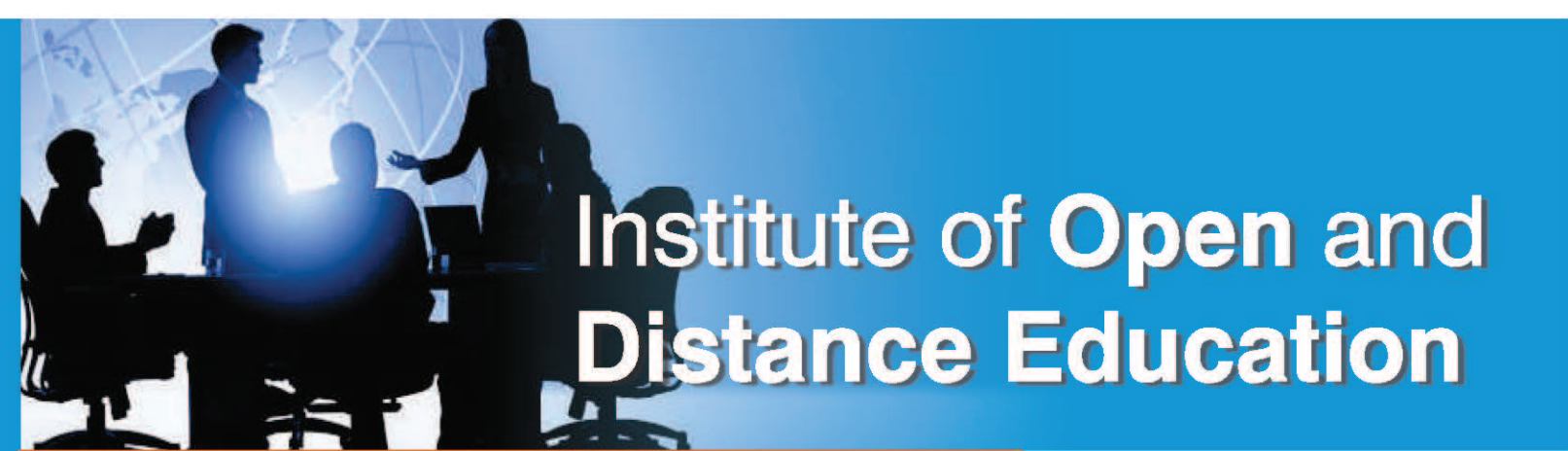




Cost & Management Accounting



Institute of Open and Distance Education

Faculty of Management

Cost & Management Accounting



3BBA4



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A STATUTORY UNIVERSITY UNDER SECTION 2(F) OF THE UGC ACT

3BBA4

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BLOCK – I

UNIT 1

COST ACCOUNTING: AN OVERVIEW

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1.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Define cost accounting
- Explain the scope and functions of cost accounting
- Enumerate the objectives and methods of cost accounting

- Discuss the techniques and classification of cost accounting
- Describe the difference between cost accounting and financial accounting
- Know the key elements of cost accounting

1.1 INTRODUCTION

Cost accounting is the classification, recording and appropriate allocation of expenditure for the determination of the products or services, and for the suitable presentation of data for the purpose of control and management. The cost accounting normally includes the cost of job or contract, batch, process and so on. It normally illustrates the following compartments of the cost aspect of the organization, viz. production, administration, selling and distribution. The cost accounting not only reveals the amount of costs, which are relevant with the product or service, but also establishes the ways and means to control through budgets and standard cost in order to maintain the profitability of the firm.

Cost accountancy is the combination of both the application of costing and cost accounting principles, methods, techniques to science, art and practice of cost control and ascertainment of profitability. Cost accountancy consists of three components. First component science means that he must have systematic knowledge of cost principles for the discharge of responsibilities. Art is the next component in the cost accountancy reveals the ability and skill required for the discharge of responsibilities cost accountant in order to resolve the problems. Practice is the third component of cost accountancy, which comprises the continuous efforts of the accountant in the field of cost accounting not only to disseminating the information but also facilitating the organisation to take decisions.

1.2 MEANING AND CONCEPT OF COST ACCOUNTING

Cost accounting is a very wide term. It embraces many subjects within its folds. In general usage, it is the application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control and ascertainment of profitability of business. The Institute of Cost and Management Accountants, England has defined cost accounting as, *"the application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control. It includes the presentation of information derived there from for the purpose of managerial decision-making."* Thus, cost accounting is the science, art and practice of a cost accountant. It is a science because it consists of organized body of knowledge, which a cost accountant must possess for proper discharge of his responsibilities.

Cost accounting involves the application of costing principle, methods and techniques for ascertaining costs and their control by comparing actual costs with the budget or standard. Cost accounting is an art also, because it includes the ability and skill with which a cost accountant has to apply his basic knowledge to particular circumstances. It involves the use of various costing techniques and methods such as marginal costing, standard costing, budgetary control, etc. The applications of these techniques help him in dealing with various problems such as cost reduction, cost control, ascertainment of profitability, etc.

Cost accounting is also the practice of a cost accountant because he has to make constant efforts in the field of cost accounting. Such efforts include the information presentation to the top management for the purpose of managerial decision-making and keeping various records of business.

Cost accounting is an important development in the field of accounting. It is the process of accounting for costs. It embraces the accounting procedures relating to

recording of all income and expenditure and the preparation of various statements and reports with the object of ascertaining and controlling costs. On analysis of the above meaning and definitions, the following features of cost accounting become evident:

- (i) Cost accounting is used in the very wide sense when compared to cost accountancy and costing. This is so because cost accounting is concerned with the formulation of principles, methods and techniques to be applied for ascertaining cost and profit.
- (ii) Having ascertained cost and profit, cost accounting is concerned with presentation of information to management. To enable management to carry out its functions, reports must be promptly made available at the right time, to the right person and in a proper form.
- (iii) The information so provided is to serve the purpose of managerial decision-making such as introducing a new line of product, replacement of manual labour by machines, make or buy decisions, etc.

This section will help you understand the meaning of cost, costing and the cost accounting.

1.2.1 Cost

Cost can be defined as the value attributed to a resource. There are three resources of a cost, i.e. material, labour and services for a manufacturing organisation. Cost is the amount of expenditure incurred on a given thing. The committee on cost concepts and standards of American Accounting Association has defined Cost as foregoing measured in monetary terms incurred or potentially to be incurred to achieve a specific objective. In this way, cost indicates a foregoing of something of value in consideration of obtaining some sort of benefit. The term Cost connotes different meanings to different people. But in cost accounting it is used in a special sense.

According to Crowningshield cost represents, "*an expenditure made to secure an economic benefit, generally resources that promise to produce revenue. The resources may have tangible substance (material) or they may take the form of labour and services*".

Cost has been defined in terminology given by the Institute of Cost and Management Accountants as, "*the amount of expenditure incurred or attributed on a given thing*". More simply, it can be defined as that cost which is given or sacrificed to obtain something. Thus, the cost of an article is its purchase or manufacturing price, i.e., it would consist of its direct material cost, direct labour cost, direct and indirect expenses allocated or apportioned to it.

The term cost is denoted by Expenses when the cost is incurred after deriving the benefit. The AICPA Committee on terminology defined expenses as, "*all expired cost which is deductible from revenue*". In a narrow sense, expense refers to such items as production, administrative and selling expenses.

1.2.2 Costing

Costing is the system of calculating the cost of production by allocating expenditures to different stages of production or operations of the firm.

It is a managerial accounting method that describes when all fixed and variable costs, including manufacturing costs are used to compute the total cost per unit. Costing includes these costs when computing the amount of money it takes to produce and distribute one unit of output.

1.3 IMPORTANCE OF COST ACCOUNTING

The importance of cost accounting is presented below:

1. ***Helps in controlling cost:*** Cost accounting helps in controlling cost by applying some techniques such as standard costing and budgetary control.
2. ***Provides necessary cost information:*** It provides necessary cost information to the management for planning, implementing and controlling.
3. ***Ascertains the total per unit cost of production:*** It ascertains the total and per unit cost of production of goods and services that helps to fix the selling prices as well.
4. ***Introduces cost reduction programs:*** It helps to introduce and implement different cost reduction programs.
5. ***Discloses the profitable and non-profitable activities:*** It discloses the profitable and non-profitable activities that enable management to decide to eliminate or control unprofitable activities and expand or develop the profitable activities.
6. ***Provides information for the comparison of cost:*** It provides reliable data and information which enable the comparison of cost between periods, volume of output, determent and processes.
7. ***Checks the accuracy of financial accounts:*** It helps checking the accuracy of financial accounts. This is done by preparing cost reconciliation statement.
8. ***Helps to investment and financial institutions:*** It is also advantageous to investment and financial institutions since it discloses the profitability and financial position in which they intend to invest.
9. ***Beneficial to workers:*** It is beneficial to workers as well since it emphasises the efficient utilisation of labour and scientific systems of wages payment.

1.4 NATURE AND SCOPE OF COST ACCOUNTING

The nature and scope of cost accounting are ascertainment of cost, fixation of selling price of product, proper recording and presentation of cost data to the management for measuring efficiency and for cost control. The following are the main objectives of cost accounting:

- (i) ***Ascertainment of Cost:*** Ascertainment of cost is primary objective of cost accounting in the initial stages of its development. However, in modern times, this has assumed the secondary objective of cost accounting. Cost ascertainment involves the collection and classification of expenditures at the first instance. Those items of expenditures or expenses which are capable of charging directly to the products manufactured are allocated. Then the other expenses which are not capable of direct allocation are apportioned on some suitable basis. Thus the cost of production of goods manufactured is ascertained. In this process, cost accounting involves maintenance of different types of books to record various cost elements. Cost of production is ascertained by using any of the costing technique and method such as historical costing, standard costing, marginal costing, job costing, unit costing, etc.
- (ii) ***Fixation of Selling Price:*** Every business enterprise aims at maximising its profit. The total cost of production constitutes the basis on which selling price is fixed by adding a part of profit. Cost accounting furnishes both the total cost of production as well as cost incurred at each and every stage of production. No doubt other factors are taken into consideration before fixing of selling price such as market conditions, the area of distribution, volume of sales, etc. But cost plays the dominating role in the price fixation.

- (iii) **Cost Control:** At one time cost control was considered as secondary objective of cost accounting. But in modern business, it constitutes the primary objective. Cost control is exercised at different stages in an industry, viz., acquisition of materials, recruiting of labour, during the production process and so on. As such, we have material cost control, labour cost control, production cost control, quality control and so on. However, control over cost is exercised through the techniques of budgetary control, historical costing and standard costing. The control techniques enable the management in knowing the operating efficiency of a business organisation.
- (iv) **Provides Various Policies:** Cost data to a great extent helps in formulating the various policies of a business or industry and in decision-making. As every alternative decision involves investment of capital outlay, costs play an important role in decision-making of organisation. Therefore, availability of cost data is a must for all levels of management.

1.5 METHODS OF COSTING

The methods of costing in ascertainment of the costs are different from one industrial practice to another. The methods of costing are normally classified into two major categories, viz. specific order costing and operation costing.

- **Specific order costing:** It is one of the major methods of costing, pertaining to the specific job or work, which is normally entrusted upon the industry to complete the entire process of manufacturing. Under this type of costing specific cost of the jobs, contracts, batch can be ascertained to the tune of their own nature and characteristics.
- **Operation costing:** It is another major classification in connection with the process or operation required for the manufacture of a product. This is more applicable in the case of products, which are normally manufactured as well as expected to come across many stages of production process or operations in the industry.

The following are the detailed classifications of the costing:

- Job order costing
 - Contract costing
 - Batch costing
 - Process costing
 - Operation costing
 - Service costing
1. **Job order costing:** Under this method of costing, the cost inputs of every or specific jobs are collected and assimilated together for the determination of the total cost of the job, which is most useful to analyse the cost of the job not only alone but also to compare with other kind of jobs. It paves way through job card to conduct an analysis in the angle of cost factor influence.
 2. **Contract costing:** This is a method of costing preferably required for the jobs which are normally having longer gestation period to complete, i.e., by the civil engineers and mechanical engineers.
 3. **Batch costing:** It is another most important classification in which small orders costs are ascertained. This is mostly preferred by the companies or factories, which normally engage in the manufacture of small articles in the form of batch.

Each batch is considered as a unit cost and exclusively costed. Under this method, the cost per unit could be ascertained as follows:

$$= \frac{\text{Cost of the batch}}{\text{Number of units in a batch}}$$

It is applied in the case of biscuits, chalk piece, pencil, cigarette, garments manufactures. It could be put in simple sense that this method of costing is more applicable in the case of Fast Moving Consumer Goods (FMCG) industries.

4. **Process costing:** This is another method of costing, which is mostly suited for the continuous process of manufacturing of a finished product. The production of a finished product requires many stages of production in the form of processes, which takes normally the inputs for one process from the output of another/yester process. The cost of a finished product is normally prepared through the preparation of separate process accounts, which normally reveals the cost of each process, highlights the cost of the specific process, finally known as continuous costing.
5. **Operation costing:** This is a suitable method of costing for the industries, which manufacture the standard or identical products. This method is applied in the industries of brewery, oil drilling, cement works and so on.
6. **Service costing:** This is suitable method for the industries, which render service rather than manufacturing of goods. This is applied in the case of service industries, viz., transport corporations, municipalities, power supply organisation and so on. This method is suited to ascertain the cost of rendering service.

1.6 TECHNIQUES OF COSTING

The following are the various techniques of costing, which are nothing but vital tools of ascertaining costs:

1. **Uniform costing:** It is the use of same costing principles and practices by several undertakings for common control and comparison of costs.
2. **Marginal costing:** It is another tool of costing, by studying the difference in between the fixed and variable cost in order to determine the influence of change in the level of output on the cost per unit.
3. **Historical costing:** It is another technique of costing through which the costs of the yester horizon are ascertained.
4. **Direct costing:** It is the practice of charging all direct variable and fixed costs which are in relation with the operations, processes or products by leaving all other costs which are normally written off against the profits.
5. **Absorption costing:** It is unlike the marginal costing technique, includes the fixed cost of operations along with the variable cost of production.
6. **Standard costing:** It is another tool of costing which normally facilitates the firm to determine the deviation in between the actual and standards in order to exercise the control of deviations through correction measures.

1.7 FUNCTIONS OF COST ACCOUNTING

According to Weltemer and Blocker, "Cost accounting is to serve management in the execution of various policies and in comparison of actual and estimated results in order that the value of each policy may be appraised and changed to meet the future conditions".

The following are the main functions of cost accounting:

- (i) To establish various cost centres in the business or industry.
- (ii) To provide necessary data to the management for fixing the selling price.
- (iii) To prepare various reports on wastages, loss of labour, idle capacity of machines so as to improve profitability of business or industry.
- (iv) To ascertain the cost of every product, job or process both in terms of total cost and per unit cost of product.
- (v) To implement various cost control techniques such as budgetary control, historical costing and standard costing.
- (vi) To design suitable system for defining responsibilities and controlling cost.
- (vii) To prepare cost schedules to assist management in decision-making.
- (viii) To prepare cost statements and profit and loss account for giving advice to management.
- (ix) To assist management in the valuation of closing stock of raw materials and work-in-progress so that too much of capital is not locked up in unnecessary inventories.
- (x) To help in supervising the working of punched card accounting or data processing through computers.
- (xi) To organise cost reduction programmes with the help of departmental managers.
- (xii) To organise the internal audit systems to ensure effective working of different departments.
- (xiii) To undertake cost audit programmes as per the directives issued by the central government and the provisions of Indian Companies Act.
- (xiv) To design suitable forms for organising an effective cost system of reporting.

1.8 COST CLASSIFICATION

Costs can be classified according to:

1. General classification
2. Technical classification

1.8.1 General Classification

Generally, the costs are classified as follows:

Product vs. Period Costs

Product costs include all the costs that are involved in acquiring or making product. For a manufacturer, they would be the direct materials, direct labour and manufacturing overhead used in making its products. Product costs are viewed as attaching to units of product as the goods are purchased or manufactured and they remain attached as the goods go into inventory awaiting sale. So initially, product costs are assigned to an inventory account on the balance sheet. When the goods are sold, the costs are released from inventory as expense (typically called Cost of Goods Sold) and matched against sales revenue.

The purpose is to emphasise that product costs are not necessarily treated as expense in the period in which they are incurred. Rather, as explained above, they are treated as expenses in the period in which the related products are sold. This means that a product cost such as direct materials or direct labour might be incurred during one period but not treated as an expense until a following period when the completed product is sold.

Period costs are not included as part of the cost of either purchased or manufactured goods and are usually associated with the selling function of the business or its general administration. As a result, period costs cannot be assigned to the products or to the cost of inventory. These costs are expensed on the income statement in the period in which they are incurred, using the usual rules of accrual accounting that we learn in financial accounting.

Examples: 1. Sales commissions and office rent.
2. Selling and administrative expenses.

The period costs are reported as expenses in the accounting period in which they

1. Best match with revenues,
2. When they expire, or
3. In the current accounting period.

In addition to the selling and general administrative expenses, most interest expense is a period expense.

Direct vs. Indirect Costs

Direct costs are those costs that can be traced to specific segments of operations.

Direct cost of the product can be classified into the following categories:

1. ***Direct Material:*** Direct material which is especially used as a major ingredient for the production of a product.

Examples:

- (a) The wood is a basic raw material for the wooden furniture. The cost of the wood procured for the furniture is known direct material cost.
- (b) The cotton is a basic raw material for the production of yarn. The cost of procuring the cotton is known as direct material for the manufacturing of yarn.

2. ***Direct Labour:*** Direct labour is the cost of the labour which is directly involved in the production of either a product or service.

Example: The cost of an employee, who is mainly working for the production of a product/service at the centre, is known as direct labour cost.

3. ***Direct Expenses:*** Direct expenses which are incurred by the firm with the production of either a product or service. The excise duty and octroi duty are known as direct expenses in connection with the production of goods/articles and so on. Indirect costs are those costs that cannot be identified with particular segments.

4. ***Indirect Material:*** The material which is spent cannot be measured for a product is known as indirect material.

Example: The thread which is used for tailoring the shirt cannot be measured or quantified in specific length as well as ascertained the cost.

5. **Indirect Labour:** Indirect labour is the cost of the labour incurred by the firm other than the direct labour cannot be apportioned.

Example: Cost of supervisor, cost of the inspectors and so on.

6. **Indirect Expenses:** Indirect expenses are the expenses other than that of the direct expenses in the production of a product. The expenses which are not directly part of the production process of a product or service known as indirect expenses.

Examples:

- (a) Rent of the factory, salesmen salary and so on.
- (b) Common costs are shared by multiple segments.

Example: Manufacturer of chairs, Segments - Plastic chairs (P) & Wood chairs (W)

Manufacturing vs. Non-manufacturing Costs

Manufacturing costs are product costs consisting of Direct Material (DM), Direct Labour (DL) and Manufacturing Overhead (MOH, OH)

$$\text{Manufacturing Costs} = \text{DM} + \text{DL} + \text{MOH}$$

Non-manufacturing costs are period costs incurred in selling and administrative activities.

MOH = All indirect manufacturing costs, including

- 1. Indirect materials
- 2. Indirect labour & supervision, maintenance, janitorial services, etc.
- 3. Other services & utilities, supplies, rent, insurance, depreciation, taxes, etc. used in production
- 4. Anything that is related to production (cafeteria, fitness room, etc.)

1.8.2 Technical Classification

Apart from this classification the costs are also classified into various categories according to the purpose and requirements of the firm. Some of the most important classifications are as follows:

- 1. By nature or element or analytical segmentation
- 2. By functions
- 3. Direct and indirect cost
- 4. By variability
- 5. By controllability
- 6. By normality
- 7. By time
- 8. According to planning and control
- 9. For managerial decisions

Now let us understand each of them one by one.

By Nature or Element or Analytical Segmentation

The costs are classified into three major categories Materials, Labour and Expenses.

By Functions

Under this methodology, the costs are classified into various divisions or functions of the enterprise viz., production cost, administration cost, selling & distribution cost and so on.

The detailed classification is that total of production cost sub-classified into cost of manufacture, fabrication or construction.

1. ***Costs of manufacture:*** The cost of materials for packaging, the cost of electricity and water, the cost of promotion and advertising, etc.
2. ***Costs of construction:*** The cost of materials, the cost of equipment, the cost of labour, etc.
 - (a) Cost of transportation
 - (b) Cost of management and co-ordination
 - (c) Depreciation of fixed assets.

And another classification of cost is commercial cost of operations; which is other than the cost of manufacturing and production.

The major components of commercial costs are known as administrative cost of operations and selling and distribution cost of operations.

1. ***Administrative cost of operations:*** Expense incurred in controlling and directing an organization.
2. ***Selling and distribution cost of operations:*** Any cost incurred by a producer or wholesaler or retailer or distributor (as for shipping, etc.)

Direct and Indirect Cost

1. ***Direct cost:*** This classification of costs is incurred for the manufacture of a product or service. They can be conveniently and easily identified.
 - (a) ***Material cost for the product manufacture:*** It includes the direct material for manufacturing.

