation) of ₹1,00,000 annually.

Project R, which is the alternative one under consideration, requires an investment of ₹3,00,000 in machinery and as in Project K investment in current assets of ₹40,000. The residual salvage value of the machinery at the end of its useful life of ten years is expected to be ₹25,000. The annual cash inflow (before depreciation) from the project is worked at ₹80,000 p.a. for the first five years and ₹1,80,000 per annum for the next five years.

Depreciation is written off by the Company on sum-of-the years' digits method, (i.e., if the life of the asset is 10 years, then in the ratio of 10,9,8 and so on). Income tax rate is 50%. A minimum rate of return has been calculated at 16%. The present value of Re. 1 at interest of 16% p.a. is 0.86, 0.74, 0.64, 0.55, 0.48, 0.41, 0.35, 0.30, 0.26 and 0.23 for years 1 to 10 respectively.

Which Project is better? Assuming no capital gains taxes, calculate the Net Present Value of each Project.

**Solution:**

**Appraisal of mutually exclusive decision under NPV method**

**Alternative 1: Project K**

**Calculation of NPV under alternative I**

**Step 1:**

Calculation of present value of cash outflow	₹
Cost of machine at (t <sub>0</sub> ) (2,68,000 x 1)	= 2,68,000
Additional working capital at (t <sub>0</sub> ) [40,000 x 1]	= 40,000
PV of additional asset at (t <sub>5</sub> ) [45,000 x 0.48]	= 21,600
PV of total cash outflow	<u><b>= 3,29,600</b></u>

**Step 2:**

Calculation of PV of operating cash inflows for 10 years ₹

Year	Cash profit before dep	Dep. on original asset	Dep. on additional asset	PBT	PAT at 50%	CIAT	PV factor at 16%	PV
1	1,00,000	45,000	--	55,000	27,500	72,500	0.86	62,350
2	1,00,000	40,500	--	59,500	29,750	70,250	0.74	51,985
3	1,00,000	36,000	--	64,000	32,000	68,000	0.64	43,250
4	1,00,000	31,500	--	68,500	34,250	65,750	0.55	36,163
5	1,00,000	27,000	--	73,000	36,500	63,500	0.48	30,480
6	1,00,000	22,500	15,000	62,500	31,250	68,750	0.41	28,188
7	1,00,000	18,000	12,000	70,000	35,000	65,000	0.35	22,750
8	1,00,000	13,500	9,000	77,500	38,750	61,250	0.30	18,375
9	1,00,000	9,000	6,000	85,000	42,500	57,500	0.26	14,950
10	1,00,000	4,500	3,000	92,500	46,250	53,750	0.23	12,363
								<b>3,21,123</b>

Note 1: Calculation of depreciation under sum of the years digits method:

$$\text{Depreciation} = \frac{\text{Cost of asset} - \text{Scrap}}{\text{Sum of the year}} \times 10/9/8\dots \text{and so on}$$

$$= \frac{2,68,000 - 20,500}{55} \times 10/9/8\dots \text{and so on as follows:}$$

1	2	3	4	5	6	7	8	9	10
4500x 10	4500 x 9	4500 x 8	4500 x 7	4500 x 6	4500 x 5	4500 x 4	4500 x 3	4500 x 2	4500 x 1
45,000	40,500	36,000	31,500	27,000	22,500	18,000	13,500	9,000	4,500

Note 2: Calculation of depreciation on additional asset

$$\text{Depreciation} = \frac{\text{Cost of asset} - \text{Scrap}}{\text{Sum of the year}}$$

$$= \frac{45,000 - 0}{15}$$

$$= 3,000$$



6	7	8	9	10
3000 x 5	3000 x 4	3000 x 3	3000 x 2	3000 x 1
15,000	12,000	9,000	6,000	3,000

**Step 3:** Calculation of present value of terminal cash inflows:

	₹
Realizable value of asset	= 20,500
WC recovered (100%)	= 40,000
	<u>= 60,500</u>

Its present value = 60,500 x 0.23 = 13,915

**Step 4:** Calculation of NPV

PV of total cash inflows	3,35,038
[3, 22,123 + 13,915]	
Less: outflow	3,29,600
NPV	<u>5,438</u>

**Alternative II – Project R**

**Calculation of NPV under alternative II**

**Step 1:**

**Calculation of initial investment**

	₹
Cost of asset	= 3,00,000
(+) Working capital	= 40,000
Initial investment	<u>= 3,40,000</u>

**Step 2:**

**Calculation of PV of recurring cash inflows for 10 years.**

Year	Cash profit before tax	Dep	PBT	PAT at 50%	CIAT	PV factor at 16%	PV
1	80,000	50,000	30,000	15,000	65,000	0.86	55,900
2	80,000	45,000	35,000	17,500	62,500	0.74	46,250
3	80,000	40,000	40,000	20,000	60,000	0.64	38,400
4	80,000	35,000	45,000	22,500	57,500	0.55	31,625
5	80,000	30,000	50,000	25,000	55,000	0.48	26,400
6	1,80,000	25,000	1,55,000	77,500	1,02,500	0.41	42,025
7	1,80,000	20,000	1,60,000	80,000	1,00,000	0.35	35,000
8	1,80,000	15,000	1,65,000	82,500	97,500	0.30	29,250
9	1,80,000	10,000	1,70,000	85,000	95,000	0.26	24,700
10	1,80,000	5,000	1,75,000	87,500	92,500	0.23	21,275
							<b>3,50,825</b>

**Step 3:**

Calculation of PV of terminal cash inflows

Scrap value	₹	= 25,000
WC		= 40,000
		= 65,000

Its PV = 65,000 x 0.23 = 14,950

**Step 4:**

PV of total cash inflows	₹	= 3,65,775
[3,50,825 + 14,950]		
Less: Outflow		= 3,40,000
NPV		= 25,775

**Comment:**

Project R is better compared to project K because it has higher NPV.

**Illustration 7**

A product is currently manufactured on a machine that is not fully depreciated for tax purposes and has a book value of ₹70,000. It was purchased for ₹2,10,000 twenty years ago. The cost of the product are as follows:

	Unit Cost
Direct Labour	₹28.00
Indirect labour	14.00
Other variable overhead	10.50
Fixed overhead	17.50
	70.00

In the past year 10,000 units were produced. It is expected that with suitable repairs the old machine can be used indefinitely in future. The repairs are expected to average ₹ 75,000 per year.

An equipment manufacturer has offered to accept the old machine as a trade in for a new equipment. The new machine would cost ₹4,20,000 before allowing for ₹1,05,000 for the old equipment. The Project costs associated with the new machine are as follows:

	Unit Cost
Direct Labour	₹14.00
Indirect labour	21.00
Other variable overhead	7.00
Fixed overhead	22.75
	64.75

The fixed overhead costs are allocations for other departments plus the depreciation of the equipment. The old machine can be sold now for ₹50,000 in the open market. The new machine has an expected life of 10 years and salvage value of ₹20,000 at that time. The current corporate income tax rate is assumed to be 50%. For tax purposes cost of the new machine and the book value of the old machine may be depreciated in 10 years. The minimum required rate is 10%. It is expected that the future demand of the



product will stay at 10,000 units per year. The present value of an annuity of ₹ 1 for 9 years @ 10% discount factor = 5.759. The present value of ₹1 received at the end of 10th year @10% discount factor is = 0.386. Should the new equipment is purchased?