Example: For garments factory, cloth is the direct material for readymade garments.
 - (b) ***Labour cost for production:*** Labour cost is the cost of the entire labour that is directly involved in the production of a product as well as attributable to single product expenses and so on.
2. ***Indirect cost:*** The costs which are incurred for and cannot be easily identified for any single cost centre or cost unit known as indirect cost.

Indirect material cost, indirect labour cost and indirect expenses are the three different components of the indirect expenses.

- (a) ***Indirect material:*** Indirect materials are materials used in the production process, but which cannot be linked to a specific product or job.

Example: Cost of the thread cannot be conveniently measured for single unit of the product.

- (b) *Indirect labour*: Indirect labour is the cost of any labour that supports the production process, but which is not directly involved in the active conversion of materials into finished products.

Example: Salary paid to the supervisor.

- (c) *Indirect expenses*: All expenses other than direct expenses are assumed as indirect expenses. Indirect expenses are those expenses that are incurred to operate a business as a whole or a segment of a business, and so cannot be directly associated with a cost object, such as a product, service, or customer.

Example: Office rent, telephone expenses, factory rent, materials management executives' salaries etc.

By Variability

The costs are grouped according to the changes taken place in the level of production or activity.

It may be classified into three categories:

1. **Fixed cost**: It is the cost which does not vary irrespective level of an activity or production.

Example: Rent of the factory, salary to the manager and so on.

2. **Variable cost**: It is a cost which varies in along with the level of an activity or production like material consumption and so on.

Example: The fuel for an airline. The cost for it changes with the number of flights and how long the trips are.

3. **Semi-variable cost**: It is a cost which is fixed up to certain level of an activity. Later it fluctuates or varies in line with the level of production. It is known, in other words, as step cost.

Example: Electricity charges

Labour costs in a factory are semi-variable. The fixed portion is the wage paid to workers for their regular working hours. The variable portion is the overtime pay they receive when they exceed their regular working hours.

By Controllability

The costs, which are classified into two categories in accordance with controllability, are as follows:

1. **Controllable costs**: Cost which can be controlled through some measures known as controllable costs. All variable costs are considered to be controllable in segment to some extent.
2. **Uncontrollable costs**: Costs which cannot be controlled are known as uncontrollable costs. All fixed costs are very difficult to control or bring down; they rigid or fixed irrespective to the level of production.

By Normality

Under this methodology, the costs which are normally incurred at a given level of output in the conditions in which that level of activity normally attained.

1. **Normal cost**: It is the cost which is normally incurred at a given level of output in the conditions in which that level of output is normally achieved.
2. **Abnormal cost**: It is the cost which is not normally incurred at a given level of output in the conditions in which that level of output is normally attained.

Normal cost for a defined-benefit pension plan generally represents the portion of the economic cost of the participant's anticipated pension benefits allocated to the current plan year.

Abnormal cost may be unexpected costs incurred, as a result of natural calamities or fire or accident or such other losses.

By Time

According to this classification, the costs are classified into historical costs and predetermined costs:

1. **Historical costs:** The costs are accumulated or ascertained only after the incurrence known as past cost or historical costs.
2. **Predetermined costs:** These costs are determined or estimated in advance to any activity by considering the past events which are normally affecting the costs.

According to Planning and Control

The following are the two major classifications, viz., standard cost and budgetary control:

1. **Standard cost:** Standard cost is a cost scientifically determined by way of assuming a particular level of efficiency in utilization of material, labour and indirect expenses.

The prepared standards are compared with the actual performance of the firm in studying the variances in between them. The variances are studied and analysed through an exclusive analysis.

2. **Budget:** A budget is a detailed plan of operation for some specific future period. It is an estimate prepared in advance of the period to which it applies. It acts as a business barometer as it is complete programme of activities of the business for the period covered.

The control is exercised through continuous comparison of actual results with the budgets. The ultimate aim of comparing with each other is to either to secure individuals' action towards the objective or to provide a basis for revision.

For Managerial Decisions

The major classifications are marginal cost and sunk cost.

Marginal cost is the amount at any given volume of output by which aggregate costs are changed if the volume of output is decreased or increased by one unit.

Sunk costs are costs that cannot be recovered once they have been incurred.

Examples:

Marginal Cost: Suppose it costs ₹ 1000 to produce 100 units and ₹ 1020 to produce 101 units. The average cost per unit is ₹ 10, but the marginal cost of the 101 unit is ₹ 20.

Sunk Cost: Total spending on advertising or researching a product idea.

They can be a barrier to entry. If potential entrants would have to incur similar costs, which would not be recoverable if the entry failed, they may be scared off.

1.9 ELEMENTS OF COST

The correct interpretation of the term 'Cost' may also be understood by having knowledge about basic elements of cost.

These elements have been shown in the following figure:

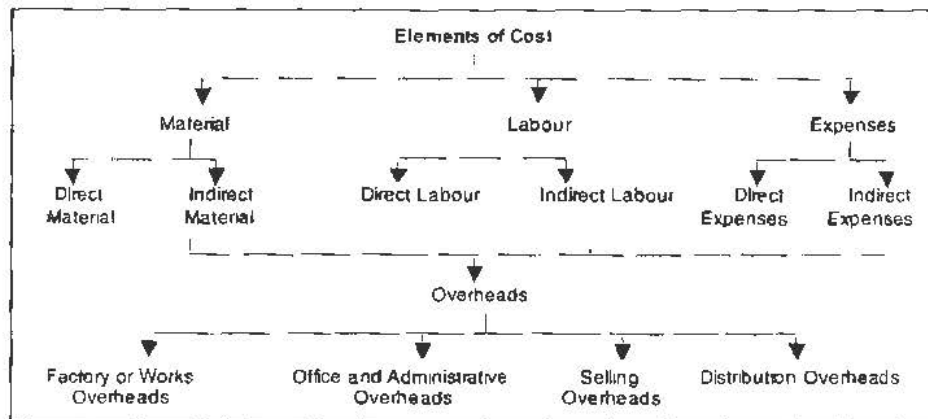


Figure 1.1: Elements of Cost

The following is the brief description of these elements of cost:

1.9.1 Material

Direct Material

To obtain the materials that will be converted into the finished product, the manufacturer purchases raw materials. Raw materials are the basic materials and parts used in the manufacturing process. For example, car manufacturers such as Maruti Udyog and Tata Motors use steel, plastics, and glass as raw materials in making cars. Raw materials that can be physically and directly associated with the finished product during the manufacturing process are called direct materials. Examples include flour in the making of bread, steel in the making of cars, etc. Direct materials for HP in making computers include plastic, hard drives, processing chips, etc.

$$\text{Direct material} = \text{Opening stock} + \text{Purchases} - \text{Closing stock}$$

Indirect Material

Some raw materials cannot be easily associated with the finished product. These are considered indirect materials. Indirect materials (1) do not physically become part of the finished product, such as lubricants and polishing compounds, or (2) cannot be traced because their physical association with the finished product is too small in terms of cost, such as nails and Fevicol (as per the previous example). Indirect materials are treated as part of manufacturing overhead.

1.9.2 Labour

Direct Labour

The work of factory employees that can be physically and directly associated with converting raw materials into finished goods is considered direct labour.

Indirect Labour

In contrast, the wages of maintenance people, time-keepers, and supervisors are usually identified as indirect labour. Their efforts have no physical association with the finished product, or it is impractical to trace the costs to the goods produced. Like indirect materials, indirect labour is also treated as manufacturing overhead.

1.9.3 Expenses

Direct Expenses

Apart from material and labour, many a times there is need to insert some specific expenses such as production royalties to be paid to the holders of manufacturing/patent rights, hire/purchase of certain special machine tools for one-time jobs etc. This category of cost is termed as direct expenses.

Indirect Expenses

Indirect expenses consist of costs that are indirectly associated with the manufacture of the finished product. These costs may also be manufacturing costs that cannot be classified as direct materials or direct labour. Indirect expenses include indirect materials, indirect labour, depreciation on factory assets, etc.

1.9.4 Overhead

The term overhead includes indirect material, indirect labour and indirect expenses. Thus, all indirect costs are overheads.

A manufacturing organisation can broadly be divided into the following three divisions:

- Factory or works, where production is done
- Office and administration, where routine as well as policy matters are decided.
- Selling and distribution, where products are sold and finally dispatched to customers.

Overheads may be incurred in a factory or office or selling and distribution divisions. Thus, overheads may be of three types:

Factory Overheads

They include the following things:

- Indirect material used in a factory such as lubricants, oil, consumable stores, etc.
- Indirect labour such as gatekeeper, timekeeper, works manager's salary, etc.
- Indirect expenses such as factory rent, factory insurance, factory lighting, etc.

Office and Administration Overheads

They include the following things:

- Indirect materials used in an office such as printing and stationery material, brooms and dusters, etc.
- Indirect labour such as salaries payable to office manager, office accountant, clerks, etc.
- Indirect expenses such as rent, insurance, lighting of the office, etc.

Selling and Distribution Overheads

They include the following things:

- Indirect materials used such as packing material, printing and stationery material, etc.
- Indirect labour such as salaries of salesmen and sales manager, etc.
- Indirect expenses such as rent, insurance, advertising expenses, etc.

1.10 COMPARISON BETWEEN FINANCIAL ACCOUNTING AND COST ACCOUNTING

The cost accounting is very closely-related to financial accounting. Few authorities of accounting consider cost accounting to be the branch of financial accounting. But it may be said that cost accounting is complementary to financial accounting. Financial accounting and cost accounting are both similar in various ways. The main relationship between financial accounting and cost accounting is given as under:

1. The fundamental principles of double entry system are applicable in financial accounting as well as cost accounting.
2. The results of business or organisation are revealed by both the systems of accounts.
3. The determination of future business activities and policy is guided by both accounting systems.
4. A basis for comparison of expenditures is being provided by both the accounting systems.
5. The invoices and vouchers constitute the common basis for recording transactions under both the systems of accounting.
6. The causes for losses and wastages of a business or industry are provided by financial and cost accounting.

The main differences between financial accounting and cost accounting are shown in Table 1.1:

Table 1.1: Differences between Financial Accounting and Cost Accounting

Basis of Differences	Financial Accounting	Cost Accounting
Purpose and Objective	The purpose and objective of financial accounting is external reporting mainly to owners, creditors, tax authorities, government and investors.	The purpose and objective of cost accounting is internal reporting to management.
Maintenance of Accounts	This is to be maintained compulsorily by firms of business organisations. The preparation of accounts must be in accordance with the statutory provisions of Companies Act and Income Tax Act.	Cost accounting is maintained voluntarily. In some cases government has directed some companies to maintain cost accounts to improve efficiency of business or industry.
Profit Analysis	Financial accounting discloses profit for the entire business as a whole.	Cost accounting shows the profit for each product, process or operation.
Recording	It classifies, records and analyses the transactions in a subjective manner, i.e., according to the nature of expenses.	Cost accounting records the expenditure in an objective manner, i.e., according to purpose for which costs are incurred.
Use of Control Techniques	It does not make use of any type of control techniques.	It makes use of some important control techniques such as Marginal Costing, Historical Costing, Budgetary Control, Standard Costing, etc., in order to control cost.
Stock Valuation	Stock is valued at cost or market price whichever is low.	Stock is always valued of cost price.
Pricing Policy	It fails to guide the formulation of pricing policy.	It provides adequate data for formulating of pricing policy.
Facts and Figures	Financial accounting deals mainly with actual facts and figures.	Cost accounting deals partly with facts and figures and partly with estimates.

Contd...

Duration of Information Reporting	Generally, financial accounting provides financial information once a year.	Cost accounting furnishes cost data at frequent intervals i.e., reports are daily, weekly and monthly.
Evaluation of Efficiency	The information provided by financial accounting is not sufficient to evaluate the efficiency of the business activities.	The cost data helps in evaluating the efficiency of the business activities.

1.11 LIMITATIONS OF COST ACCOUNTING

Cost accounting like other branches of accountancy is not an exact science but is an art which has developed through various theories and accounting practices based on reasoning and common sense. Many theories can be proved or disproved in the light of conventions and basic principles of cost accounting. The following are the main limitations of cost accounting:

- (i) **System is more Complex:** As the cost accounting system involves number of steps in ascertaining of cost such as collection and classification of overheads, allocation and apportionment of overheads, it is considered to be complicated system of accounts. Moreover the system makes use of several documents and forms in preparing the reports. This will tend to delay in the preparation of accounts.
- (ii) **Lack of Accuracy:** The accuracy of cost accounting gets distorted owing to the use of various costs such as standard cost, marginal cost, estimated cost, etc.
- (iii) **It is Expensive:** The system of cost accounting involves additional expenditure to incur in installing and maintaining it. However, before installing it, care must be taken to ensure that the benefits derived are more than the investment made on this system of counting.
- (iv) **It lacks Social Accounting:** Cost accounting fails to take into account the social obligation of the business or organisation. In other words, social accounting is outside the purview of cost accounting.
- (v) **Not Suitable for Small Units:** A cost accounting system is applicable only to a large business enterprise but not to a small scale one. Hence, there is a limitation to its application to all types of business enterprises.
- (vi) **Implementation of Same Costing Method and Technique:** All business enterprises cannot make use of a single method and technique of costing. It all depends upon the nature of business and type of product manufactured by it. If a wrong method and technique is used, it misleads the results of business.

Check Your Progress

Fill in the blanks:

1. _____ can be defined as the value attributed to a resource.
2. _____ costing is suitable method for the industries, which render service rather than manufacturing of goods.
3. Direct costs are those costs that can be traced to specific segments of _____.
4. _____ is the cost of the labour which is directly involved in the production of either a product or service.
5. _____ is cost which do not vary irrespective level of an activity or production.
6. The wages of maintenance people, time-keepers, and supervisors are usually identified as _____.

1.12 LET US SUM UP

- Cost accountancy is the combination of both the applications of costing and cost accounting principles, methods, techniques to science, art and practice of cost control and ascertainment of profitability. Cost denominates the use of resources only in terms of monetary terms.
- The scope of the cost accounting could be classified into three major segments viz., cost ascertainment, cost accounting and cost control.
- The methods of costing are normally classified into two major categories viz. specific order costing and operation costing.
- The various techniques of costing, nothing but vital tools of ascertaining costs, are uniform costing, marginal costing, historical costing, direct costing, absorption costing and standard costing.
- The costs are classified into various categories according to the purpose and requirements of the firm. Some of the most important classifications are according to functions, direct and indirect cost, according to variability, according to controllability, according to normality, according to time, according to planning and control, according to managerial decisions, differentials, incremental or decrement cost and opportunity cost.

1.13 UNIT END ACTIVITY

Identify the key statements prepared under financial and cost accounting and prepare the proforma of all the relevant statements.

1.14 KEY WORDS

Operation Costing: This is a suitable method of costing for the industries, which manufacture the standard or identical products.

Historical Costing: It is another technique of costing through which the costs of the yester horizon are ascertained.

Absorption Costing: It is unlike the marginal costing technique, includes the fixed cost of operations along with the variable cost of production.

Indirect Material: Cost of the thread cannot be conveniently measured for single unit of the product.

Indirect Labour: Salary paid to the supervisor.

Fixed Cost: It is the cost, which does not vary irrespective level of an activity or production, rent of the factory, salary to the manager and so on.

Variable Cost: It is the cost, which varies in along with the level of an activity or production.

Predetermined Costs: These costs are determined or estimated in advance to any activity by considering the past events, which are normally affecting the costs.

1.15 QUESTIONS FOR DISCUSSION

1. Define cost and cost accounting.
2. Define direct cost.
3. Define indirect cost.
4. Explain the various components of the indirect cost.

5. Critically evaluate the relationship between cost accounting and financial accounting.
6. How will you determine the scope of cost accounting?
7. Illustrate indirect and direct expenses with the help of suitable examples.
8. Once standard costs are established, what conditions would require the standards to be revised? Give your opinion.
9. What is cost classification? Classify it in detail.
10. Illustrate the different types of costs with suitable examples.
11. Briefly write a note on key elements of cost.
12. What are the limitations of cost accounting?

Check Your Progress: Model Answer

1. Cost
2. Service
3. Operations
4. Direct labour
5. Fixed cost
6. Indirect labour

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UNIT 2

MATERIAL COSTING

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2.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Discuss the classification of materials
- Understand the material control
- Explain the purchasing procedure
- Discuss the storekeeping
- Explain the techniques of inventory control
- Learn the setting of stock levels
- Explain the concept of EOQ
- Describe the methods of pricing materials issues

2.1 INTRODUCTION

Material is a very important factor of production in a manufacturing organisation. It is the first and the most important element of cost. Materials account for nearly 50-60 % of the cost of production. This fact can be inferred from an analysis of the financial statements of a large number of organisations.

Uninterrupted supply of materials of acceptable quality and in required quantity as and when required by the production department is a pre-requisite for carrying out production activities smoothly, because the non-availability of materials will bring the entire production activities to a standstill. And, the implications of production stoppage are very well-known. Further, the cost of materials forms a major part of total cost of production and sales as it ranges from 50-60% depending upon the nature of industries. Besides, this element of cost provides a number of avenues for cost control such as at the time of purchase, during the process of manufacturing. Hence, greater emphasis is to be laid on the control of material and material cost as the success of any company depends, to a greater extent, upon the efficient purchase, storage and usage of materials.

2.2 CONCEPT OF MATERIAL

Material is the first and most important element of cost. In most of the manufacturing organizations, material forms the single largest component of cost. The term material simply means any commodity or substance which is processed in a factory in order to be converted into finished product. Materials may be classified as follows: Raw Materials are the basic materials supplied in crude form to be used for production, e.g., jute cotton, steel, timber, rubber, coal, etc.

Components are not raw in nature rather are finished parts made out of raw materials which are assembled to make the finished product, e.g., tyres and tubes in cycle industry, stabilizers in A.C. and fridge manufacturing, batteries in car manufacturing, monitors in computer manufacturing, etc. Tools are the appliances used in the manufacturing operations, e.g., hammers, screw drivers, drills, milling cutters, etc. Spare parts are used for the maintenance of plant, machinery and buildings and for smooth running of production schedule.

Consumable stores are the items used for smooth running of the machines, e.g., lubricants, oil, cotton waste, rags, brooms, etc. The materials include both direct and indirect materials. Both direct and indirect materials are treated as stores items, whereas stock of finished goods is not treated as a stores item. Direct and indirect

materials purchased for stock purpose to be issued to different jobs work orders or departments as and when required are known as stores. On the other hand, finished goods are treated as stock. We may also refer to the commonly used term inventory which includes the stock not only of raw materials but also stores and spares, work-in-progress and finished goods. Thus stock of materials is only a part of the inventory held by a manufacturing unit.

2.3 CLASSIFICATION OF MATERIALS

One of the important functions of the storekeeper in the stores department is the classification and codification of materials. Classification refers to grouping of materials into three or four categories on the basis of material nature. And codification refers to the procedure of assigning symbols to each item of material stored. Since the symbols are shorter and simple and they are used in names of materials. There are a number of methods of codification of the materials. The following are the main methods of codification of materials:

(i) Numerical Method,

(ii) Alphabetical Method, and

(iii) Decimal Method.

(i) **Numerical Method:** Under this method, materials are codified with the help of the numbers such as,

Material X : 101

Material Y : 102

Material Z : 103

(ii) **Alphabetical Method:** Under this method, each material will be allotted an alphabet such as,

Plastic Material : X

Glassware : AB

Rubber Materials : KLM

(iii) **Decimal Method:** Decimal method is similar to numerical method. Under this method, decimals are used to codify the different types of materials such as,

Plastic Material X1 : 101.1

Plastic Material X2 : 101.2

Plastic Material X3 : 101.3

2.4 PURCHASING FUNCTION

Material cost is a major portion of production cost. This material cost can significantly be reduced by acquiring the right quantity, of the right quality, for the right price, at the right time and from the right sources. Decision of the manager of purchase with respect to each of these aspects will have a significant effect not only on the regularity in production but also on both the qualities of the end product and the cost of materials, cost of production, cost of sales and therefore, on the profit and profitability. Hence, purchase function plays a pivotal role. In this regard, the top management of the organization has to take an important decision.

2.4.1 Purchase Department

Purchases are made by the purchase department. The purchase department plays a very important role in an organisation because purchasing has its effect on every vital factor concerning the manufacture, quality, cost, efficiency and prompt delivery of goods to customers. Its function is to procure materials, services, machines and tools at the most favourable terms consistent with maintaining the desired standard of quality. Purchasing is the most important function of materials management as the moment an order is placed for the purchase of materials a substantial part of the company finance is committed which affects cash flow position of the company. Thus if the size of a business concern permits there should be a separate purchasing department. The head of this department is usually known as the purchase manager or the supply manager or the chief buyer. Following are the basic objectives behind establishing a separate purchasing department:

- To make continuous availability of materials so that there may be uninterrupted flow of materials for production;
- To make purchases competitively and wisely at the most economical prices;
- To make purchases in reasonable quantities to keep investment in materials at minimum;
- To purchase proper quality of materials to have minimum possible wastage of materials and loss in production;
- To develop alternate sources of supply so that materials may be purchased from those alternate sources if a particular supplier fails to supply the materials;
- To adopt the most advantageous method of purchases to ensure smooth delivery of materials from suppliers and to avoid the risk of any dispute or financial loss; and
- To serve as an information centre in the materials knowledge relating to prices, sources of supply, specifications, mode of delivery, etc.