**Solution:**

**Evaluation of replacement decision under NPV Method**

**Step 1: Calculation of PV of net cash outflow**

Cost of new machine	4,20,000
Less: Exchange price for old machine	1,05,000
	<u>3,15,000</u>
Add: Tax on profit on exchange	
[1,05,000 – 70,000]	
[35,000 x 50%]	= 17,500
Net Investment	<u>= 3,32,500</u>

**Step 2: Calculation of PV of incremental operating cash inflows for 10 years**

	Existing	New	Incremental
Number of units	10,000	10,000	--
Variable cost per unit	52.5	42	
Variable Cost	5,25,000	4,20,000	1,05,000
Repairs	75,000	--	75,000
Depreciation	7,000	40,000	[33,000]
[2,10,000 – 70,000]/20			
[4,20,000 – 20,000]/10			
Total Savings before tax			1,47,000
Less: Tax at 50%			73,500
Savings after tax			73,500
Add: Depreciation			33,000
CIAT			1,06,500

**Note:** The allocations from other department are irrelevant for decision making.

**Step 3: Calculation of terminal cash inflows**

Salvage value of machine = ₹20,000

**Step 4: Calculation of NPV:**

Operating cash inflow from 1 to 9 years	₹
[1,06,500 x 5.759]	= 6,13,334
PV of cash inflow for 10th year	= 48,829
(1,06,500 + 20,000) x 0.386	
PV of total cash inflow	<u>= 6,62,163</u>
Less: Outflow	= 3,32,500
<b>NPV</b>	<u><b>= 3,29,663</b></u>

**Comment:**

Since NPV is positive, it is advised to replace the machine.

**Note:**

Since the exchange value is greater than open market value, the open market value is irrelevant.

**Illustration 8**

Electromatic Excellers Ltd. specialise in the manufacture of novel transistors. They have recently developed technology to design a new radio transistor capable of being used as an emergency lamp also. They are quite confident of selling all the 8,000 units that they would be making in a year. The capital equipment that would be required will cost ₹.25 lakhs. It will have an economic life of 4 years and no significant terminal salvage value.

During each of the first four years promotional expenses are planned as under:

	₹			
1st Year	1	2	3	4
Advertisement	1,00,000	75,000	60,000	30,000
Others	50,000	75,000	90,000	1,20,000
Variable cost of production and selling expenses: ₹250 per unit				

Additional fixed operating costs incurred because of this new product are budgeted at ₹.75,000 per year.

The company's profit goals call for a discounted rate of return of 15% after taxes on investments on new products. The income tax rate on an average works out to 40%. You can assume that the straight line method of depreciation will be used for tax and reporting.

Work out an initial selling price per unit of the product that may be fixed for obtaining the desired rate of return on investment.

Present value of annuity of Re. 1 received or paid in a steady stream throughout 4 years in the future at 15% is 3.0079.

**Solution:****Calculation of Selling Price**

Let x be the selling price.

**Evaluation under NPV method****Step 1:**

Initial Investment = 25,00,000

**Step 2:**

PV of operating cash inflows per annum

A. Sales p.a.	=	8,000 X
B. Expenses		
Depreciation [(25,00,000 – 0) / 4]	=	6,25,000
Promotion Expenses	=	1, 50,000
Variable costs	=	<u>20, 00,000</u>
Fixed costs	=	75,000
		<u>₹28,50,000</u>

PBT (A-B)	= 8,000 X-28,50,000
Less: Tax at 40%	= 3,200 X-11,40,000
PAT	= 4,800 X-17,10,000
Add: Depreciation	<u>6,25,000</u>
Cash inflow after tax	<u>= 4,800 X-10,85,000</u>

**At required return at 15%**

$$\begin{aligned}
 \text{PV of total cash inflow} &= \text{outflow} \\
 [4,800 X - 10,85,000] \times 3.0079 &= 25,00,000 \\
 14,437.92 X - 32,63,572 &= 25,00,000 \\
 14,437.92 X &= 32,63,572 + 25,00,000 \\
 X &= \frac{32,63,572 + 25,00,000}{14,437.92} \\
 &= 399.196 \\
 &= 400 \\
 \text{Initial selling Price} &= ₹ 400
 \end{aligned}$$

**Illustration 9**

Bisk-Farm Biscuits Ltd is considering the purchase of a delivery van, and is evaluating the following two choices:

- The company can buy a used van for ₹ 20,000 and after 4 years sell the same for ₹ 2,500 (net of taxes) and replace it with another used van which is expected to cost ₹ 30,000 and has 6 years life with no terminating value,
- The company can buy a new van for ₹ 40,000. The projected life of the van is 10 years and has an expected salvage value (net of taxes) of ₹ 5,000 at the end of 10 years.

The services provided by the vans under both the choices are the same. Assuming the cost of capital at 10 percent, which choice is preferable?

**Solution:**

**Calculation of mutually exclusive decision**

**Alternative I : Company purchased a used van**

**Calculation of PV of cash outflow:**

₹

Year	Cash outflow	PV factor at 10%	Present Value
$t_0$	20,000	1	20,000
$t_4$	27,500 (30,000-2,500)	0.6830	18,783
PV of total cash outflow under Alternative I			38,783

**Alternative II : Company purchased a new van**

Year	Cash outflow	PV factor at 10%	Present Value
$t_0$	40,000	1	40,000
$t_{10}$	(5,000)	0.3855	(1,928)
PV of net cash outflow			38,072

**Comment:**

It is advised to select alternative II as it involves lower cash outflows.

**Illustration 10**

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

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

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

Discount Factor	15%	14%	13%	12%
1 year	0.869	0.877	0.885	0.893
2 years	0.756	0.769	0.783	0.797
3 years	0.658	0.675	0.693	0.712
4 years	0.572	0.592	0.613	0.636
	2.855	2.913	2.974	3.038

**Solution:**

$$\text{CIAT} = 40,000$$

$$\text{Life} = 4 \text{ years}$$

$$\text{IRR} = 15\%$$

$$\text{PI} = 1.064$$

At 15% IRR

$$\text{PV of cash inflow} = \text{Cost of project}$$

$$40,000 \text{ PVAF } 4 \text{ yrs } 15\% = \text{Cost of project}$$

$$\text{Cost of Project} = 40,000 \times 2.855$$

$$= 1,14,200$$

$$\text{PI} = \frac{\text{PV of cash inflow}}{\text{Initial outflow}}$$

$$= 1.064$$

$$1.064 = \frac{\text{PV of cash inflow}}{1,14,200}$$

$$1,14,200$$

$$\text{PV of cash inflow} = 1,21,509$$

$$\text{Less: Outflow} = 1,14,200$$

$$\text{NPV} = \underline{7,309}$$

At cost of capital

Let  $r$  be the Cost of Capital ( $K_0$ )

PV of cash inflow

$$40,000 \text{ PVAF } r\% \text{ 4 yrs} = 1,21,509$$

$$\text{PVAF } n\% \text{ 4 yrs} = 1,21,509 / 40,000 = 3.038$$

$$r = 12\%$$

$$\begin{aligned} \text{Pay back period} &= \frac{\text{Initial Investment}}{\text{Annual cash flow}} \\ &= \frac{1,14,200}{40,000} \\ &= 2.855 \end{aligned}$$

### Illustration 11

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

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

**Solution:**

#### Determination of Priority of the Project

	X	Y
NPV at 12%	II	I
NPV at 18%	Same	Same
IRR	I	II
ARR	II	I
Pay back	I	II
PI	I	II

**Decision:**

- As the outlays in the projects are different, NPV is not suitable for evaluation.
- As there is different life periods, ARR is not appropriate method for evaluation.

On the basis of remaining evaluation methods [IRR, PBP, PI] Project X is occupied first priority. Hence, it is advised to choose project X.