To sum up the basic objective of setting up a separate purchase department is to ensure continuous availability of requisite quality of materials to avoid hold up of production and loss in production and at the same time reduce the ultimate cost of the finished product.

2.4.2 Purchase Procedure

A systematic and well-defined procedure is to be followed to make the purchase of materials as any lapse in the procedure may result in the stoppage of production whose ill-effects are incalculable. The purchasing department follows the following purchase procedure:

- (i) Purchase Requisitions or Indenting for Materials,
 - (ii) Selection of Suppliers or Choosing the Suppliers,
 - (iii) Purchase Order,
 - (iv) Receiving and Inspecting Materials, and
 - (v) Verification/Checking and Passing of Bills for Payment.
- (i) **Purchase Requisitions:** The purchase department initiates actions for the purchase of materials only after the receipt of purchase requisitions from the storekeeper. The purchase requisitions are prepared by the officers who need the materials for production and other activities of business and will be sent to the purchase department for making purchases. Of the parties who prepare the

purchase requisitions, storekeeper is the important functionary. Further, he prepares the purchase requisitions on the basis of bills of materials received from the competent authorities. If the materials listed in the bill of materials are not available in the store in adequate quantity, the storekeeper will prepare the purchase requisition.

On the basis of the stock levels and/or bills of materials, the storekeeper prepares the purchase requisition in triplicate copies. The original copy is sent to the purchase department, duplicate copy to the production control department and the third copy to be retained in the stores department itself for its office record. The format of the purchase requisition is given below:

Kartik Company Limited				
Purchase Requisition				
No.: É É É É		Date: É É É É		
S. No.	Material Code No.	Description of Articles	Quantity Required	Remarks
Requested by: É É É É Checked by: É É É É Approved by: É É É É				
For Use by Purchase Department				
Date	Purchase Order Number	Name of Suppliers	Delivery Date of Materials	Remarks (if any)
Signature of Purchase Manager/Officer				

Figure 2.1: Format of a Purchase Requisition

The storekeeper must be very careful while preparing the purchase requisition. Because, any lapse on the part of the storekeeper may put the company into a very sizable loss.

- (ii) **Selection of Suppliers:** Once the purchase department receives the purchase requisition, it has to take necessary steps to purchase the required materials. The first step in this regard is to decide about the supplier(s) to whom purchase order may be sent. For selection purpose, it has to examine its records about the previous performances of suppliers who had supplied materials to the company and also the suppliers who have been supplying the materials to the company. Further, it has to update the list of suppliers by collecting the information about the new suppliers. After that, the purchase department has to decide about whether the quotations are to be invited only from one source of supply, or from a very few selected sources of supply, or from all sources of supply through advertisement. On the receipt of tenders in sealed envelopes which will be opened and a comparative statement of all the quotations will be prepared. This statement

is called comparative statement of quotations. The specimen forms of comparative statement of quotations are as follows:

Kartik Company Limited							
Comparative Statement of Quotation							
Material: É É É É É .				Date: É É É É É .			
Tender No.: É É É É É .							
Serial No.	Name of the Suppliers	Quantity	Rate or Price	Date of Delivery	Terms of Delivery	Other Terms	Remarks (If any)

Figure 2.2: Comparative Statement of Quotations

Usually, the purchase department selects the supplier who has quoted the lowest price and if he satisfies the other conditions. If the purchase department wants to deviate from this method of selecting the lowest quoted supplier, supporting reasons are to be given in the comparative statement of quotations.

- (iii) **Purchase Order:** After choosing the supplier, the purchase department will prepare the purchase order to be placed with the supplier. The purchase order is in the form of an agreement with the suppliers which binds both the purchaser and supplier. Because, when the order is placed, the supplier is bound to supply the necessary materials as per the terms and conditions of the order. On the other hand, the purchase order also binds the purchase manager to accept the delivery of necessary materials and to make necessary arrangement for payments, because it is the purchase manager who has placed the order. A figure of the purchase order is given below:

Kartik Company Limited						
Purchase Order						
To,			Purchase Reg. No. : É É É É É .			
The Supplier,			Date : É É É É É .			
É É É É É .			Quotation No. : É É É É É .			
É É É É É .			Purchase Order No. : É É É É É .			
Dear Supplier,						
Your Quotation No. É É É É É . dated É É É É É . has been accepted. Hence you are requested to supply the following materials in accordance with the terms and conditions.						
Serial No.	Description of Materials	Quantity	Rate or Price	Amount ()	Delivery Date	Remark (If any)
Place of Delivery : É É É É É .						
Terms of Payment : É É É É É .						
Packing Charges : É É É É É .						
Excise Duty : É É É É É .						
Other Conditions : É É É É É .						
For Kartik Company Limited						
Signature of Purchase Manager						

Figure 2.3: Purchase Order

Five copies of the purchase order will be prepared by purchase manager, one each to the supplier, storekeeper, receiving and inspection department, accounts department and to the office record of the purchase department itself.

(iv) **Receiving and Inspecting of Materials:** In large organisation, a separate receipt and inspection department independent of stocking locations should be set up to receive and inspect the materials. But in small unit, the work of receiving the materials may be entrusted to the storkeeper. However, these two receiving and inspection are important functions. The receiving department receives, unloads, unpacks and marks the materials. It also checks the quantity of materials received and compares it with the quantity mentioned in the purchase order. Any difference between the quantity ordered and the quantity received will be recorded in the remarks. On the basis of this, receiving department will prepare the materials received note in the following format:

Kartik Company Limited Materials Received Note						
From:		Purchase Order No. & Date. E E E E E E E ...				
The Supplier		Delivery Note No. & Date : E E E E E E E ...				
E E E E E E E E		Date : E E E E E E E				
E E E E E E E E						
Item No.	Description of Materials	Code No.	Quantity			Remarks (If any)
			Ordered	Received	Diff.	
Received by: E E E E E E E ...			Checked by: E E E E E E E ...			

Figure 2.4: Material Received Note

Any shortage will be noted in materials received and brought to the notice of the purchase department or manager which will take up the matter with the supplier. In the same way, excess supplies may be either retained or returned to the supplier by the storekeeper of the purchase department. Receiving department will prepare five copies of the materials received note D one each to purchase department, accounts department, storekeeper, inspection department, and to the file of the receiving department itself.

The important function of the inspection department is to check the quality and specifications of materials received as per purchase order. After the completion of inspection, the inspection department will prepare its report called materials inspection report mentioning clearly the quality of materials received and inspected and the reasons for the rejection or shortage of material, if any. Inspection report will be prepared in four copies & one each to purchase

department, stores department, accounts department and for the file of inspection department itself.

A format of the materials inspection report is as follows:

Kartik Company Limited Materials Inspection Report						
From:		GR Note No.				
The Supplier.		Purchase Order No.				
.		GIR No.				
.		Date				

Item No.	Description of Materials	Code No.	Quantity			Reasons for Rejections
			Received & Inspected	Passed	Rejected	

Inspected by:	Special Remarks:
-------------------------	----------------------------

Figure 2.5: Materials Inspection Report

On the basis of the materials, received note and the materials inspection report, the purchase department will initiate steps for the discrepancies in the material received. In case the invoice sent by the supplier includes the cost for materials not received, then the purchase department will issue a note called material debit note to the supplier and the accounting department will be informed to make the payment only for the actual quantity of materials received.

- (v) **Verification/Checking and Passing of Bills for Payment:** When the invoice is received from the supplier, it is sent to the stores accounting section to check both the authenticity as well as the arithmetical accuracy. The quantity and price mentioned in the invoice are checked with reference to stores received note and the purchase order respectively. For a comprehensive verification, the purchase department has to take into consideration the purchase order, materials received

note, materials inspection report, materials returned note, etc. After this scrutiny, if the invoice is found to be correct by the purchase department, then a suitable endorsement is to be made by the purchase department to this effect and it is to be passed on to the accounts department for payment. A format of invoice is given as under:

ABC Company Invoice					
To, The Purchase Manager Purch. Ord. No.: É É É É Delivery Note No.: É É É .. Kartik Company Ltd., Date: É É É É É É É É Date of Dispatch: É É É É .. Invoice No.: É É É É É É Date: É É É É É É ..É É É É					
Item No.	Description of Materials	Quantity	Rate or Price	Amount ()	Remarks (If any)
Signature of Supplier					
Purchase Department (it may use overleaf of invoice or a separate sheet may be used)					
Purchase Order No. & Date: É É Details of Debit or Credit Note No.: É É É É É É É É .. G R. No. & Date: É É É É É Delivery Note No.: É É É É É É É É É É É É É É .. Ins. Rep. No. & Date: É É É Passed for Payment of : É É É É É É É É ÉÉ É .. Checked by: É É É É É É É ..					
Signature of Purchase Manager					

Figure 2.6: Invoice

2.5 STOREKEEPING

Storekeeping is the next important aspect of materials management after the completion of purchase procedure.

A storehouse is a building provided for preserving materials, stores and finished goods. The in-charge of store is called storekeeper or stores manager. The organisation of the stores department depends upon the size and layout of the factory, nature of the materials stored and frequency of purchases and issue of materials.

According to Alford and Beatty, "*Storekeeping is that aspect of material control concerned with the physical storage of goods.*" In other words, storekeeping relates to art of preserving raw materials, work-in-progress and finished goods in the stores.

2.5.1 Objectives of Storekeeping

The main objectives of storekeeping are to:

- ensure uninterrupted supply of materials and stores without delay to various production and service departments of the organisation.
- prevent over and under stocking of materials,

- protect materials from pilferage, theft fire and other risks,
- minimise the storage costs,
- ensure proper and continuous control over materials,
- ensure most effective utilisation of available storage space and workers engaged in the process of storekeeping.

2.5.2 Functions of Storekeeping

The main functions of storekeeping are as follows:

- Issuing purchase requisitions to Purchase Department as and when necessity for materials in stores arises.
- Receiving purchased materials from the purchase department and to confirm their quality and quantity with the purchase order.
- Storing and preserving materials at proper and convenient places so that items could be easily located.
- Storing the materials in such a manner so as to minimise the occurrence of risks and to prevent losses due to defective storage handling.
- Issuing materials to various departments against material requisition slips duly authorized by the respective departmental heads.
- Undertaking a proper system of inventory control, taking up physical inventory of all stores at periodical intervals and also to maintain proper records of inventory.
- Providing full information about the availability of materials and goods, etc., whenever so necessary by maintaining proper stores records with the help of bin cards and stores ledger, etc.

2.5.3 Stores Department

To further strengthen material control purchase control must be matched by equally effective stores control to avoid losses from misappropriation, damage, deterioration, evaporation and carelessness. The investment in materials constitutes a major portion of current assets, so there should be a separate care for it. It is an amazing fact that in many industrial organisations while a most rigid control over cash exists, little or not attention is paid to materials. It is amount of cash so it is desirable materials to become cash on the sale of the finished products represent an equivalent amount of cash so it is desirable to have an efficient and well equipped stores department to exercise an effective material control.

The location of the stores department should be carefully planned out and it should be housed in a position which is very near to the receiving department so that transportation charges are at a minimum. At the same time, there should be an easy access to all other department of the factory roads, railway siding and wharf so that the minimum expense is incurred in unloading. It is very important that bulky and heavy stores should be stationed nearest to the department requiring them in order to minimize the layout and transportation charges. In this way, planned location of the stores department will avoid delay in the movement of material to the department in which these are needed.

The layout of the stores department needs careful consideration. The store should be divided into racks which should be further sub-divided into small spaces. All these spaces are known as bins and for one item of material, one bin is allotted. Bin is not necessarily a space on a rack but it really means any place where material is kept.

All bins should be serially numbered. For example, for bulky and heavy material a big hall can be treated as one bin.

Special attention must be paid to storage of materials which are liable to leakage or evaporation or deterioration due to atmospheric conditions. The building of the stores department should be properly constructed from the point of view of avoiding loss due to damage and pilferage. Moreover all the materials needed in a department should be kept side by side or systematic way.

2.5.4 Types of Stores

There are two types of stores:

- 1 **Centralised Store:** Under this system, a single store is there for the whole organisation. It ensures the following:
 - (a) Better layout and control of stores.
 - (b) Economical use of storage space.
 - (c) Saving in storage costs and appointment of experts for handling storage problems.
 - (d) Continuous stock checking.
 - (e) Apart from various benefits, centralised stores suffer from certain drawbacks also.
 - (f) It leads to higher cost of materials handling.
 - (g) Delay in issue of materials to respective departments.
 - (h) Exposure of materials to risks of fire and accident losses is practical difficulties in managing big stores.
- 2 **Decentralised Store:** Under this system, independent small stores are attached to various departments. It involves the following:
 - (a) Lesser costs and time in moving bulky materials to distant departments.
 - (b) Helpful in avoiding overcrowding in central store.
 - (c) However, it too suffers from certain drawbacks viz.,
 - (i) uniformity in storage policy of goods cannot be achieved under decentralised storekeeping,
 - (ii) more staff is needed and experts may not be appointed.

2.5.5 Working of the Stores

There are four sections in the process of storekeeping viz.

- 1 **Receiving Section:** There are four kinds of inventories received by stores viz.,
 - (a) Raw materials,
 - (b) Stores and supplies.
 - (c) Tools and equipment, and
 - (d) Work-in-progress or semi-finished goods.

Under mentioned procedure is followed in receiving these inventories:

- (a) Receiving these incoming materials in stores.
- (b) Checking and inspection of these incoming materials and stores, etc.

- (c) Recording the incoming materials in goods received book.
 - (d) Preparing and forwarding goods inwards note to purchasing section.
 - (e) Informing the purchase department about damaged and defective goods and surplus or deficit supplies, etc. along with rejection forms and notes.
 - (f) Returning damaged or defective goods to the suppliers in accordance with the instructions of the purchase department.
 - (g) Forwarding the materials to respective stores and locations where these are to be stored or preserved.
- 2 **Storage Section:** The store room should be located at a convenient and appropriate place. It should have ample facilities to store the materials properly viz., bins, racks and shelves, etc. There can be a single store room in case of a small organisation, but a large scale concern can have different or multiple stock rooms in addition to general or main store.
- The separate stockrooms may be used for different classes of inventories. The material should be stored in such a manner as to protect it against the risks of damage, destruction and any kind of loss. Each article should have identifying marks viz., stamping, embossing, colour, coding or/and painting, etc. These marks are very useful in locating or identifying an article in the stores.
- 3 **Accounting Section:** This section is concerned with keeping proper records with regard to receipt and issue of materials. The primary task of this section is to undertake the process of inventory control.
- 4 **Issue Section:** The materials should be issued to respective departments on receiving duly authorised requisition slips. An entry should be made immediately on the bin card attached with the bin from where the material has been issued.

Bin cards contain valuable information with regard to receipt and issue of materials, which is greatly helpful in exercising a system of inventory control. These cards are further helpful in determining various levels of materials viz., maximum, minimum, and re-ordering level.

2.6 METHODS OF VALUING MATERIAL ISSUES

The success of any industry or enterprise depends, to a greater extent, upon the successful control of inventory. Further, this input provides a number of avenues and wide scope for improvement of overall performance of the industry. Inventory control, therefore, aims at ensuring the availability of required quality material in required quantity, at required time or period and place with minimum cost. Inventory involves investment of money and locking up of precious space which has alternate uses. It is said that inventory is a necessary evil. As a result, proper control has to be exercised over it. In controlling inventory, firms or industries use a number of techniques and models. Inventory control is generally exercised over raw materials and work in progress. The basic purpose of inventory control is to maintain optimum level of inventory.

Different methods available for pricing the material issues are presented in the figure. Some of the more commonly used methods of pricing material issues are discussed below:

2.6.1 First-in-First-out Method (FIFO)

This method which is popularly known as FIFO method is based on the assumption that the units which are acquired first are issued first. The materials are issued in order of their purchases and at the price of the original purchase.

This method uses the price of first batch received from all issues until all units from this batch have been issued after which the price of the next batch received becomes the issue price. Upon that batch being fully issued the price of the next batch received is used, and so on.

Advantages of FIFO Method

The main advantages of this method are given below:

- (a) The method is very simple and it is easy to operate.
- (b) It is claimed that since the materials are charged into production at actual cost in order of receipt.
- (c) It is more accurate method.
- (d) It is also realistic since items are issued to shop in order of receipt
- (e) Valuation of stock balance is a fair commercial value.

Disadvantages of FIFO Method

This method suffers from the following disadvantages:

- (a) It is cumbersome and shows inflated profits during a period of rising prices.
- (b) This method can, therefore, be used satisfactory where the following conditions exist:
 - (i) Where inventories turn over rapidly, and
 - (ii) Where the inventory is not a major factor in the profit or current asset situation.

2.6.2 Last-in-First-out Method (LIFO)

Under this method, it is presumed that latest receipts are used first. The cost of the last lot of materials received is used to price requisition until that consignment is exhausted. Then, the next lot pricing is used and so on through successive lots. This method, thus, takes note on fluctuations in price.

This method uses the price of the last batch received for all issues until all units from this batch have been issued, when the price of the previous batch received is used. Usually, however, a new delivery received before the first batch is fully issued, in which case the new delivery price becomes the Last-in-First-out price and is used for pricing issues until either the batch is exhausted or a new delivery received. In this case, there are two points to be noted:

- 1 The method can result in many batches being only partially written off
- 2 This is a book-keeping method and must not be confused with the physical method of issue used by the storekeeper, who will always issue the oldest stock first.

Advantages of LIFO Method

The following advantages are claimed for LIFO method:

- (a) It tends to level profits and losses during periods of rising and falling prices.
- (b) This method is also quite simple to operate, particularly when prices are fairly steady.
- (c) It keeps value of issues close to current economic values.

Disadvantages of LIFO Method

The main disadvantages of this method are mentioned below:

- (a) It is cumbersome and shows out of date figures in the balance sheet.
- (b) Valuation of stock balance may not be acceptable for income-tax purposes.
- (c) This method can be used satisfactorily where following conditions exist:
 - (i) Price fluctuations are considerable for most of the materials, and
 - (ii) The relative value of materials is large in comparison to the total cost of the product.

Example: Mahesh and Sons have purchased the material as under:

Jan. 3, 2006	500 kg. of crude oil @ ₹ 2 per kg.
Jan. 18, 2006	350 kg. of crude oil @ ₹ 3 per kg.
Jan. 25, 2006	600 kg. of crude oil @ ₹ 2.50 per kg.
Feb. 4, 2006	500 kg. of crude oil @ ₹ 2.75 per kg.

Issues therefrom are as under:

Jan 19, 2006	600 kg. of crude oil
Jan. 27, 2006	450 kg. of crude oil
Feb. 5, 2006	500 kg. of crude oil
Feb. 7, 2006	150 kg. of crude oil

Prepare the Stores Ledger Account using the following methods of pricing materials issue.

- (a) First in-First-out method, and
- (b) Last-in-First-out method.

Solution:

(a) FIFO Method:

Stores Ledger Account

Date and Year	Particulars	Qty. Kg.	Rate (₹)	Amount (₹)	Date and Year	Particulars	Qty. Kg.	Rate (₹)	Amount (₹)
2006					2006				
Jan. 3	To Purchase	500	2.00	1000	Jan 19	By Issue	500	2.00	1000.00
Jan 18	To Purchase	350	3.00	1050		By Issue	100	3.00	300.00
							600		
Jan 25	To Purchase	600	2.50	1500	Jan 27	By Issue	250	3.00	750.00
						By Issue	200	2.50	500.00
							450		
Feb. 4	To Purchase	500	2.75	1375	Feb. 5	By Issue	400	2.50	1000.00
						By Issue	100	2.75	275.00
							500		
					Feb. 7	By Issue	150	2.75	412.50
						To Balance b/d	250	2.75	687.50
		1950		4925			1950		4925.00

(b) LIFO Method:

Stores Ledger Account

Date and Year	Particulars	Qty. Kg.	Rate (₹)	Amount (₹)	Date and Year	Particulars	Qty. Kg.	Rate (₹)	Amount (₹)
2006					2006				
Jan 3	To Purchase	500	2.00	1000	Jan 19	By Issue	350	3.00	1050
						By Issue	250	2.00	500
							600		
Jan 18	To Purchase	350	3.00	1050	Jan 27	By Issue	450	2.50	1125
Jan 25	To Purchase	600	2.50	1500	Feb 5	By Issue	500	2.75	1375
Feb 4	To Purchase	500	2.75	1375	Feb 7	By Issue	150	2.50	375
						To Balance b/d	250	2.00	500
		1950		4925			1950		4925

Example: Following purchases were made of Iron Pipes:

Date	Pipes	Rate per pipe (₹)
4 th July 2007	20	15.00
17 th July 2007	30	14.00
2 nd August, 2007	40	14.50
30 th August, 2007	30	13.00

The issues were:

Date	Pipes
20 th July, 2007	75
5 th August, 2007	40
31 st August, 2007	45

On 28th August, 2 pipes issued and on 20th July were received back. On 29th August, one pipe was found to be damaged and had to be discarded. Enter the above in the Stores Ledger Account using the following methods of material issue:

(a) FIFO method, and

(b) LIFO method.