**SELF EXAMINATION QUESTIONS:**

1. What do you mean by Capital Budgeting? Explain its importance.
2. Explain various Capital Budgeting techniques.
3. Write short notes on:
  - a) Internal Rate of Return.
  - b) Average Rate of Return.
  - c) Net Present Value
  - d) IRR vs. NPV
  - e) Discounted Payback Period
  - f) Modified Internal Rate of Return

**PRACTICAL PROBLEMS:**

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

Year	1	2	3	4	5
Estimated Cash flow before depreciation and tax (₹ Lakhs)	4	6	8	8	10

You are required to determined the:

- i) Pay back period for the investment
- ii) Average rate of return on the investment
- iii) NPV at 10% cost of capital
- iv) Benefit – Cost Ratio

Ans:

- i) Pay back period = 3 years 10 months
  - ii) ARR = 16%
  - iii) NPV = ₹ 0.717 lakhs
  - iv) Benefit Cost Ratio = 1.036
5. Indo Plastics Ltd. is a manufacturer of high quality plastic products, Rasik, President, is considering computerizing the company's ordering, inventory and billing procedures. He estimates that the annual savings from computerization include a reduction of 4 clerical employees with annual salaries of ₹ 50,000 each, ₹ 30,000 from reduced production delays caused by raw materials inventory problems ₹ 25,000 from lost sales due to inventory stock outs and ₹ 18,000 associated with timely billing procedures.

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

You are required to:

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

**Note:**

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

**Ans:**

- i) NPV = ₹ (16,647)
- ii) PI = ₹ 0.945
- iii) Pay back period = 3 years 9.8 months

6. United Industries Ltd. has an investment budget of ₹ 100 lakhs for 2011-12. It has short listed two projects A and B after completing the market and technical appraisals. The management wants to complete the financial appraisal before making the investment. Further particulars regarding the two projects are given below:

	(₹ Lakhs)	
Particulars	A	B
Investment required	100	90
Average annual cash inflow before depreciation and tax (estimate)	28	24

Salvage value: Nil for both projects. Estimate life – 19 years for both projects.

The company follows straight line method of charging depreciation. Its tax rate is 50%.

You are required to calculate i) Payback period and ii) IRR for the 2 projects.

Note: P.V of an annuity of Re. 1 for ten years at different discount rate is given below:

Rate %		10	11	12	13	14
Annuity Value of return	6.1446	5.8992	5.6502	5.462	5.2161	5.01

**Ans:**

	Project A	Project B
i) Payback period	5.26 years	5.45 years
ii) IRR	13.78%	12.89%

7. Precision Instruments is considering two mutually exclusive Projects X and Y. The following details are made available to you:

	(₹ Lakhs)	
Particulars	Project X	Project Y
Project Cost	700	700
Cash inflows: Year 1	100	400
Year 2	200	400
Year 3	300	200
Year 4	450	100
Year 5	600	100
<b>Total</b>	<b>1,650</b>	<b>1,300</b>

Assume no residual values at the end of the fifth year. The firm's cost of capital is 10%. Required, in respect of each of the two projects: i) Net present value, using 10% discounting, ii) Internal rate of return iii) profitability Index.

**Ans:**

	Project X	Project Y
i) NPV	461.35 lakhs	365.5 lakhs
ii) IRR	27.21%	37.63%
iii) PI	1.659	1.522

8. XYZ Ltd. has decided to diversify its production and wants to invest its surplus funds on the most profitable project. It has under consideration only two projects, 'A' and 'B'. The cost of project 'A' is ₹ 100 lakhs and that of 'B' is ₹ 150 lakhs. Both projects are expected to have a life of 8 years only and at the end of this period 'A' will have a salvage value of ₹ 4 lakhs and 'B' ₹ 14 lakhs. The running expenses of 'A' will be ₹ 35 lakhs per year and that of 'B' ₹ 20 lakhs per year. In either case the company expects a rate of return of 10%. The company's tax rate is 50%. Depreciation is charged on straight line basis. Which project should the company take up?

Note: Present value of annuity of Re. 1 for eight years at 10% is 5.335 and present value of Re.1 received at the end of the eighth year is 0.467.

**Ans:** NPV of Project A = ₹ 19.238 lakhs; Project B = ₹ 27.258 lakhs