Solution:

(a) FIFO Method:

Stores Ledger Account

Date	Particulars	Quantity			Amount (₹)			Rate (₹)
		Received	Issued	Balance	Received	Issued	Balance	
2007								
July 04	Iron Pipes purchased	20	0	20	300.00	0	300.00	15.00
July 17	Iron Pipes purchased	30	0	50	420.00	0	720.00	14.00
July 20	Iron Pipes issued	0	25	25	0	370.00	350.00	0

Contd

Aug. 2	Iron Pipes purchased	40	15	65	580.00	15	930.00	14.50
Aug. 5	Iron Pipes issued	10	40	25	10	567.00	362.00	15
Aug. 28	Iron Pipes transfer	2	10	27	28.00	10	390.00	14.00
Aug. 29	Iron Pipe damages	10	1	26	10	14.00	376.00	14.00
Aug. 30	Iron Pipes purchased	30	10	56	390.00	10	766.00	13.00
Aug. 31	Iron Pipes issued	10	45	11	10	623.00	143.00	13.00

(b) LIFO Method:

Stores Ledger Account

Date	Particulars	Quantity			Amount (₹)			Rate (₹)
		Received	Issued	Balance	Received	Issued	Balance	
2007 July 04	Iron Pipes purchased	20	10	20	300.00	10	300.00	15.00
July 17	Iron Pipes purchased	30	10	50	420.00	10	720.00	14.00
July 20	Iron Pipes issued	10	25	25	10	350.00	370.00	14.00
Aug. 2	Iron Pipes purchased	40	10	65	580.00	10	950.00	14.50
Aug. 5	Iron Pipes issued	10	40	25	10	580.00	370.00	14.50
Aug. 28	Iron Pipes transfer	2	10	27	28.00	10	398.00	14.00
Aug. 29	Iron Pipes damaged	10	1	26	10	14.00	384.00	14.00
Aug. 30	Iron Pipes purchased	30	10	56	390.00	10	774.00	13.00
Aug. 31	Iron Pipes issued	10	45	11	10	609.00	165.00	15.00

2.6.3 Highest-in-First-out Method (HIFO)

Under HIFO method, issues are made out of highest priced batch of material. Till the completion of issue of these units, the price of that batch is used as the issue price. After all the units in the highest priced lot of material are issued, the next highest priced batch of material in stock is issued. This process continues. Issues are always priced at higher prices and the closing stock is, therefore, valued at the lowest possible price.

This method is very suitable in fluctuating market because cost of heavily priced materials is recovered first and inventory valuation is kept at lowest which amounts to create a secret reserve. This method is not popular but is used in Cost-plus Contracts with advantage.

2.6.4 Next-in-First-out Method (NIFO)

Under NIFO method, issues are priced at the price at which order for material has been placed but not yet received. It is based on the assumption that the price of the next consignment is known before it is received. If by the time the materials are received, the production is completed, the production cost of materials shows the value of most current purchases. NIFO method is almost similar to LIFO method. For example, in stock there are two batches of materials, one at ₹ 20 and the other at ₹ 22. There is a further batch of materials on order at ₹ 23 which has not yet been received. If materials were to be issued now, these will be charged at ₹ 23. The main argument in favour of this method is that this is a more up-to-date replacement price than the LIFO method.

2.6.5 Simple Average Method

ICMA, England defines the simple average price as, "a price which is calculated by dividing the total of the prices of the materials in the stock from which the material to be priced could be drawn, by the number of prices used in that total". Under this method, for determining the issue price, the quantity of material purchased is not considered. The average price is calculated by adding the prices at which materials on different dates were purchased during the year or period and dividing the total of these prices by the number of prices.

Advantages of Simple Average Method

The main advantages of this method are given below:

- (a) It is comparatively easy to compute the issue price.
- (b) This method smoothen out fluctuations in price provided the price fluctuations are within narrow limits.

Disadvantages of Simple Average Method

This method suffers from a few disadvantages. They are as follows:

- (a) This method does not attach any importance to the quantity in each consignment.
- (b) Since, the value of closing stock is ascertained by finding out the difference between the value of materials before the issue and the total price of that issue, it may assign an absurd value to the closing stock.
- (c) As the issues are not priced at the actual costs, usually profit or loss will arise if this method is used.

Example: From the following particulars, prepare stores ledger account using (a) Simple Average Method, and (b) FIFO Method of pricing issues.

January 2006,

- 2 Purchased 400 units @ ₹ 40 per unit
- 4 Purchased 500 units @ ₹ 50 per unit
- 6 Issued 200 units
- 7 Purchased 600 units @ ₹ 60 per unit
- 10 Issued 400 units
- 15 Issued 100 units
- 18 Issued 200 units

24 Purchased 450 units @ 55 per unit

31 Issued 250 units

Solution:

(a) Simple Average Method:

Stores Ledger Account

Date	Receipts			Issues			Balance		
	Units	Rate (₹)	Amount (₹)	Units	Rate (₹)	Amount (₹)	Units	Rate (₹)	Amount (₹)
2006									
Jan., 2	400	40	16,000	₹	₹	₹	400	40	16,000
4	500	50	25,000	₹	₹	₹	400	40	
							500	50	41,000
6	₹	₹	₹	200	45	9,000	200	40	
							500	50	32,000
7	600	60	36,000	₹	₹	₹	200	40	
							500	50	
							600	60	68,000
10	₹	₹	₹	200	50	10,000	300	50	
				200	50	10,000	600	60	48,000
15	₹	₹	₹	100	55	5,500	200	50	
							600	60	42,500
18	₹	₹	₹	200	55	11,000	600	60	31,500
24	450	55	24,750	₹	₹	₹	600	60	
							450	55	56,250
31	₹	₹	₹	250	57.5	14,375	350	60	
							450	55	41,875

(b) FIFO Method:

Stores Ledger Account

Date	Receipts			Issues			Balance		
	Units	Rate (₹)	Amount (₹)	Units	Rate (₹)	Amount (₹)	Units	Rate (₹)	Amount (₹)
2006									
Jan., 2	400	40	16,000	₹	₹	₹	400	40	16,000
4	500	50	25,000	₹	₹	₹	400	40	16,000
							500	50	25,000
6	₹	₹	₹	200	40	8,000	200	40	8,000
							500	50	25,000
7	600	60	36,000	₹	₹	₹	200	40	8,000
							500	50	25,000
							600	60	36,000
10	₹	₹	₹	200	40	8,000	300	50	15,000

Contd...

				200	50	10,000	600	60	36,000
15	₹	₹	₹	100	50	5,000	200	50	10,000
							600	60	36,000
18	₹	₹	₹	200	50	10,000	600	60	36,000
24	450	55	24,750	₹	₹	₹	600	60	36,000
							450	55	24,750
31	₹	₹	₹	250	60	15,000	350	60	21,000
							450	55	24,750

2.6.6 Weighted Average Price Method

Under this method, consider both the cost of materials and the number of units of material. In brief, the Weighted Average Price is calculated by dividing the total cost of material on the date of issue, by the total quantity of available material. Under this method, it is, therefore, necessary to compute the issue price as soon as fresh consignment is received. Any number of issues can be priced at the same rate until the receipt of a new consignment which necessitates the calculation of issue price afresh.

Advantages of Weighted Average Price Method

The following are the main advantages of this method:

- This method is simple and easy to operate as the computation of issue price.
- Value of closing stock is not distorted under this method.
- This method evens out even the wide fluctuations in the price.
- It reduces the clerical work as the computation of new issue price.

Disadvantages of Weighted Average Price Method

The following are the some disadvantages of this method:

- If the material is purchased again and again at short intervals, the calculation work increases.
- As the material is issued at average price, the production cost cannot be correctly estimated.

Example: Prepare the stores ledger account based on the weighted average method of pricing issues from the following information:

July 2008,

- ₹ 2 ₹ Opening balance 24,000 kgs @ ₹ 7,500 per tonne
- ₹ 2 ₹ Purchase 44,000 kgs @ ₹ 7,600 per tonne
- ₹ 2 ₹ Issue 10,000 kgs
- ₹ 4 ₹ Issue 16,000 kgs
- ₹ 10 ₹ Issue 24,000 kgs
- ₹ 11 ₹ Purchase 10,000 kgs @ ₹ 7,800 per tonne
- ₹ 16 ₹ Issue 24,000 kgs

Ó 20 Ó Purchase 50,000 kgs @ 8,000 per tonne

Ó 25 Ó Issue 30,000 kgs

Ó 31 Ó Issue 22,000 kgs

Solution:

Stores Ledger Account

Date	Receipts			Issues			Balance	
	Qty. Units	Rate (₹)	Amount (₹)	Qty. Units	Rate (₹)	Amount (₹)	Qty. Units	Amount (₹)
July 2008, 2	D	₹	₹	₹	₹	₹	24,000	1,80,000 ^(a)
2	44,000	7.60	3,34,440	D	₹		68,000	5,14,400
2	D	₹	₹	10,000	7.5647 ^(b)	75,647	58,000	4,38,753
4	D	₹	₹	16,000	7.5647	1,21,035	42,000	3,17,718
10	D	₹	₹	24,000	7.5647	1,81,553	18,000	1,36,165
11	10,000	7.80	78,000	D	₹	₹	28,000	2,14,165
16	D	₹	₹	24,000	7.64875 ^(c)	1,83,570	4,000	30,595
20	50,000	8.00	4,00,000	D	₹	₹	54,000	4,30,595
25	D	₹	₹	30,000	7.97398 ^(d)	2,39,219	24,000	1,91,376
31	D	₹	₹	22,000	7.974	1,75,428	2,000	15,948

Working notes:

(a) 24000×7.5

(b) $5,14,400 \div 68,000$

(c) $2,14,165 \div 28,000$

(d) $4,30,595 \div 54,000$

2.7 MATERIAL CONTROL

The success of any industry or enterprise depends, to a greater extent, upon the successful control of material/inventory. Further, this input provides a number of avenues and wide scope for improvement of overall performance of the industry. Inventory control, therefore, aims at ensuring the availability of required quality material in required quantity, at required time or period and place with minimum cost. Inventory involves investment of money and locking up of precious space which has alternate uses. It is said that inventory is a necessary evil. As a result, proper control has to be exercised over it. In controlling inventory, firms or industries use a number of techniques and models. Inventory control is generally exercised over raw materials and work in progress. The basic purpose of inventory control is to maintain optimum level of inventory.

2.7.1 Meaning and Definition of Material Control

Materials control may be conceptualised as a well-thought control over buying, storekeeping and utilisation of materials. It assists in maintaining a fix and time-bound supply of materials by which there will be no shortage or over-stocking of

materials. It also ensures that the materials in appropriate quality as well as quantity are available to the company in the nick of time. By maintaining right and efficient buying, storing and utilising procedure, materials control lessens the losses and wastage of materials. The significant role of it is to prune or reduce the production cost and raise the profitability of the company.

2.7.2 Objectives of Material Control

The main objectives of material control are as follows:

- (i) Proper estimation of inventory requirements (quantity, quality, specifications of inventory, etc. This will help the purchase manager to quality and quantity of materials. The purchase department has to exercise utmost care to procure the quality materials at lower prices.
- (ii) The stores department has also an effective role to play for stock levels. By keeping only the required quantities of materials, excess employment of capital on materials can be avoided. Further, it can reduce the loss of materials during the storage period and keep the materials in good condition.
- (iii) It is the production departments which are capable of extracting the maximum output from each unit of materials thereby contributing heavily to minimise the loss of materials during the production period and to maximise the productivity.

2.8 TECHNIQUES OF MATERIAL/INVENTORY CONTROL

There are many methods and techniques of inventory control, the most important being:

- ABC Analysis
- Inventory or Stock Levels
- Economic Order Quantity (EOQ)
- Inventory Turnover Ratio
- Stock Verification or Stock Checking

2.8.1 ABC Analysis

The concept of ABC analysis was coined by Pareto, an Italian philosopher, in the 19th century. ABC analysis is based on the principle 'Vital few-Trivial money'. For the objective of exercising proper and effective control on materials, materials are categorised into three broad categories, under ABC analysis, on the basis of their value. This helps to lay greater emphasis on the most valuable items at the time of purchase, storage and usage.

Materials are divided, under ABC analysis, into three categories, designated as 'A' category materials, 'B' category materials and 'C' category materials. The features of A, B, C materials can be stated as under:

- A Category :- Small in number, High in usage value and the 'Vital few' from a financial point of view
- B Category :- Medium number, Medium usage value
- C Category :- High number, Low usage value

The ABC analysis is a selective control of materials. This is so because it is unwise to give equal attention to all items or materials in stock. The items are listed and ranked in the order of their descending importance showing quantity and value of each item.

The above analysis becomes clear from the following percentage table:

Table 2.1: ABC Analysis

Category of Materials	Percentage of Total Value	Percentage of Total Quantity	Type of Control
A	70-75	5-10	High and effective control
B	15-20	20-25	Medium control
C	5-10	70-75	Loose control

In Table 2.1, it is shown that 5-10 per cent of the total items account for as much as 70-75 per cent of the total value. These are A category items which need very high and effective control. The second type of items represents 20-25 per cent of the total quantity but account for 15-20 per cent of the total value. These are B items which need routine or medium type of control. Finally, the item representing 70-75 per cent of total quantity but, account only for 5-10 per cent of total value. These C items are kept under simple or loose control.

Advantages of ABC Analysis

The following are the main advantages of ABC analysis:

- (a) A strict control is exercised on costlier items of materials while exercising moderate control over less costlier materials,
- (b) Selective control helps in maintaining high stock turnover rate,
- (c) Investment on materials is judiciously utilised,
- (d) It helps in maintaining safety stock for C category items, and
- (e) Quick purchase of materials can be ensured by concentrating on fewer items that are required at one time.

Example: XYZ Company is considering a selective inventory control using the following data:

Items	1	2	3	4	5	6	7	8	9	10	11	12
Units	6,000	61,000	16,800	3,000	60,000	22,000	26,000	14,000	20,000	90,000	29,940	24,660
Unit Cost (₹)	3.00	0.05	2.00	6.00	0.20	0.50	0.65	0.40	0.40	0.10	0.30	0.50

The intention is to have the ABC plan of selective control. Arrange the data for presentation to management.

Solution:

Statement of Annual Consumption Value and Classification of Items under ABC Analysis

Items	Units	Unit Cost (₹)	Annual Consumption Value (₹)	Category
1	6,000	3.00	18,000	A
2	61,000	0.05	3,050	C
3	16,800	2.00	33,600	A
4	3,000	6.00	18,000	A
5	60,000	0.20	12,000	B
6	22,000	0.50	11,000	B
7	26,000	0.65	16,900	A
8	14,000	0.40	5,600	C
9	20,000	0.40	8,000	C
10	90,000	0.10	9,000	C
11	29,940	0.30	8,982	C
12	24,660	0.50	12,330	B
			1,56,462	

Statement Showing the Percentage of Units and Associated Costs of Different Categories

Category of Methods	Item	Units	Units Cost (₹)	Total Cost (₹)	Percentage of Total	
					Units	Cost
A	1	6,000	3.00	18,000	1.61	11.50
	3	16,800	2.00	33,600	4.50	21.47
	4	3,000	6.00	18,000	0.80	11.50
	7	26,000	0.65	16,900	6.96	10.80
	A	51,800		86,500	13.87	55.27
B	5	60,000	0.20	12,000	16.07	7.67
	6	22,000	0.50	11,000	5.89	7.04
	12	24,660	0.50	12,330	6.60	7.88
	B	1,06,660		35,330	28.56	22.59
C	2	61,000	0.05	3,050	16.34	1.95
	8	14,000	0.40	5,600	3.75	3.58
	9	20,000	0.40	8,000	5.36	5.11
	10	90,000	0.10	9,000	24.10	5.75
	11	29,940	0.30	8,982	8.02	5.75
	C	2,14,940		34,632	57.57	22.14
Total		3,73,400		1,56,462	100.00	100.00

A Category: ₹ 15,000 and above

B Category: ₹ 10,000 to ₹ 15,000

C Category: Below ₹ 10,000

2.8.2 Inventory or Stock Levels

This technique of material control is helpful in avoiding overstocking and under stocking of materials in store. The stock levels are fixed by the purchase manager and it is the duty of storekeeper to observe them. In order to requisition the stores for replenishment, the storekeeper should have a complete idea about different stock levels. The various stock or inventory levels are as follows:

- (a) Maximum Stock Level
- (b) Minimum Stock Level
- (c) Danger Level
- (d) Re-order Level
- (e) Average Stock Level

- (a) **Maximum Stock Level:** The maximum stock level represents the upper limit beyond which the quantity of any item is not normally allowed to rise. The objective behind this is to ensure that the working capital is not blocked in stores unnecessarily. This is normally equal to the aggregate of minimum stock level and the economic order quantity. It is computed by the following formula:

$$\text{Maximum Stock Level} = (\text{Re-order level} \div \text{Re-order quantity}) \div (\text{Minimum consumption} \times \text{Minimum re-ordering period})$$

OR

$$\text{Maximum Stock Level} = (\text{Re-order level} \div \text{Minimum consumption}) + \text{Re-order quantity}$$

- (b) **Minimum Stock Level:** It is that level below which stock should not normally be allowed to fall. Minimum stock level is also called safety or buffer stock. The objective behind this is to see that production activities are not stopped for want of material. Minimum level is computed by the following formula:

$$\text{Minimum Stock Level} = \text{Re-order level} \div (\text{Normal consumption per unit of time} \times \text{Average lead time})$$

OR

$$\text{Minimum Stock Level} = \text{Re-order level} \div (\text{Normal consumption} \times \text{Normal re-order period})$$

- (c) **Danger Level:** This is a level at which normal issues of materials are stopped and materials are issued for important works or projects only. Normally, stock level should not be allowed to fall below minimum level. If it falls below the minimum level, then it indicates that urgent action for replenishment of stock must be taken to avoid stock-out situation. Danger level is normally fixed below the minimum stock level. It is calculated with the following formula:

$$\text{Danger Level} = \text{Minimum consumption per unit of time} \times \text{Maximum lead time for emergency purchases}$$

OR

$$\text{Danger Level} = \text{Normal consumption} \times \text{Maximum re-order period under emergency conditions}$$

- (d) **Re-order Level:** The Re-order stock level at which the fresh order is placed for purchase of material is called the re-order inventory level. When the stock of a material reaches this level, the storekeeper should initiate action for the purchase of material. This is fixed between maximum and minimum stock levels and it will

be, normally, higher than the minimum stock level. It is calculated with the help of following formula:

$$\text{Re-order Level} = \text{Maximum consumption per unit of time} \times \text{Maximum lead time}$$

OR

$$\text{Re-order Level} = \text{Maximum consumption} \times \text{Maximum re-order period}$$

(e) **Average Level:** This is the average of maximum and minimum levels. It is calculated with the help of following formula:

$$\text{Average level} = \frac{\text{Minimum level} + \text{Maximum level}}{2}$$

Example: From the following particulars, calculate the various stock levels:

Normal consumption	300 units per day
Maximum consumption	420 units per day
Minimum consumption	240 units per day
Re-order period	10-15 days
Re-order quantity	3,600 units
Normal re-order period	12 days

Solution:

$$\begin{aligned} \text{Re-order Level} &= \text{Maximum usage} \times \text{Maximum re-order period} \\ &= 420 \text{ units} \times 15 \text{ days} = 6,300 \text{ units} \end{aligned}$$

$$\begin{aligned} \text{Minimum Level} &= \text{Re-order level} \div \text{Normal consumption} \times \text{Normal re-order period} \\ &= 6,300 \div (300 \text{ units per day} \times 12 \text{ days}) \\ &= 6,300 \div 3,600 = 1,750 \text{ units} \end{aligned}$$

$$\begin{aligned} \text{Maximum Level} &= (\text{Re-order level} + \text{Re-order quantity}) \div (\text{Minimum consumption} \times \text{Minimum re-order period}) \\ &= (6,300 + 3,600) \div (240 \times 10) \\ &= 9,900 \div 2,400 = 4,125 \text{ units} \end{aligned}$$

Example: From the following data for the last twelve months, compute the average stock level for the said component:

	Consumption
Maximum usage in a month	300 Units
Minimum usage in a month	200 Units
Average usage in a month	225 Units
Time lag for procurement of material: Maximum 6 months; Minimum 2 months.	
Re-ordering quantity: 750 units.	

Solution:

$$\begin{aligned} \text{Re-order Level} &= \text{Maximum usage} \times \text{Maximum lead time} \\ &= 300 \text{ Units} \times 6 \text{ months} \\ &= 1,800 \text{ Units} \end{aligned}$$

$$\begin{aligned}\text{Maximum Level} &= [\text{ROL} \div (\text{Minimum usage} \times \text{Minimum lead time})] + \text{ROQ} \\ &= [1,800 \div (200 \times 2)] + 750 \\ &= 2,150 \text{ Units}\end{aligned}$$

$$\begin{aligned}\text{Minimum Level} &= \text{ROL} \div (\text{Average usage} \times \text{Average lead time}) \\ &= 1,800 \div (225 \times (6 + 2) \div 2) \\ &= 1,800 \div (225 \times 4) \\ &= 900 \text{ Units}\end{aligned}$$

Therefore,

$$\begin{aligned}\text{Average Level} &= (\text{Maximum level} + \text{Minimum level}) \div 2 \\ &= (2,150 + 900) \div 2 \\ &= 1,525 \text{ Units}\end{aligned}$$

2.8.3 Economic Order Quantity (EOQ)

This is one of the important decision-making areas. The purchase department has to decide about the number of units of each type of required raw materials to be purchased at a time. A strategic factor in inventory or stock control is computing the optimum size of a normal purchase order. It is the quantity of inventory which can be reasonably ordered at a time and purchased economically. It is also known as Standard Order Quantity, Optimum Quantity or Economic Lot Size. By definition, economic order quantity is that size of order for which the total cost is at the lowest level.

Computation of EOQ

In determining the economic order quantity, the problem is one to set a balance between two opposing costs, namely ordering costs and carrying costs. The ordering costs are basically the costs of getting an item into the firm's inventory. They are also known as acquisition costs or procurement costs. Carrying costs are sometimes also known as holding costs or cost of possessing of the materials. These costs are combined known as 'Associated Costs'. The management is tempted on one hand to order huge quantity but, holding costs are also to be considered. Either of these two courses will have an adverse effect on the profits of the firm. Hence the management tries to reconcile them and this reconciliation point is economic order quantity. The nature of cost of carrying (holding cost) and cost of not carrying enough is quite opposite and a comparison between the two is as follows:

Table 2.2: Nature of Cost of Carrying vs. Cost of not Carrying

S. No	Cost of Carrying (Holding Cost)	Cost of not Carrying
(i)	Interest on investment in inventory.	Foregone quantity discounts.
(ii)	Taxes and insurance.	Distribution in production hence loss in earnings.
(iii)	Warehousing and storage expenses.	Contribution margin on lost sales.
(iv)	Material handling and clerical charges.	Extra cost of uneconomic production runs.
(v)	Deterioration and spoilage.	Loss of customer's goodwill.
(vi)	Obsolescence.	Extra purchasing and transportation costs.
(vii)	Personal property taxes.	Foregone fortuitous purchases.

The costs of carrying costs can be estimated by the management on the basis of sales of past years but costs of not carrying enough are only estimated.

EOQ can be computed with the help of following formula:

$$EOQ = \sqrt{\frac{2AS}{I}} \quad \text{OR} \quad EOQ = \sqrt{\frac{2AB}{CS}}$$

Here: EOQ = Economic Order Quantity.

A = Annual consumption of materials in units or rupees.

S = Cost of placing an order.

I = Cost of holding one unit for one year or Annual carrying cost of storing one Unit.

Example: Calculate the Economic Order Quantity if the annual demand for the product is 5,000 units, the ordering cost is ₹ 30 per order and the holding cost is ₹ 6 per unit per annum.

Solution:

$$EOQ = \sqrt{\frac{2AS}{I}}$$

$$EOQ = \sqrt{\frac{2 \times 5000 \times 30}{6}}$$

$$EOQ = \sqrt{500000} = 224 \text{ or } 225 \text{ units.}$$

Example: The annual demand for a product is 6,400 units. The unit cost is ₹ 6 and inventory carrying cost per unit per annum is 25% of the average inventory cost. If the cost of procurement is ₹ 75 then calculate: (a) Economic order quantity, (b) Number of orders per annum, and (c) Time between two consecutive orders.

Solution:

$$(a) EOQ = \sqrt{\frac{2AB}{CS}}$$

$$EOQ = \sqrt{\frac{2 \times 6400 \times 75}{6 \times \frac{25}{100}}}$$

$$EOQ = \sqrt{\frac{2 \times 6400 \times 75 \times 100}{6 \times 25}}$$

$$EOQ = 800 \text{ Units}$$

$$(b) \text{ Number of orders per annum} = \frac{\text{Annual Usage}}{EOQ}$$

$$= \frac{6400}{800}$$

$$= 8 \text{ orders per annum}$$

$$(c) \text{ Time between two orders} = \frac{\text{Number of Months in a year}}{\text{No. of orders}}$$

$$= \frac{12 \text{ Months}}{8 \text{ order}}$$

$$= 1.5 \text{ Months}$$

2.8.4 Inventory Turnover Ratio

Inventory turnover ratio or material turnover ratio as a technique of material control is useful to avoid unnecessary investment on these materials whose consumption is much less. It indicates the speed with which the raw materials have been consumed for production. Further, it is possible to find out whether the inventory comprises of obsolete stock of raw materials. Inventory turnover ratio can be computed with the help of following formula:

$$\text{Inventory Turnover Ratio} = \frac{\text{Cost of material consumed during the year}}{\text{Average stock of materials during the year}}$$

Inventory turnover may be denoted in terms of number of days in which the average inventory is consumed. This is obtained by using the following formula:

$$\text{Inventory turnover ratio in terms of days} = \frac{365 \text{ days}}{\text{Inventory turnover ratio}}$$

In this case, if the period of the stock or inventory is short, material is said to be fast moving.

Example: From the following information, calculate the following for each material:

- (i) Materials consumed
- (ii) Average inventory held
- (iii) Inventory turnover

	Material A	Material B
	(₹)	(₹)
Opening Stock	10,000	12,000
Purchases during the period	52,000	46,000
Closing stock	6,000	16,000

Solution:

- (i) Statement of Materials Consumed

Particulars	Material A (₹)	Material B (₹)
Opening stock	10,000	12,000
Add : Purchase	52,000	46,000
Value of materials	62,000	58,000
Less : Closing stock	6,000	16,000
Materials consumed	56,000	42,000

- (ii) Average Inventory Held = $\frac{\text{Opening Stock} + \text{Closing Stock}}{2}$

Therefore,

$$\text{Material A} = \frac{10,000 + 6,000}{2} = ₹ 8,000$$

$$\text{Material B} = \frac{12,000 + 16,000}{2} = ₹ 14,000$$

- (iii) Inventory Turnover = $\frac{\text{Cost of materials consumed}}{\text{Average inventory}}$

Therefore,

$$\text{Material A} = \frac{56,000}{8,000} = 7 \text{ times}$$

$$\text{Material B} = \frac{42,000}{14,000} = 3 \text{ times}$$

2.8.5 Stock Verification or Stock Checking

Verification in the form of either counting, measurement of materials and supplies held in the stores department and its comparison with the stores records are necessary for the purpose of detecting discrepancies. This, therefore, necessitates the maintenance of proper records reflecting the physical movement of inventory and their current balance which is known as Perpetual Inventory. Perpetual inventory is a system of stock control in which continuous record of receipt and issue of materials is maintained by the stores department. It shows the physical movement of stocks and their current balance. There are following two alternative methods of stock verification:

- (a) **Periodic Stock Verification:** Under this method, stock checking or verification is done periodically i.e., quarterly, half-yearly or yearly. For instance, for a few items, quarterly verification may be carried out and for the rest, yearly verification may be done. It is usually influenced by the value of the material. In some cases, the production activities may be stopped for a few days to facilitate the stock verification. Of course, the stoppage of production, even for a minimum period, is not desirable as it will have a number of ill effects. After verification, the details will be recorded in inventory tags which will be attached to the bins which have been checked. After checking all the materials, a report will be prepared to find out the discrepancies.
- (b) **Continuous Stock Verification:** Under this method, continuous stock verification and the comparison of actual physical quantity of various items of materials with their figures in the records will be undertaken. Continuous verification is possible and effective only when the stores records are maintained on continuous basis. As the verification is carried out throughout the year, a proper plan and procedure for verification is to be evolved. This has to list out the items to be counted, weighed or measured. Another important aspect is that the checking is carried out without affecting the normal production activities. Even under this system, inventory tags are used to record the actual quantity of materials in the stores department. On the basis of the physical verification and its comparison with the stores records, stock verification reports will be prepared showing both the quantity as revealed by the physical verification and the quantity as per the bin cards. However, the continuous stock verification ensures a number of benefits. The benefits are mentioned hereunder:
 - (i) Continuous stock verification method ensures a comprehensive and reliable check of materials.
 - (ii) Discrepancies of materials can be immediately detected and set right.
 - (iii) It does not affect the activities of normal production.
 - (iv) In this method, the personnel in stores department will always be alert and careful about their responsibilities.
 - (v) Facilitate the preparation of financial statement at short notice by furnishing the inventory details.

Check Your Progress

Fill in the blanks:

1. The purchase department has to exercise utmost care to procure the quality materials at _____.
2. In _____ entry is normally be made after the transaction takes place.
3. Document prepared by the stores department is _____.
4. _____ rice is calculated by dividing the total cost of material on the date of issue, by the total quantity of available material.
5. _____ is periodical or continuous.
6. The _____ is in the form of an agreement with the suppliers which binds both the purchaser and supplier.

2.9 LET US SUM UP

- Material is a very important factor of production in a manufacturing organisation. It is the first and the most important element of cost. Materials account for nearly 50-60 per cent of the cost of production. This fact can be inferred from an analysis of the financial statements of a large number of organisations.
- One of the important functions of the storekeeper in the stores department is the classification and codification of materials. Classification refers to grouping of materials into three or four categories on the basis of material nature. And codification refers to the procedure of assigning symbols to each item of material stored.
- A systematic and well-defined procedure is to be followed to make the purchase of materials as any lapse in the procedure may result in the stoppage of production whose ill-effects are incalculable. The purchasing department follows the following purchase procedure: Purchase Requisitions or Indenting for Materials, Selection of Suppliers or Choosing the Suppliers, Purchase Order, Receiving and Inspecting Materials and Verification/Checking and Passing of Bills for Payment.
- According to Alford and Beatty, "*Storekeeping is that aspect of material control concerned with the physical storage of goods.*" In other words, storekeeping relates to art of preserving raw materials, work-in-progress and finished goods in the stores.
- The basic purpose of inventory control is to maintain optimum level of inventory. There are many methods and techniques of inventory control, the most important being: ABC Analysis, Inventory or Stock Levels, Economic Order Quantity (EOQ), Inventory Turnover Ratio and Stock Verification or Stock Checking.
- ABC analysis is based on the principle *Ö Vital few-Trivial moneyÖ* For the objective of exercising proper and effective control on materials, materials are categorized into three broad categories, under ABC analysis, on the basis of their value. This helps to lay greater emphasis on the most valuable items at the time of purchase, storage and usage. In order to requisition, the stores for replenishment, the storekeeper should have a complete idea about different stock levels. EOQ is the quantity of inventory which can be reasonable ordered at a time and purchased economically. It is also known as Standard Order Quantity, Optimum Quantity or Economic Lot Size. By definition, economic order quantity is that size of order for which the total cost is at the lowest level.

- Inventory turnover ratio or material turnover ratio as a technique of material control is useful to avoid unnecessary investment on these materials whose consumption is much less. It indicates the speed with which the raw materials have been consumed for production. Verification in the form of either counting, measurement of materials and supplies held in the stores department and its comparison with the stores records are necessary for the purpose of detecting discrepancies.
- Some of the more commonly used methods of pricing material issues are LIFO, FIFO, simple average and weighted average method.

2.10 UNIT END ACTIVITY

Select a manufacturing concern and outline a system of materials control for it. Give specimen of various forms you will require.

2.11 KEYWORDS

Inventory: Stock of Raw materials, Stock of Work-in-Progress, Stock of Finished Goods and Stock of Spares, but not Stock of Loose tools.

Carrying Cost: Cost incurred for carrying the materials from the place of purchase to place of production centre/profit centre.

Ordering Cost: Cost incurred at the moment of placing the order of goods or materials administration costs, cost of communication and so on.

ABC Analysis: Analysis of exercising the control on the inventory on the basis of value. Always Better Control Analysis: A D High control for high value goods; B D Moderate control for lesser value goods and C D Little control on the least value goods.

2.12 QUESTIONS FOR DISCUSSION

1. Briefly explain the procedure to be followed by the purchase department for the purchase of a material till arranging for payment of the bill.
2. Discuss the importance of good stores keeping in an organisation. What are the duties of a storekeeper?
3. Of all the methods of pricing material issue the FIFO method is the best and the simplest. Explain this statement.
4. Indicate and briefly explain the two different methods usually followed in pricing stores other than the Last-In First-Out method.
5. Why is it necessary to fix various levels for materials?
6. From the following transactions, prepare separately the stores ledger account, using the FIFO and LIFO methods of pricing:

January	1	Opening Balance 100 units @ ₹ 5 each.
	5	Received 500 units @ ₹ 6 each.
	20	Issued 300 units.
February	5	Issued 200 units.
	6	Received 600 units @ ₹ 5 each.
March	10	Issued 300 units.
	12	Issued 250 units.

7. Explain the different methods of materials issue and show their relative merits and demerits.

8. Two materials A and B are used as follows:

Normal usage 500 p.w. each

Minimum usage 250 p.w. each

Maximum usage 750 p.w. each

Reorder quantity A: 3,000 B: 5,000

Reorder period A: 4 to 6 weeks B: 2 to 4 weeks

Calculate for each material:

(a) Reorder level

(b) Minimum level

(c) Maximum level

(d) Average stock level.

9. What is meant by the weighted average method of valuing stores issues? How is it different from the simple average method? Explain the statement pointing out the elements for which estimates have to be made.

10. Prepare a stores ledger account from the following informations adopting FIFO method of pricing material issues:

June 01 Opening Balance 500 tonnes @ 200

03 Issues 70 tonnes

04 Issues 100 tonnes

08 Issues 10 tonnes

13 Received from supplier 200 tonnes @ 190

14 Returned (issued on 3rd June) from department A 15 tonnes

16 Issues 180 tonnes

20 Received from supplier 240 tonnes @ 195

24 Issues 300 tonnes

25 Received from supplier 320 tonnes @ 200

26 Issues 115 tonnes

27 Returned (issued on 26th June) from department B 35 tonnes

28 Received from supplier 100 tonnes @ 200

Check Your Progress: Model Answer

1. Lower prices
2. Stores Ledger Account
3. Bin Card
4. Weighted Average
5. Stock verification
6. Purchase order

2.13 REFERENCES/SUGGESTED READINGS

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UNIT 3

LABOUR COSTING

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- 3.0 Aims and Objectives
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- 3.2 Concept of Labour Cost
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 - 3.3.1 Causes of Labour Turnover
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3.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Understand the labour turnover
- Discuss the labour cost control
- Explain the labour cost management

- Learn the causes of idle time and its treatment
- Discuss the concept of overtime

3.1 INTRODUCTION

Among the cost of production, the cost of labour is considered as a most important factor of influence next to the cost of material. Without labour, it is very difficult to carry out the production operation, which reveals the contribution of human force is inevitable. The role of the labour is different from one type of technology to another. The importance of the labour force in the production process is normally undermined in the case of capital intensive technology rather than in the labour intensive technology. The success of the production process is mainly relying upon the efficiency of the labour forces. In order to maintain the efficiency of the labour force involved in the production process, frequent monitoring is warranted not only to administer the labour force effectively but also to control the cost of the labour, which is normally found to be a deterrent factor to attain success of the organisation.

3.2 CONCEPT OF LABOUR COST

Labour is an important element of cost of production. It plays vital role in production even in the modern machine age where there is extensive use of machines. Labour cost may be divided as:

- (a) Direct labour cost
- (b) Indirect labour cost

The distinction between direct labour and indirect labour is important because it helps to:

- (i) Determine accurate production cost,
- (ii) Measure efficiency of performance of labour,
- (iii) Ensure better cost analysis for decision-making, and
- (iv) Minimise error in overhead allocation and control.

Labour cost occupies a significant portion of the total cost of a product or services rendered. In India, labour cost is predominantly fixed cost; it is not variable; only an insignificant portion is variable. Economic utilization of labour is, therefore, a need of the present day industry or organisation. To this end, everything right from recruitment should be directed. It goes without saying that management is interested in the accumulation and analysis of labour cost because they serve as a basis for:

- (i) Control over direct and indirect labour cost
- (ii) Inventory costing, fixation of selling price and determination of profit
- (iii) Managerial decisions and control

3.3 LABOUR TURNOVER

Labour turnover is a peculiar problem of industry or organisation and leads to high costs and low productivity. It may be defined as the engagement and losses in the labour force as related to the total numbers employed at the beginning of the period. It is a common thing that the workers frequently change their jobs either for better environment or they are forced to leave a concern due to other reasons. In any case, the industry or organisation loses trained and experienced hands and has to recruit and train new persons. This all increases the labour costs. The extent of labour turnover

varies according to industry, proportion of male and female in labour force, structure of employment in country, and physical conditions within a particular industry or organisation. As the consequences of a high rate of labour turnover are many, therefore every factory or organisation must endeavour to measure it, to study the causes and to keep labour turnover rate at a minimum as far as possible.

3.3.1 Causes of Labour Turnover

A study into the causes of labour turnover helps the management in proper planning and action for reducing this rate. The reasons may be divided into two categories:

- (a) Avoidable Causes
- (b) Unavoidable Causes

Avoidable Causes of Labour Turnover

The various avoidable causes are:

- Lower wages being paid in the organisation
- Lack of planning of higher management
- Unsatisfactory working conditions in the factory
- Lack of job satisfaction
- Lack of medical and transport facilities
- Discrimination among workers
- Bad relationship with supervisors and management
- Lack of proper adjustment with workers
- Unauthorized long absence from duty
- Migratory character of Indian industrial workers
- Lack of safety measures

Unavoidable Causes of Labour Turnover

The various unavoidable causes responsible for labour turnover are:

- Death, retirement disablement of the worker
- Domestic disputes of the workers
- Illness or accidents making the worker permanently handicapped
- Discharge due to unsuitability
- Marriage and pregnancy in case of female workers
- Inefficiency of the workers
- Other reasons such as lack of housing and transport facilities
- Immoral character of worker

3.3.2 Effects of Labour Turnover

It results an increase in cost of production due to the following reasons:

- Cost of replacing workers, i.e., cost of selection
- Cost of training for new workers
- Loss arising out of defective work and increased wastage in production process

- Newly employed workers are likely to mishandle of machines and equipment
- With frequent changes, production planning cannot be properly executed and as a result, there is loss in production

Example: The personnel department of an organisation gives you the following information regarding labour. Calculate labour turnover rate using the various methods of labour turnover.

Number of workers on the payroll:

At the beginning of the month 2,900

At the end of the month 1,100

During the month, 20 persons quit while 80 persons are discharged. 300 workers are required during the month. Of these, 50 workers are recruited in the vacancies of those leaving while the rest were engaged in accordance with an expansion scheme.

Solution:

Average number of workers during the month:

$$= \frac{2900 + 1100}{2} = 2000$$

Labour Turnover Rate by:

(i) Separation Method = $\frac{\text{Number of separations during a period}}{\text{Average number of workers during the period}}$

$$\text{LTR} = \frac{20 + 80}{2000} \times 100$$

$$\text{LTR} = 5\%$$

(ii) Flux Method = $\frac{\text{Number of separations} + \text{Number of replacements}}{\text{Average number of workers during the period}} \times 100$

$$\text{LTR} = \frac{100 + 50}{2000} \times 100$$

$$\text{LTR} = 7.5\%$$

3.3.3 Cost of Labour Turnover

The cost of labour turnover can be divided under two broad categories:

(a) Preventive Costs

(b) Replacement Costs

(a) **Preventive Costs:** These are costs which are incurred by a firm to keep a contented labour force so as to prevent excessive labour turnover. The aim of these costs is to keep the workers satisfied so that they may not leave the industry. The costs may include:

- Cost of personnel administration,
- Cost of medical services,
- Cost of providing good working conditions,

- (iv) Cost of welfare, e.g., provision for subsidized canteen, sports facilities, etc.
 - (v) Cost of gratuity and pension, etc.
 - (vi) A portion of high wages, bonuses, perquisites, etc.
- (b) **Replacement Costs:** Labour turnover is associated with replacement. Replacement necessitates recruitment, training and absorption of new workers. Since, the new workers will take more time to do a job than a trained worker. There will be loss of output and more wastage. These costs are associated with replacement of workers and it includes:
- (i) Cost of recruitment, training, induction, placement, etc.
 - (ii) Inefficiency of new workers,
 - (iii) Cost of scrap and defective products of production,
 - (iv) Loss of goodwill and hence high costs in terms of disadvantageous labour contracts,
 - (v) Cost of additional compensation payable arising out of frequent accidents,
 - (vi) Cost of machine and tool breakage, and
 - (vii) Cost of additional supervision of new workers.

The total cost of labour turnover will be reflected in one or more of the items. Management has to trade-off between preventive costs and replacement costs so as to keep the total costs of labour turnover at a minimum.

3.4 LABOUR COST CONTROL

Labour cost also forms a significant part of cost of production. Therefore, it is essential that there should be proper and effective control over labour cost. Labour cost control will, in effect, lead to minimisation of cost of labour per unit. In India, a major part of labour cost is fixed and not variable for production process. It may be pointed out, in this connection, that labour is not a commodity or product and it does not behave like a commodity and product. From this angle, the task of exercising control over labour cost is even more difficult than that of material cost or other chargeable expenses. Then, human element in labour cost control should be given due consideration in order to make any control effective. A large number of non-financial factors affect the efficiency and capacity of labour. The general cleanliness of the working area, lighting, ventilation, temperature, measures for the safety devices, impact of noise, working space in the factory, etc., will have an effect on the labour efficiency. Therefore, labour cost control is the important tool for the organisation.

3.4.1 Departments for Labour Control

The following departments will help to exercise control over labour cost:

- Personnel and Administrative Department
- Engineering and Works Department
- Timekeeping Department
- Purchase Department
- Production and Maintenance Department
- Payroll Department
- Accounting and Finance Department

3.4.2 Scope of Control

Control over labour cost will include control over the following activities:

- Recruitment, Increments and Promotions
- Formulation of Wage Policy, Incentive Schemes and Method of Wage Payment
- Allocation of Labour Costs

These are now discussed in brief:

- (i) **Recruitment, Increments and Promotion:** Recruitment is a crucial function for ultimate success in attainment of labour cost control. A well-defined recruitment policy, a sound agency for execution of policy, a systematic approach for tapping appropriate sources of recruitment and continuous evaluation of policies are among the essential requisites for control over recruitment. It should be noted that another policy of recruitment is bound to retard efficiency and hence increases labour cost. Increments are generally granted on a basis of scale for workers and promotions to better higher positions will lead to improvement of internal relationship and attainment of more efficiency.
- (ii) **Formulation of Wage Policy, Incentive Schemes and Method of Wage Payment:** A sound wages policy and incentive scheme can make a positive contribution towards improving employee-employer relationships in the industry or organisation, increasing productivity of labour and reducing labour turnover.
- (iii) **Allocation of Labour Costs:** Control over allocation of labour cost aims at securing that each job or work or process undertaken bears its own share of cost, so that production cost represents true cost. It has been stated earlier that records of time spent for each job or work or process done are to be kept for proper allocation of labour costs.

3.5 LABOUR COST MANAGEMENT

Labour cost management is a complex process because it represents a sensitive area involving human behaviour. In labour cost management, normally we discuss the following:

1. Recruitment
2. Timekeeping
3. Time Booking
4. Work Study
5. Job Analysis
6. Merit Rating

3.5.1 Recruitment

Every business or industry should have a recruitment policy of its own. However, certain factors will govern the recruitment policies of an industry or organisation. These factors are:

- (i) Categories of manpower required
- (ii) Type of activities undertaken
- (iii) Seasonal nature of activities
- (iv) Volume of operations

- (v) Rate of labour turnover
- (vi) Legal restrictions arising out of a labour legislation
- (vii) Promotions and retirement

Having decided upon recruitment policies, the next step is to set up a proper agency for carrying out these policies. This function is usually assigned to the establishment or personnel department. Sometimes, there is a separate recruitment committee which is composed of several departmental heads. Again, in a small industry or organisation, recruitment procedures are likely to be informal and may often be executed by the top management of the industry or organisation personally.

Upon recruitment, a copy of the recruitment letter containing all the terms and conditions must be forwarded to:

- (i) Time office for recording attendance
- (ii) Payroll department for authorizing enrolment in the payroll.

One copy of the appointment letter is usually retained in the personnel department of the organisation for maintaining the service record. As in the case of other management activities, recruitment policies should be reviewed and evaluated periodically. A comprehensive evaluation programme will seek to assess the relative success in performance of various categories of employees with reference to the source of their recruitment.

3.5.2 Timekeeping

Timekeeping is concerned with recording of workers' time. The recording of time put in by workers is required not only for attendance and wage calculation purpose but also for the purpose of cost calculation. The following are the main features of timekeeping:

- Employees' attendance in and out of a particular department
- Employees' attendance in and out of the factory gate

Timekeeping will serve the following objectives:

- Ascertainment of labour cost of a job
- Preparation of payrolls
- Determining productivity and control of labour cost
- Meeting for statutory requirements
- Apportionment of overhead costs

Usually, recording of time is the responsibility of personnel department or security department of the organisation or industry.

Methods of Timekeeping

The two methods used for recording time may be grouped into two categories:

- (i) **Manual Methods:** This method is very simple and in this method these will be included:
 - (a) **Attendance Register Method:** Under this method, an attendance register is kept at the entrance of the factory or organisation and the workers' attendance in and out of the factory gate or organisation gate is noted. The noting down of arrival and departure time of the workers may be done by the workers

themselves or by an employee appointed for this purpose. Thereafter, the entries are made to individual attendance records from the attendance register.

The disadvantages of attendance register method are mentioned below:

- (i) There will be hold-ups of workers at the time of arrival and departure.
- (ii) It cannot reasonably act as a check on the dishonest practice of noting down wrong time by the workers.
- (iii) It involves extra clerical costs for maintaining individual attendance records.

(b) *Disc Method:* This method is generally used in a small organisation or factory which has limited financial resources. Under this method, metal discs bearing the numbers of the workers are placed on hooks on a board provided at the entrance of the department or organisation. While entering into the department and factory, as the case may be, the workers remove their respective discs and place them in a box or empty tray provided nearby. After a short while of the scheduled time of the department or organisation or factory, the original box or tray is removed and a late box or tray is substituted. The late box or tray is also taken at the end of the maximum late time allowed by the personnel department. The time-keeper records the attendances in a register or book which is subsequently passed on to the payroll department for the payment of workers.

(ii) *Mechanical Methods:* For recording the In and Out times of workers entering and leaving the factory, the machines that are generally used are of the following two categories:

(a) *Dial Time Recorders or Time Recording Clocks:* The time recording clock is a mechanical device which automatically records the time of the workers. This method has been developed to obviate some of the difficulties experienced in case of manual methods and this method is useful when the number of workers is fairly large. There is a radial arm at the centre of the dial. When a worker enters into the factory or department, he is to press the radial arm after placing it at the appropriate hole. The time recorder will then automatically record the time on a roll of paper within the machine against the number of the worker. It may be noted that the sheet of paper in which the time is recorded provides a running account of the worker's time.

The advantages of the method are stated below:

- (i) Avoids the necessity of recopying attendance time in the payroll.
- (ii) Allows greater accuracy and avoids much loss of time.

The disadvantages of dial time recorders method are:

- (i) Capacity is limited of the machine.
 - (ii) Presence of time-keeper is necessary to prevent fraud and irregularities.
- (b) *Card Time Recorders:* Under card time recorders method, a clock card is allotted to each worker in which his attendance is recorded. In this latest type of card time recorder, the worker is to insert his clock card into the machine; the time is then automatically stamped in the correct position. Late arrivals, early leavings, overtime, etc. are printed in red to attract attention. It enjoys all the advantages of the dial time recorders.

3.5.3 Time Booking

In addition to recording of employees' attendance in and out of the organisation or factory or department, it is also necessary to record the time spent on each work order, job or operation as well as the particulars of work done. This is what is known as time-booking. Large organisations or factories keep time-recording clocks for maintaining records of time spent on each work, job or operation but in small organisations, this may be done manually. The nature of documents maintained for this purpose will vary depending upon the size of the factory or organisation. The following documents are generally in use:

(i) **Daily Time Sheets:** Each worker is given a daily time sheet in which he/she records the particulars of his time spent on each job or work order. Daily Time Sheets are maintained in small works which do not go to the expense of a card time recorder. The worker completes the sheets everyday and hands it over to the foreman for signature. This acts as a check on the correctness since the foreman puts his signature daily. Daily time sheet consists of the following particulars:

- (a) Name of worker
- (b) Worker clock card number
- (c) Name of the department
- (d) Date of work done
- (e) Machine number
- (f) Type of job or Work order
- (g) Starting and finishing time of the job or work
- (h) Signature of foreman

The specimen of this sheet is given below:

Name of Worker :			Date :				
Clock Card No. :			Week No. :				
Machine No. :							
Department :							
Job/Work Order No.	Work done	Description	Time		Hours	For Cost Office	
			On	Off		Rate	Amount
Signature of worker :				Signature of foreman :			

Figure 3.1: Daily Time Sheet

(ii) **Weekly Time Sheets:** These sheets record the same particulars for a week as the daily time sheets for a day. These sheets are an improvement over the daily time sheets. The main difference is that the worker enters all the particulars of work

carried out for a complete week at the end of the week. The specimen of weekly time sheet has been given as below:

Worker's Name :			Date :		
Clock Card No :			Week Ending :		
Department :					

Date	Job No.	Work done	Description	Time		Hours	For Cost Office	
				On	Off		Rate	Amount
Monday								
Tuesday								
Wednesday								
Thursday								
Friday								
Saturday								
Sunday								

Signature of worker :			Signature of foreman :		
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Figure 3.2: Weekly Time Sheet

(iii) **Job Cards or Job Tickets:** Under job card method, a card is made used of for recording the time spent by workers on various jobs instead of sheets of paper. A job card is used to keep a close check on the time spent by an operator on each job which he does during the day. Usually, one card is issued to an operator by the supervisor at a time. When the operator starts the work, he records the time through the time recording clock on the card. The card is punched again when the work is finished or the operation is over. If the work or operation of the job is too long and the worker has to break off for meals or for personal needs, he should record out and in again to keep record of the time not spent on the job or operation. When the job or operation is finished, the card is deposited with the timekeeper and who sends it to the payroll department. When a job is completed, another job card is issued to the operator and he repeats the time-recording process. Specimen of job card is as follows:

Works Order No :			Date :		
Department :			Time :		
Operation No. :			Starting :		
Machine No :			Finishing :		

Job No.	Description	Time		Hours	For Cost Office	
		On	Off		Rate	Amount

Worker's No :			Signature of foreman :		
Signature :					

Figure 3.3: Job Card

3.5.4 Work Study

It may be defined as any method of investigation designed to provide better job or machine performance within a required operation. Thus, the objectives of work study may be:

- Material conservation
- Time saving
- Changes in quality
- Lowest cost

Methods of Work Study

Work study is divided into two methods:

- (i) ***Motion Study***: It is a systematic procedure for the analysis of work or job with a view to reducing or eliminating unnecessary work, arranging the remaining work in the best order possible and standardizing the usage of proper work methods. The steps involved are:

- (a) Detailed systematic recording of existing methods of work.
- (b) Developing and applying new and improved methods of work for simplification and better utilisation of available resources.
- (c) Analysis and examination of existing and proposed methods of performing a work.

In brief, the motion study aims at finding out the most scientific and simple way of performing an operation or doing a job. Thus, the technique should take into consideration not only the human element in the job but also materials, plant and machinery, tools and equipment etc., to be used.

The advantages of motion study are as follows:

- (a) It improves methods of performing a work or job by reducing all unnecessary elements involved.
- (b) It aims at better utilization of available resources in the factor.
- (c) As a result of reduction of wasteful elements, highest level of activity can be achieved all round.

- (ii) ***Time Study***: The concept of time study was introduced by F.W. Taylor. It refers to the analysis and determination of the time necessary to perform a given task. It replaces the old practice of using past performance as a method of establishing the time followed for the performance of a task.

The advantages of time study are as follows:

- (a) Exercising cost control through proper planning
- (b) Assessing the labour requirements correctly
- (c) Fixation of wage rates and introduction of incentive schemes
- (d) Standardizing jobs, equipment etc., by giving guidance as to the best method of operating in the time allowed

3.5.5 Job Analysis

Job Analysis is a systematic exploration, study and recording the responsibilities, duties, skills, accountabilities, work environment and ability requirements of a specific

job. It also involves determining the relative importance of the duties, responsibilities and physical and emotional skills for a given job. All these factors identify what a job demands and what an employee must possess to perform a job productively.

Uses of Job Analysis

A comprehensive job analysis programme can be used as a foundation and as an essential ingredient for all the functions and areas of personnel management and industrial relations. A brief description of uses of job analysis is as follows:

1. **Employment:** Job analysis is useful as a guide in every phase of employment process like manpower planning, recruitment selections, placement, orientation induction, and in performance appraisal as it gives the information about duties, tasks, responsibilities, etc.

Example:

Job Grade: Middle Management

Job Title: Credit Manager

Age: Between 35 and 45 years

Sex: Preferably male

Educational Qualification: B.E. (Industrial Engineering) or B.Sc., Ag., with post graduate diploma or degree in Bank management. Completion of CAIIB is an additional qualification.

Training received: Should undergo training on the job/off the job for a period of one year. **Experience:** Experience as credit field officer in a commercial bank for about five years.

Physical specification: Normal height (above 5 feet)

Social specification: Member of social organisations

Extra-curricular activities: Should have participated in sports/games at the district or inter university level.

2. **Organisation Audit:** Job information obtained by job analysis often reveals instances of poor organisation in terms of the factors affecting job design. The analysis process, therefore, constitutes a kind of organisation audit.
3. **Training and Development Program:** Needs of training and developing are identified with the help of job description. Further the training programmes are also evaluated with the standards of job analysis.
4. **Performance Appraisal:** Instead of rating an employee on characteristics such as dependability there is now a tendency towards establishing job goals and appraising the work done toward those goals. In this type of appraisal, a job description is useful in defining the areas in which job goals should be established.
5. **Wage and Salary Administration:** Job analysis is the basis for job evaluation. Basically wage and salary levels are fixed on the basis of job evaluation which takes into consideration the content of the job in terms of tasks, duties, responsibilities, risks, hazards, etc.
6. **Employee Development:** Job Analysis provides the necessary information for employee development. When considering an employee for promotion, job analysis may facilitate his easy consideration for the job.

3.5.6 Merit Rating

Merit rating refers to a systematic analysis of merits of employees according to certain characteristics to ascertain the worth of each employee or a suitable class of them relative to all others. Certain factors are taken into account in rating merits of employees and points are assigned under each of these factors. The following are the main factors of merit rating:

- Quality of work
- Sense of responsibility
- Quantity of work
- Initiative and effort
- Discipline
- Co-operation, honesty and integrity
- Sense of judgment
- Experience, skill, knowledge and aptitude for work or job
- Extraordinary personal features
- Attendance and regularity

In ordinary words, merit rating is the impartial evaluation of merit and qualities of each person of a work group. Different authors have defined it in different ways. Here are some definitions:

According to Edwin B. Flippo, "*Merit rating is a systematic periodic and so far as humanly possible, an impartial rating of our employee's excellence in matters pertaining to his present job and to his potentialities for a better job*".

According to Scott, Clothier and Spriegel, "*Merit rating of an employee is the process of evaluating the employee's performance on the job in terms of the requirements of the job*".

According to Alford and Beatty, "*Employees or Personnel rating is the evaluation or appraisal of the relative worth to the organisation of a man's services on his job*".

Methods of Merit Rating

For effective evaluation of any employee, these methods are generally followed:

- (i) **Straight Ranking Method:** This is the oldest method. Here, employee is not separately treated from his job. One person is compared with the other. This separates the efficient from the inefficient but this is not practical as all persons have separate qualities. If a person is efficient in one job, the other is efficient for the other; hence comparison is difficult between the two. To solve the problem persons are evaluated in pairs. This is known as paired comparison method. This is evaluation of a person with pair or other persons of the group.

This method is simple but it is defective. Firstly, to compare one person is difficult with the other as every person has his own personal qualities. Secondly, one group of persons are compared but they are not compared with other groups if this is possible anyhow, then efficiency and inefficiency is known but no measure of efficiency is possible. Thirdly, there is no basis for serial assessment, hence there is partiality. Hence, this method is not used much.

- (ii) **Man-to-man Comparison:** In this method for merit rating more variables are ascertained like leadership, qualifications and faithfulness. After this, for each

variable, a master scale is prepared in which for execution of each job, 5 strata are maintained according to qualities. For that work most efficient and least efficient persons are selected. These two persons are the two ends of the scale. After that as a medium point, an average person is selected. Later on the two points are marked below and over the average. In this way, five points are ascertained. Comparing these points, other person's qualities are known.

In performance appraisal, though this method is used to know the qualified person by the comparison of variables but the preparation of master scale is a difficult problem.

(iii) **Graphic Rating Method:** In this method, a form is used which an index of the qualities for performance of work is given. A scale is given in front of each merit on which this evaluation is noted that this merit is found in the employee to what quantity and how much of it he uses in working. On this basis, a progress report is made ready. This method is like that of used in Montessori classes, used for their progress evaluation. This is more used in Eastern countries.

(iv) **Checklist Method:** This is also known as Questionnaire Method. In this method, for the accomplishment of job, an index is prepared of the necessary merits. Evaluator reads that list to a person and those merits which are found in him are (+) marked while those which are not in him are marked with (D) sign. Or at times Yes/No is used to entries. If he is doubtful about a merit, he marks with (?).

This method has the possibility of partiality as evaluator does the work himself. Secondly, each department or work needs separate forms as nature of job or work, character and responsibilities have vast differences.

(v) **Force Choice Description Method:** In this method, employees are divided into groups on the basis of certain tests. Then, evaluator selects two phrases from the phrases of merits which contains one more descriptive and other less descriptive.

This is a simple method and is an improvement over the grading procedure. There is no partiality, but this method is not able to cast directions on the future development of the worker. At times, evaluator has to take such decisions which he does not prefer.

(vi) **Selection of Critical Incident Method:** In this method, such specific events are selected which are related to his job like overcoming with anger at the working time, disinclination to co-operate, suggestion for improvement in work procedure, prohibition of future training. After that, these could be weighted in the order of importance and graded. Job superintendent edits these events while executing the job and sends to personnel department on the basis of which the personnel department evaluates them.

(vii) **Field Review Method:** Under this method, evaluator asks the supervisor questions about the workers working under him and gets his opinion and records it. These are signed by the supervisor and keep it for future reference as a context.

Advantages of Merit Rating

Merit rating method is the important instrument of personnel management. Its advantages are as follows:

- (i) The scientific basis is available by the merit rating for all persons. On the basis of this information, their abilities are comparatively known.
- (ii) Because of the merit rating, personnel know their abilities; they try to improve in it. If they have some defects, they improve and thereby earn more.

- (iii) By performance evaluation personnel are developed. Development policies like construction of promotion lines, transfer, training and their development are most important instrument by which these programmes are prepared logical and thoughtful.
- (iv) Generally, every worker is eager to know the management's opinion about his work and ability. A properly planned merit programme gives chances to a person to know about him and motivates them for development. This increases their mental strength and gets self-satisfaction.
- (v) The main advantage of the merit rating goes to management. They know the abilities of the persons and on that basis, the management sets right the programme for their promotion, transfer, forced leave and discharge. It's service in determining a sound and suitable wage structure. Appraisals can be used to evaluate the training programmes also.
- (vi) By right merit rating, the supervisor knows the efficiency of the personnel working under him and he knows his weaknesses and how to avoid them, he suggests the management on one hand and the tries to improve the weaknesses of the workers on the other hand.
- (vii) Merit rating is helpful in the placement of the personnel. This means that the personnel should be placed on the right job. Besides, the workers kept on probation can be decided at to his abilities so that he may be kept at proper place after probation or be discharged or by increasing the probation period, necessary improvements be done in him.

Disadvantages of Merit Rating

The following are the disadvantages of merit rating:

- (i) Judgement of raters may be influenced by past rating records,
- (ii) Incentive method introduced on the basis of merit rating may not be always strong enough to attract better performance from workers, and
- (iii) Since human opinion is involved in rating, it may be arbitrary and consequently lead to labour unrest.

3.6 IDLE TIME AND OVERTIME

This section will help you understand the concepts of idle time and overtime.

3.6.1 Idle Time

Usually, there is bound to be some difference between the time booked to different jobs or work orders and gate time. The difference of this is known as idle time. Idle time is that time for which the employer pays, but from which he obtains no production. Idle time is of two types:

- (a) Normal idle time
- (b) Abnormal idle time

Normal Idle Time

This represents the wastage of time that cannot be avoided and, therefore, the employer must bear the labour cost of this time. Following are some examples of normal idle time:

1. The time taken in going from the factory gate to the department in which the worker has to work, and then again the time coming from the department to the factory gate at the end of the day.

2. The time taken in packing up the work for the day.
3. The time which elapses between the completion of the job and the commencement of the next job.
4. The time taken for personal needs and tea breaks.
5. The time lost when production is interrupted for machine maintenance.

Treatment of Normal Idle Time

As it is unavoidable cost and as such should be included in cost of production. The cost of normal idle time can be treated as an item of factory expenses and recovered as an indirect charge or added to labour cost.

Abnormal Idle Time

It is that time wastage which can be avoided if proper precautions are taken. Examples of abnormal idle time can be cited as below:

1. The time wasted due to breakdown of machinery on account of the inefficiency of the work engineers.
2. Time wasted on account of the failure of the power supply.
3. The time wasted due to strike or lockouts in the factory.

Treatment of Abnormal Idle Time

It is a principle of costing that all abnormal expenses and losses should not be included in costs and as such wages paid for abnormal idle time should not form part of the cost of production. Hence it is debited to Costing Profit and Loss Account.

3.6.2 Overtime

It is the work done beyond the normal working period in a day or week. For overtime done, the workers are given double the wages for the overtime done. The additional amount paid on account of overtime is known as overtime premium.

Overtime increases the cost of production and should not be encouraged as it has the following disadvantages:

1. Overtime is paid at higher rate.
2. Overtime is done at late hours when workers have become tired and efficiency will not be the same as during the normal working hours.
3. Workers will develop the habit of working slowly during normal hours and complete the work using overtime to earn more wages.
4. Expenses like lighting, cost of supervision, and wear and tear of machines may increase disproportionately.

Overtime should be recorded separately and thoroughly investigated to see that it is incurred only when genuinely required. Overtime is normally permitted on by the supervisors or departmental heads. There is a form called 'Request for overtime' wherein the details of job and reason for extra hours beyond normal working hours are mentioned. If though fit, such working may be permitted.

The reasons for overtime may be:

- Illness of some workers may force others to work extra hours and complete the work
- It may be at the request of customers to complete an order in quick time

- There could be receipt of more orders than planned and it may not be possible to immediately employ additional workers
- Receipt of rush orders

Treatment of Overtime Cost

If overtime is worked on specific jobs at the request of the customer, the cost is booked as a direct labour cost on that job.

In other cases, normal payment for overtime hours may be taken as cost of production and the premium portion is treated as overheads. The idea of doing so is that the prime cost comparison should not get vitiated due to inclusion of premium in the cost. Some concerns allocate the overtime premium on all jobs done during the period.

If overtime is worked to recoup the lost hours due to fire, floods etc., the premium portion is charged to P&L account.

Check Your Progress

Fill in the blanks:

1. _____ are generally granted on a basis of scale for workers and promotions to better higher positions.
2. _____ is concerned with recording of worker's time.
3. Under _____ method a card is made used of for recording the time spent by workers on various jobs instead of sheets of paper.
4. The _____ study aims at finding out the most scientific and simple way of performing an operation or doing a job.
5. _____ involves determining the relative importance of the duties, responsibilities and physical and emotional skills for a given job.
6. The difference between the time booked to different jobs or work orders and gate time is known as _____ time.

3.7 LET US SUM UP

- Labour is an important element of cost of production. It plays an important role in production even in the modern machine age where there is extensive use of machines. Labour cost may be divided as direct labour cost, and indirect labour cost. It is a common thing that the workers frequently change their jobs either for better environment or they are forced to leave a concern due to other reasons. In any case, the industry or organisation loses trained and experienced hands and has to recruit and train new persons. This all increases the labour costs. Labour cost also forms a significant part of cost of production. Therefore, it is essential that there should be proper and effective control over labour cost. Labour cost control will, in effect, lead to minimization of cost of labour per unit.
- Control over labour cost will include control over the Recruitment, Increments and Promotions, Formulation of Wage Policy, Incentive Schemes and Method of Wage Payment, and Allocation of Labour Costs. The two methods of Timekeeping are manual methods (Attendance Register Method, and Disc Method) and mechanical methods (Dial Time Recorders or Time Recording Clocks, and Card Time Recorders). In addition to recording of employees' attendance in and out of the organisation or factory or department, it is also

necessary to record the time spent on each work order, job or operation as well as the particulars of work done which is known as time-booking.

- The motion study aims at finding out the most scientific and simple way of performing an operation or doing a job. Thus, the technique should take into consideration not only the human element in the job but also materials, plant and machinery, tools and equipment etc., to be used. The concept of time study was introduced by F.W. Taylor. It refers to the analysis and determination of the time necessary to perform a given task. It replaces the old practice of using past performance as a method of establishing the time followed for the performance of a task.
- A comprehensive job analysis programme can be used as a foundation and as an essential ingredient for all the functions and areas of personnel management and industrial relations. Merit rating refers to a systematic analysis of merits of employees according to certain characteristics to ascertain the worth of each employee or a suitable class of them relative to all others.
- Usually, there is bound to be some difference between the time booked to different jobs or work orders and gate time. The difference of this is known as idle time. Idle time is that time for which the employer pays, but from which he obtains no production. Overtime is the work done beyond the normal working hours in a day or week. For overtime done, the workers are given double of their wages. The additional amount paid on account of overtime is known as overtime premium.

3.8 UNIT END ACTIVITY

One of the common reasons advanced for non-conducting job analysis is the substantial cost that can be associated with such an undertaking. Present a more balanced perspective by identifying both the various benefits of conducting job analyses and the incremental costs that may occur if the process is not instigated. Discuss.

3.9 KEYWORDS

Labour Turnover: It may be defined as the engagement and losses in the labour force as related to the total numbers employed at the beginning of the period.

Timekeeping: It is concerned with recording of workers' time. The recording of time put in by workers is required not only for attendance and wage calculation purpose but also for the purpose of cost calculation.

Time Booking: It means to record the time spent on each work order, job or operation as well as the particulars of work done.

Motion Study: It is a systematic procedure for the analysis of work or job with a view to reducing or eliminating unnecessary work, arranging the remaining work in the best order possible and standardizing the usage of proper work methods.

Job Analysis: It is a systematic exploration, study and recording the responsibilities, duties, skills, accountabilities, work environment and ability requirements of a specific job.

Idle time: Idle time is that time for which the employer pays, but from which he obtains no production.

Normal Idle Time: This represents the time wastage that cannot be avoided and therefore, the employer must bear the labour cost of this time.

Abnormal Idle Time: It is that time wastage which can be avoided if proper precautions are taken.

Differential Piece Rate: Under this scheme earnings vary at different stages in the range of output, sometimes proportionally more, sometimes less, or sometimes in proportion to output, designed to reward efficient workers with the further object of encouraging less efficient workers or a trainee to improve.

3.10 QUESTIONS FOR DISCUSSION

1. What do you understand by labour turnover? Discuss the causes of labour turnover.
2. Control over labour cost will include control over the recruitment, increments and promotions. Discuss.
3. Explain the different methods of timekeeping.
4. What do you understand by time booking? Which documents are generally required for time booking?
5. Discuss the methods of work study. Also discuss their advantages.
6. Explain the uses of job analysis.
7. Explain merit rating system and the different methods of merit ratings.
8. Discuss the treatment of idle time and overtime in the books of accounts.
9. Cost of labour turnover is treated as an overhead expense and should not be charged direct to any work order. Why?
10. Do you think that there is a direct relationship of the labour to a particular production unit or process?
11. Idle time is that time for which the employer pays, but from which he obtains no production. Discuss.
12. During one week, workman B produced 200 units. He receives wages for a guaranteed 4 hours week at the rate of ₹ 1.50 per hour. The estimated time to produce one article is 1/4 hours and under incentive scheme the time allowed is increased by 20 percent. Calculate the gross wages under each of the following methods of remuneration:
 - (a) Time rate
 - (b) Piece work with a guaranteed weekly wage
13. An employee working under a bonus scheme saves 4 hours in a job for which the standard time is 32 hours. Calculate the rate per hour worked and wages payable for time taken under the following alternative scheme (award rate is ₹ 1 per hour).
 - (a) Employee receives an increase in the hourly rate based on percentage that the time saved bears to the time set.
 - (b) A bonus of 10 percent on award rate is payable when standard time (namely, 100% efficiency) is achieved plus a further bonus of 1% on award rate for each 1% in excess of 100 percent efficiency.
14. Critically evaluate the rate system and bonus system of wages payment.
15. Under time rate method payment is made at a rate on attendance by hour, day, week or a month regardless of output. What are the key significance and drawbacks of time rate method?

16. Do you think idle time can be reduced by implementing some effective strategies? Discuss.
17. What factors would you take into consideration in introducing an incentive scheme?
18. Discuss the advantages and disadvantages of the piece rate method of payment of wages. Do you consider that workers remunerated by reference to this method should be required to maintain time records?

Check Your Progress: Model Answer

1. Increments
2. Timekeeping
3. Job card
4. Motion
6. Idle

3.11 REFERENCES/SUGGESTED READINGS

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UNIT 4

METHODS OF WAGE PAYMENT

CONTENTS

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4.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Understand the concept and types of time rate method of wage payment
- Discuss the concept and types of piece rate method of wage payment
- Explain the concept of different incentive schemes

4.1 INTRODUCTION

Remuneration to workers is the most complex problem in a democratic country like India because there is no effective single method of wage payment which is acceptable both to the employers and the workers. Wages as a means of providing income for the workers become the only source of income which determines their economic survival in the society, so they try to force the employers to follow a method of wage or remuneration payment.

Remuneration for labour is wages as remuneration for capital is interest, for land is rent and for organisation is profit. Both direct and indirect labour employed in a factory or industry will have to be paid remuneration for the services rendered by them. The amount of wages or remuneration payable to each of the employees depends on a number of factors. The terms of employment generally specify the rate or pay scale and other allowances payable to workers. In the modern industrial organisation of mass production, a worker's wages are eased upon incentive, job evaluation, negotiated labour contracts, wages plans and profit-sharing, etc.

4.2 METHODS OF REMUNERATION

There are three basic methods of wage payment or remuneration, i.e. time rate method, piece rate method and incentive plans or schemes. The different methods of remuneration or wage payment can be classified into:

1. Time Rate Method
2. Piece Rate Method
3. Incentive Plans/Schemes

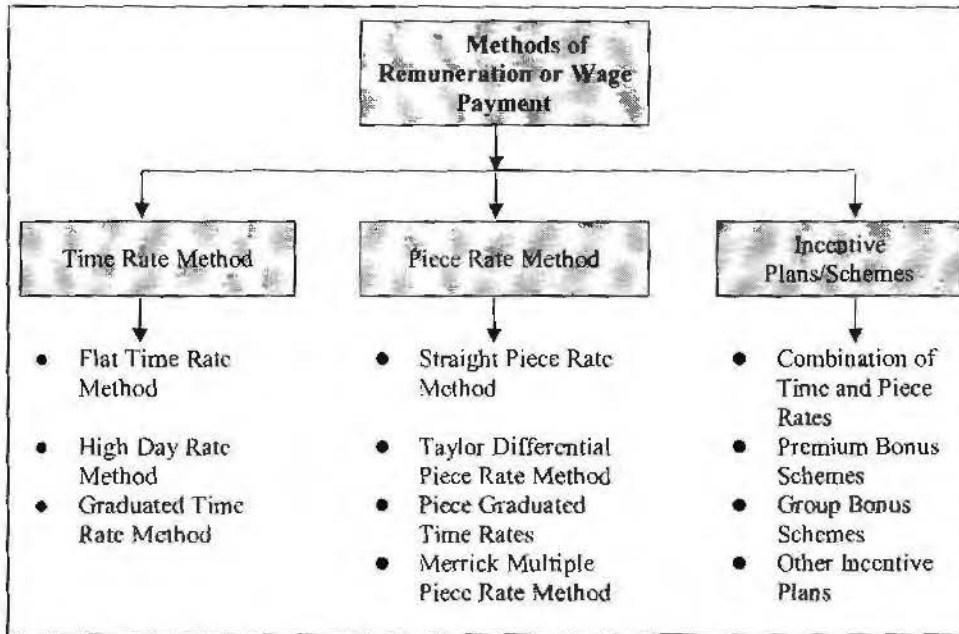


Figure 4.1: Methods of Remuneration

4.2.1 Time Rate Method

Under time rate method of wage payment, the worker is paid at an hourly, daily, weekly and monthly rate. The general features of all the time rate method is that the workers do not get anything beyond their time wages. There are three types of this method, they are as follows:

- (i) **Flat Time Rate Method:** It is the oldest method of wage payment. Under this method, workers or employees are paid at a flat rate on the basis of time they are employed. The flat rate method may be on hour, day, week and month basis. This method of wage payment is most suitable for the skilled and unskilled workers. When payment is made on the basis of hours worked by the employees, wages are to be calculated from the following formula:

$$\text{Wages} = \text{Hours worked} \times \text{Rate per hour}$$

- (ii) **High Rate Method:** This method is similar to the previous method except that the day rates are made high enough, so that in return a much higher standard of performance from the workers is ensured. According to Henry Ford, the time rates at high wage levels are equally effective like other incentive plans.
- (iii) **Graduated Time Rate Method:** Under this method, the wages are paid at time rates which vary with changes in local cost of living index. In India, the basic wage rates normally remain fixed and it is the dearness allowance, other

allowances, etc. that varies with the cost of living. Sometimes, wage rates are adjusted with changes in the selling price of the product.

Advantages of Time Rate Method

The following are the main advantages of this method:

- **Simplicity:** It is the simplest method. Wages can be easily calculated by workers as well as by the management. As the system is very simple to understand, the workers are also satisfied with it.
- **Best Work:** As there is no hurry to the worker for completing the work, he handles work with his all ability and cares the job. Hence, this method is useful for artistic and fine jobs.
- **Safety of Wages:** The timely prescription of wages is very safe. Sickness, accident or less work has no effect on the wages.
- **Economy in Costs:** As labourer and producer are in no hurry for the work, it is done properly and accurately with care so there is no need of control; hence there is economy in administration costs as less supervision is required.
- **Easy Counting:** Workers can calculate their wages easily. Working for a certain period gives them knowledge as to what they have earned as wages.
- **Feeling of Unity:** Workers engaged in the same kind of work with equal wages have the feeling of unity and it makes the union strong.
- **Appropriate Use of Factors of Production:** As there is no rush of work and machines, instruments and materials are properly handled and wastes are avoided.
- **Possibility of Exhibiting Efficiency:** Worker performs the job with care and ably hence he has enough chances to show his job efficiency.

Disadvantages of Time Rate Method

This method has following disadvantages also:

- **Need of More Inspection:** Times wages make the labour costly. They do not care for time and consume time uselessly. Hence to make it disciplined, they need more control and inspection.
- **Fatal to Efficiency:** Efforts and rewards are not correlated in this system. This works as a disincentive to efficient and skilled workers. They feel frustrated. It leaves a bad moral influence on them in the long run.
- **Dissatisfaction among Workers:** Inefficient and efficient persons get equal wages; hence efficient workers lose their enthusiasm for work. They are dissatisfied because of low wages and he may start to search greener pasture.
- **Employer's Complaint:** Employer is unsatisfied with the work of workers even if they do much work. He expects always more work and output from them.
- **Higher Cost of Production:** As there is no check on the quantity of production by workers, more supervision is required. Thus, the additional cost of supervision increases the labour cost per unit.
- **Slow Production:** Worker has no hurry to complete the work hence, there is slow work and production slackens.

4.2.2 Piece Rate Method

The second important method of wage payment is piece rate method. Under this method, the wages are paid on the basis of output of workers without considering the

time taken in performing the work. Thus, the workers are paid on the basis of quantity of work.

This quantity of work is expressed in terms of units e.g. per meter, per tonne, per piece, etc. In this method, the wages are to be calculated from the following formula:

$$\text{Wage} = \text{No. of units produced} \times \text{Rate per unit}$$

Types of Piece Rate Method

The following are the main types of piece rate method:

- (i) ***Straight Piece Rate Method:*** Under this system, payment is made on the basis of a fixed amount per unit or number of units produced without regard to time taken. The wages are to be calculated from the following formula:

$$\text{Wages} = \text{Number of units} \times \text{Rate per unit}$$

The piece rate is usually fixed with the help of work study. Standard time for each job is ascertained first. Piece rate is then ascertained with reference to hourly or daily rate of pay.

- (ii) ***Taylor's Differential Piece Rate Method:*** In the Taylor's differential method, piece rates were determined by time and motion study. Day wages were not guaranteed. There were two rates: very low piece rate and high piece rate. Thus, the system was designed to:

- (a) Reward the efficient workers by setting a high piece rate for high level production.
- (b) Discourage below-average workers by providing no guaranteed wages and setting low piece rate for low level production.

Example. 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:

80 % of piece rate below standard

120 % of piece rate at or above standard.

Worker A produces 1,300 units per day and worker B produces 1,500 units per day.

Solution:

Standard production per 20 seconds = 1 unit

Standard production per minute = $60/20 = 3$ units

Standard production per hour = $3 \times 60 = 180$ units

Standard production per day of 8 hrs (assumed) = $180 \times 8 = 1440$ units

Normal rate per hour = ₹ 1.80

Normal piece rate = ₹ $1.80/180$ units = 1 paisa

Low piece rate below standard production $(1p \times 80)/100 = 0.8$ paise

High piece rate at or above standard $(1p \times 120)/100 = 1.2$ paise

Earning of Worker A

Under straight piece rate system

$$1300 \text{ units @ } 1P = \frac{1300 \times 1}{100} = ₹ 13$$

Under Taylor's Differential Piece-rate System

$$1300 \text{ units @ } 0.8 P = \frac{1300 \times 0.8}{100} = ₹ 10.40$$

Low piece rate has been applied because worker A's daily production of 1300 units is less than the standard daily production of 1,440 units.

Earnings of Worker B

Under Straight Piece-rate System

$$1500 \text{ units @ } 1P = \frac{1500 \times 0.1}{100} = ₹ 15$$

Under Taylor's Differential Piece-rate System

$$1500 \text{ units @ } 1.2P = \frac{1500 \times 1.2}{100} = ₹ 18$$

High piece-rate has been applied because worker B's daily production of 1500 units is more than the standard daily production of 1440 units.

(iii) ***Piece Graduated Time Rate:*** Under this method, workers are paid minimum wages on the basis of time rates. A piece rate method with graduated time rate may include any one of the following:

- (a) Guaranteed wages according to time rate plus a piece rate payment for units above a required minimum.
- (b) Piece rate with a fixed dearness allowance or cost of living bonus.
- (c) If earning on the basis of piece rate is less than the guaranteed minimum wages, the workers will be paid on the basis of time rate.

(iv) ***Merrick's Multiple Piece Rate Method:*** Merrick afterwards modified the Taylor's differential piece rate method. Under this method, the punitive lower rate is not imposed for performance below standard. On the other hand, performance above a certain level is rewarded by more than one higher differential rate. Thus, this method rewards the efficient workers and encourages the less efficient workers to increase their output by not penalizing them for performance. This method also does not guarantee day wages.

Example: Calculate the earnings of workers A, B and C under straight piece rate system and Merrick's multiple piece rate system from the following particulars:

Normal rate per hour = ₹ 1.8

Standard time per unit 1 minute

Output per day is as follows:

Worker A : 384 units

Worker B : 450 units

Worker C : 552 units

Working hours per day are 8

Solution:

Standard output per minute = 1 unit

Standard production per hour = 60 units

Standard production per day of 8 hours = 480 units (8 × 60)

Normal rate per hour = ₹ 1.80

Normal output per hour = 60 units

Normal piece rate = $\frac{1.80}{60} = 3$ paise

Calculation of level of performance:

Standard output per day = 480 units

Worker A's output per day = 384 units

Worker A's level of performance = $\frac{384}{480} \times 100 = 80\%$

Worker B's output per day = 450 units

Worker B's level of performance = $\frac{450}{480} \times 100 = 93.75\%$

Worker C's output per day = 552 units

Worker C's level of performance = $\frac{552}{480} \times 100 = 115\%$

Earnings of Worker A

Under straight piece rate system:

For 384 units @ 3 paise per unit = $384 \times 0.03 = ₹ 11.52$

Under Merrick's multiple piece rate system:

For 384 units @ 3 paise per unit = $384 \times 0.03 = ₹ 11.52$

Earnings of Worker B

Under straight piece rate system:

For 450 units @ 3 paise per unit = $450 \times 0.03 = ₹ 13.50$

Under Merrick's multiple piece rate system:

For 450 units @ 3.3 paise per unit = $450 \times 0.033 = ₹ 14.85$

Earnings of Worker C

Under straight piece rate system:

For 552 units @ 3 paise per unit = $552 \times 0.03 = ₹ 16.56$

Under Merrick's multiple piece rate system:

For 552 units @ 3.6 paise per unit = $552 \times 0.036 = ₹ 19.87$

Worker C's level of performance is 115% which is more than 100% of standard output; so he is entitled to get 120% of normal piece rate (i.e. 120% of 3 paise or 3.6 paise per unit)

Advantages of Piece Rate Method

The following are the main advantages of piece rate method:

- (i) The system works as an incentive to workers to produce more. Under this method, the efficiency of workers has a tendency to increase. Thus, it maximizes output and minimizes the cost of per unit.
- (ii) Under this method, the reward is related to effort and this can be regarded as more equitable than the time rate method.
- (iii) Under this method, the loss of breakage is minimized because the workers handle the machines, tools and implements with great care. They know that the breakage will reduce their output which means reduced wages.
- (iv) The workers always try to discover new method or technique for efficient production resulting in more production and more wages for them.
- (v) As the cost per unit can be known exactly the quotations can be made confidently and accurately.
- (vi) As compared to the time rate method, under this method, the supervision costs are not high, because the workers are to be paid on the basis of performance.

Disadvantages of Piece Rate Method

The following are the disadvantages of piece rate method:

- (i) If there is no good and ready market for production, the problem of over production may arise.
- (ii) The worker may be tempted to have quantity even at the cost of his health.
- (iii) The workers always attempt to maximize their output and in doing so they use the machines and tools recklessly and thus, the breakage cost may increase.
- (iv) Determination of the piece rate is a difficult task and generally disputes take place between employer and employees due to it.
- (v) As more output means more wages, the workers are always in a hurry to produce more. They are encouraged to have quantity at the cost of quality; bad quality means wastage of material and other resources on the same products.
- (vi) The method will frustrate the less efficient workers. The efficiency may further decrease because of discontent.

4.2.3 Incentive Plans/Schemes

The basic purpose of incentive plans to introduce for workers to produce more to earn higher wages. The various incentive plans are available for wage payment to workers. The main incentive plans are discussed as follows:

- (i) Combination of Time and Piece Rates
- (ii) Premium Bonus Schemes
- (iii) Group Bonus Schemes
- (iv) Other Incentive Plans

Combination of Time and Piece Rates

Under this scheme, the following methods are important for wage payment:

(a) **Emerson's Efficiency Bonus Scheme:** This scheme is designed to give encouragement to the slow works to perform better than before. Under this system, time wage is guaranteed. The main features of plan are given below:

- (i) Day wages are guaranteed.
- (ii) A standard time is fixed for each production or output.
- (iii) Below 66 2/3 per cent efficiency, the worker is paid his hourly rate and from 66 2/3 per cent up to 100 per cent efficiency, payments are made on the basis of step bonus rates.
- (iv) Above 100 per cent efficiency, an additional bonus of 1 per cent of the hourly rate is paid for each 1 per cent increase in efficiency.

The formula for calculating earnings under this scheme is:

$$\text{Earnings} = AT \times R + (\text{Percentage of Bonus} \times AT \times R)$$

Example: Standard time 8 hours, standard output 8 units, rate per hour = 3, units produced 5, 6, 7, 8 and 10. The table of premium is as under:

Efficiency (%)	Bonus (%)
67-70	5
71-80	7
81-90	10
91-99	15
100	20

Calculate total wage payment and cost of per unit under Emerson plan.

Solution:

Statement for Total Wage Payment and Cost of Per Unit

Unit output	Time hours	Rate per hours	Daily wages (₹)	Work capacity (%)	Bonus		Total wages (₹)	Cost per unit (₹)
					Percentage	Amount (₹)		
5	8	3	24	62.5	-	-	24.0	4.8
6	8	3	24	75.0	7	1.68	25.68	4.28
7	8	3	24	87.5	10	2.40	26.40	3.77
8	8	3	24	100.0	20	4.80	28.80	3.60
10	8	3	24	125.0	45	10.80	34.80	3.48

(b) **Gantt Task Bonus Scheme:** This method combines time rates, high piece rates and bonus. The day wage under this method is guaranteed. The main features of this method are mentioned below:

- (i) Day wages are guaranteed.
- (ii) Standards are set and bonus is paid if a work is completed within the standard time.
- (iii) Performance below standard is paid on the basis of time rate.
- (iv) Performance above standard is paid at high piece rate. The workers may also receive bonus if the workers/subordinates under him qualify for it.

The time and bonus rates are fixed for each work, and when a work is completed the worker goes on with the next. Thus, this plan provides an incentive for efficient worker to reach a high level of performance and also protects and encourages the less efficient workers by ensuring the payment of their minimum wages in case their performance is below the standard level.

Premium Bonus Schemes

The various schemes under premium bonus scheme combine time wages with piece rates. There are three main schemes under this method:

(a) **Halsey Premium Scheme:** This plan was introduced by F.A. Halsey in the year 1981. It is a simple combination of time and piece rate method. The main features of this scheme are as follows:

- (i) Standard time is fixed for each work or operation.
- (ii) Time rate is guaranteed and the worker receives the guaranteed wages.
- (iii) If the work is completed in less than standard time, a worker is paid a bonus of 50% of the time saved at time rate in addition to his normal time wages.

The formula for calculating bonus and earnings is as follows:

$$\text{Bonus} = 50\% \text{ of } (\text{Time saved} \times \text{Time rate})$$

$$\text{Earnings} = \text{Time rate} \times \text{Time taken} + 50\% \text{ of } (\text{Time saved} \times \text{Time rate})$$

Example: Calculate total earnings from the following data:

Normal hourly rate ₹ 4

Time allowed for a job 20 hours

Time taken 16 hours

Solution:

$$\begin{aligned} \text{Total earnings} &= \text{Time rate} \times \text{Time taken} + 50\% \text{ of } (\text{Time saved} \times \text{Time rate}) \\ &= (16 \times ₹ 4) + \frac{1}{2} (20 - 16) \times ₹ 4 \\ &= ₹ 64 + 4 \\ &= ₹ 68 \end{aligned}$$

Example:

Rate per hour = ₹ 1.50 per hour

Time allowed for job = 20 hours

Time taken = 15 hours

Calculate the total earnings of the worker under the Halsey Plan. Also find out effective rate of earnings.

Solution:

Standard time (S) = 20 hours

Time taken (T) = 15 hours

Rate per hour (R) = ₹ 1.50 per hour

Total Earnings = $T \times R + 50\% (S - T) \times R$

$$= 15 \times ₹ 1.50 + \frac{50}{100} (20 - 15) \times ₹ 1.50 = ₹ 26.25$$

Total wages for 15 hours = ₹ 26.25

$$\begin{aligned}\text{Therefore, effective rate of earning per hour} &= \frac{\text{Total Wages}}{\text{Actual Time Taken}} \\ &= \frac{26.25}{15} = ₹ 1.75\end{aligned}$$

(The percentage of bonus is taken as 50% when not given)

- (b) **Halsey-Weir Scheme:** Under this scheme, a worker will get a bonus of 30% of time saved as against 50% in the case of previous scheme. In other respects, both Halsey and Halsey-Weir Schemes are similar.

Example: Continuing the previous problem, the earnings under this scheme will be:

$$\begin{aligned}&= (16 \times ₹ 4) + 30/100 (20 - 16) \times ₹ 2 \\ &= ₹ 64 + 2.40 \\ &= ₹ 66.40\end{aligned}$$

- (c) **Rowan Premium Scheme:** This scheme was introduced by D. Rowan in 1901. As before, the bonus is paid on the basis of time saved. This plan is also similar to Halsey plan except in calculation of bonus. Formulas for calculating wages are:

- (i) Total Wages = Time wages + (Time wages × Bonus ratio)
(ii) Total Wages = Time taken × (Hourly rate + Hourly rate × Bonus ratio)

$$\text{Time Saved} = \text{Time allowed} - \text{Time taken}$$

Example: Calculate total earnings from the following data:

Time taken 8 hours
Time allowed 10 hours
Rate per hour ₹ 2

Solution:

$$\text{Bonus ratio is} = \frac{10 - 8}{10} = \frac{2}{10} = \frac{1}{5}$$

Total earnings by method (i)

$$\begin{aligned}&= 8 \text{ hrs.} \times ₹ 2 + ₹ 16 \times 1/5 \\ &= ₹ 16 + 3.20 \\ &= ₹ 19.20\end{aligned}$$

Total earnings from method (ii)

$$\begin{aligned}&= 8 \text{ hrs.} \times (₹ 2 + ₹ 2 \times 1/5) \\ &= 8 \text{ hrs.} \times ₹ 2.40 \\ &= ₹ 19.20\end{aligned}$$

The advantages of Rowan Premium Scheme are as follows:

- (i) It is suitable for learners and beginners.
- (ii) The workers share the benefit with the employer.
- (iii) This scheme provides a safeguard against loose fixation of standard.

The disadvantages of Rowan Premium Scheme are as follows:

- (i) It is more complicated than the Halsey premium scheme.
- (ii) The employers share the bonus earned by workers.
- (iii) Incentive is not as attractive as it is with his piece work rate.

Example: A worker completes a job in a certain number of hours. The standard time allowed for the job is 10 hours, and the hourly rate of wages is ₹ 1. The worker earns a 50% rate of bonus of ₹ 2 under Halsey Plan. Ascertain his total wages under the Rowan Premium Plan.

Solution:

The worker earns ₹ 2 as bonus at 50%; so total bonus at 100% should be ₹ 4. The hourly rate of wages being ₹ 1, the time saved should be 4 hours.

Standard time allowed 10 hours

Less: Time Saved 4 hours

Time Taken 6 hours

Earnings under the Rowan Premium Plan

$$\text{Earnings} = T \times R + \frac{(S - T)}{S} \times T \times R$$

Where, T = 6 hours

S = 10 hours

R = ₹ 1 per hour

$$\text{Earnings} = 6 \times 1 + \frac{(10 - 6)}{10} \times 6 \times 1 = ₹ 8.40$$

Group Bonus Schemes

In all the premium schemes discussed so far, the bonus payable to an individual was ascertained. But bonus scheme for a group of workers working together may also be introduced where:

- (a) It is necessary to have a team work.
- (b) It is difficult to measure the output of individual workers because the output depends upon the combined effort of a team of workers.
- (c) It is required to reward not only the direct workers but also the indirect workers.

Types of Group Bonus Schemes

Some of the group bonus schemes are described below:

- (a) **Priestman's Production Bonus:** Under this plan, a standard is fixed in terms of units. If actual output, measured similarly, exceeds standard, the workers will receive a bonus in proportion to the increase. Therefore, this method can operate in an industry where there is mass production of a standard product with little.
- (b) **Towne Gain Sharing Plan:** According to this plan, 50% of savings in cost is paid to individual workers in addition to their basic wages. In this plan, the bonus is calculated on the basis of reduction in labour cost. The supervisory staff may also receive a share of the bonus.

- (c) **Scanlon Plan:** Under this plan, a constant proportion (ratio of wages to sales value) of the added value of output is paid to the workers who are responsible for the addition of the value. The added value is the change in market value.

Advantages of Group Bonus Schemes

The advantages of group bonus schemes are as follows:

- (i) It creates a team spirit for high output or high production.
- (ii) It guarantees time wages to the members of a group.
- (iii) Harmonious working in a group leads to increased output and lower cost of production.
- (iv) It eliminates excessive wastage of time.

Disadvantages of Group Bonus Schemes

The disadvantages of group bonus schemes are as follows:

- (i) The effort of more efficient workers are not properly rewarded.
- (ii) The production of a group should be independent of any other group.
- (iii) It is difficult to fix the amount of incentive and its principle of distribution among the workers.

Other Incentive Plans

Other incentive plans may be divided into two incentive plans.

- (a) **Indirect Monetary Plans:** These plans are further divided into:

- (i) **Profit-sharing Plan:** Under this plan, the employees are entitled, by virtue of an agreement, to a share of profits at an agreed percentage in addition to their wages. This type of plan recognizes the principle that every worker contributes something towards profits and hence he should be paid a percentage thereof.
- (ii) **Co-partnership Plan:** Under this plan, employees are allowed to have a share in the capital of the industry or organisation and thereby to have a share of the profit, when co-partnership operates in conjunction with the profit sharing. The employees are allowed to leave their bonus with the industry or organisation as shares or as a loan carrying minimum interest.

- (b) **Non-monetary Plans:** These plans are provided by the undertaking to make the conditions of employment more attractive, and to promote better health and atmosphere in the workers. Non-monetary plans may be entirely free by the industry or organisation. They are wide in number and may include:

- (i) Canteen-free or subsidized basis
- (ii) Entertainment facilities
- (iii) Health and safety facilities
- (iv) Club facilities
- (v) Housing facilities
- (vi) Educational and training facilities
- (vii) Pension, Provident fund schemes facilities

Check Your Progress

Fill in the blanks:

1. Under _____ Rate, workers are paid minimum wages on the basis of time rates.
2. The basic purpose of _____ to introduce for workers is to produce more to earn higher wages.
3. _____ Bonus Scheme is designed to give encouragement to the slow works to perform better than before.
4. _____ plans are provided by the undertaking to make the conditions of employment more attractive, and to promote better health and atmosphere in the workers.
5. _____ Scheme combines time rates, high piece rates and bonus.
6. Under Halsey premium scheme Time rate is guaranteed and the worker receives _____ wages.

4.3 LET US SUM UP

- Remuneration to workers is the most complex problem in a democratic country like India because there is no effective single method of wage payment which is acceptable both to the employers and the workers. Wages as a means of providing income for the workers become the only source of income which determines their economic survival in the society, so they try to force the employers to follow a method of wage or remuneration payment.
- There are three basic methods of wage payment or remuneration, i.e. time rate method, piece rate method and incentive plans or schemes. The different methods of remuneration or wage payment can be classified into Time Rate Method, Piece Rate Method and Incentive Plans/Schemes.
- Under time rate method of wage payment, the worker is paid at an hourly, daily, weekly and monthly rate. The general features of all the time rate method is that the workers do not get anything beyond their time wages. The second important method of wage payment is piece rate method. Under this method, the wages are paid on the basis of output of workers without considering the time taken in performing the work. Thus, the workers are paid on the basis of quantity of work. The basic purpose of incentive plans to motivate the workers to produce more to earn higher wages. The main incentive plans are Combination of Time and Piece Rates, Premium Bonus Schemes Group Bonus Schemes and Other Incentive Plans.
- Bonus scheme for a group of workers working together may also be introduced where it is necessary to have a team work, it is difficult to measure the output of individual workers because the output depends upon the combined effort of a team of workers, and it is required to reward not only the direct workers but also the indirect workers.

4.4 UNIT END ACTIVITY

Discuss the advantages and disadvantages of the piece rate method of payment of wages. Do you think that workers remunerated by reference to this method should be required to maintain time records?

4.5 KEYWORDS

Flat Time Rate Method: Under this method, workers or employees are paid at a flat rate on the basis of time they are employed.

Graduated Time Rate Method: Under this method, the wages are paid to the workers at time rates which vary with changes in local cost of living index.

Straight Piece Rate Method: Under this system, payment is made on the basis of a fixed amount per unit or number of units produced without regard to time taken.

Merrick Multiple Piece Rate Method: Under this method, the punitive lower rate is not imposed for performance below standard. On the other hand, performance above a certain level is rewarded by more than one higher differential rate.

Priestman's Production Bonus: Under this plan, a standard is fixed in terms of units. If actual output, measured similarly, exceeds standard, the workers will receive a bonus in proportion to the increase.

4.6 QUESTIONS FOR DISCUSSION

1. Describe the methods of remunerating labour.
2. Define time rates and its advantages and disadvantages.
3. What are the objectives of a group bonus scheme? Enumerate the circumstances where group bonus schemes may be successfully operated.
4. Standard time is 24 hours. The hourly rate of guaranteed wage is ₹ 3. Because of time saved, a worker namely Mr. Rajesh gets an effective hourly wage rate of ₹ 3.75 under Rowan Premium Plan. For the same saving in time, calculate the effective hourly rate of wages for Mr. Rajesh under Halsey System.
5. During one week, the workman A manufactured 200 units. He received wages for a guaranteed 45 hours week at the rate of ₹ 15 per hour. The time allowed to produce one unit is 15 minutes which is increased by 20% in case of piece rate system. Calculate his gross wages under each of the following methods of remunerating labour:
 - (a) Time Rate
 - (b) Piece Rate
 - (c) Halsey Premium Plan
 - (d) Rowan Premium Plan
6. Briefly distinguish among straight piece rates, piece rates with guaranteed day rates and differential piece rates.
7. Write a short note on Merrick's differential piece rate system.

Check Your Progress: Model Answer

1. Piece Graduated Time
2. Incentive plans
3. Emerson Efficiency
4. Non-monetary
5. Gantt Task Bonus
6. Guaranteed

4.7 REFERENCES/SUGGESTED READINGS

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BLOCK – II

UNIT 5

UNIT COSTING AND COST SHEET

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5.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Understand the concept of unit costing and cost sheet
- Discuss direct cost classification and indirect cost classification

- Explain how to prepare of cost sheet
- Describe the concept of tender price and manufacturing account

5.1 INTRODUCTION

The method which is used to ascertain the cost of a product or services is called costing. The methods to be used for the ascertainment of cost differ from industry to industry. The unit of output costing is suitable for the industry, where goods are manufactured in units and are identical in nature. As its name implies, unit or output costing is a method of costing under which cost of a single product, which is produced, by a continuous manufacturing process, is ascertained or determined. It also determines the amount of each element constituting such cost.

5.2 UNIT COSTING OR OUTPUT COSTING

Under costing, the role of unit costing is a significant tool for the industries not only to identify the volume of costs incurred at every level but also to determine the rational price on the commodities in order to withstand among the competitors. The determination of the selling price is being done through the process of determining the cost of the product. After having finalized the cost of the product, the profit margin has to be added in order to derive the final selling price of the product.

"Unit costing method is a method of costing applied to ascertain the cost per unit or production where standard and identical products are manufactured."

—Walter W. Bigg

This unit costing is also known as single costing. It is used in those industries where a single or only a few grades of similar articles are manufactured. For example, paper, cement, bricks, coal, etc. Unit or output costing is an important method of costing through which cost per unit is ascertained. The cost per unit of an article is obtained by dividing the total production cost by the number of units manufactured during a given period of time.

The basic concept of this method of costing is to ascertain the cost per unit of output. The cost per unit is ascertained by dividing the total cost incurred on the production of a product by the number of unit of that product. In other words, under this method, total cost is determined by adding all kinds of incurred costs first the total production units to determine cost per unit.

The following formula is used to ascertain cost per unit.

$$\text{Cost Per Unit} = \text{Total Cost} / \text{Number of Units Produced}$$

Under this method, the total cost incurred is divided by total production to determine the cost per unit. Moreover, the cost is collected element wise and the cost of each element is divided by total production to determine the cost per unit of each element.

This costing method is also known as single costing since the process of production includes only one stage or a single operation. Under this method, generally a statement called cost sheet is prepared to determine cost per unit or total cost.

5.2.1 Objectives of Unit/Output Costing

The objectives of unit/output costing are to:

- Know the total cost of production
- Classify cost under related categories such as prime cost, works cost, etc.

- Determine the effect of each element of cost
- Compare cost during two or more periods
- Determine proposed setting price to earn desired profit
- Determine tender price on the basis of cost data and future prospects

5.2.2 Importance of Unit Costing

Unit or output costing helps both in ascertainment and control of cost. It determines cost per unit of the products on the basis of which the selling price of products can be fixed. Thus, a unit or output costing has the following importance:

- **Ascertainment of cost:** It helps in ascertainment of total cost and cost per unit at different stages of production.
- **Controlling costs:** It helps in controlling and reducing costs since time to time costs are compared with previous period costs and leakages and wastage are checked.
- **Fixation of selling price:** It provides data about the cost of a job or product and on the basis of such data appropriate selling price of the product can be fixed
- **Submitting tenders:** It also helps the business in ascertaining the tender price by providing information about estimated cost on the basis of past data.
- **Formulating production policy:** It acts as a guide to the manufacturer and helps him in formulation a profitable production policy.

5.2.3 Limitations of Unit Costing

Unit or output costing is very much important method for ascertaining the total cost and cost per unit, but it is not free from certain limitations. These are as under:

- **Limitations of historical cost:** Unit or output costing, being basically of historical nature, suffers from all the defects of historical costing.
- **Useful only for homogeneous products:** This costing method can be used only for homogeneous products and not for heterogeneous products.
- **Not sufficient for cost control:** This costing system simply determines total cost and per unit cost of the products which is by itself not sufficient for cost control.
- **Arithmetical accuracy cannot be checked:** Under this system, generally a statement is prepared which does not form a part of the double entry system. Therefore, arithmetical accuracy cannot be checked under this system.

5.2.4 Ascertainment of Cost per Unit in Unit Costing

The main purpose of unit costing is the ascertainment of cost per unit. It is followed by the object of analyzing the cost of each element and its share in the total cost. For this purpose, costs are accumulated and analyzed under various elements of cost.

The financial records are used for the collection of direct cost and expenses. The costing records are used for the collection of indirect cost and expenses. The cost records like materials abstract, wage abstract, time records and cost ledger are some of the records used for the purpose of cost ascertainment of a unit.

5.3 COST ACCUMULATION PROCEDURE IN UNIT COSTING

The cost details of various elements of costs are collected from the financial records. For which, the financial records can be suitably designed. Hence, there is no need of maintaining separate set of books for collecting costing information. The following costing information is required for unit costing.

1. **Value of Raw Materials Consumed:** The material requisition slip is the basis for collecting the value of raw materials consumption. The materials are issued only on the basis of authorized material requisition slip. The authorization slip discloses the details of quantity of materials with values in various grades and types. If the materials are damaged during storage and handling, adjusted by increasing the issue price of materials, so as to indicate normal loss. The abnormal loss should be charged to costing Profit and Loss Account.
2. **Cost of Labour:** The labour is divided into two categories i.e. direct labour and indirect labour. If the workers are directly engaged in the manufacturing activities, they are treated as direct labour and can be identified and calculated the direct labour with the help of production details. A few workers are engaged in general factory activities; they can be put in a separate category in wage sheet.
3. **Overhead:** The overheads are classified on functional basis for unit costing purpose. The factory overhead or production overhead, office and administration overhead and selling and distribution overhead are the classifications of overhead. These overheads are recovered on predetermined rate for cost accounting purposes. The actual overheads incurred are collected from the financial records. The cost statements are prepared at short intervals with the help of predetermined overhead rate.

5.4 COST SHEET

Cost sheet is "a document which provides for the assembly of the estimated detailed cost in respect of a cost centre pool a cost unit". It is a period's document of cost designed to exhibit the total cost and the unit cost of products in an analytically and detailed form. In other words, a cost sheet presents cost information in such a manner that it can show cost of total production, quantity of production and per unit cost of production.

"It is a statement of costs incurred at every level of manufacturing a product or service."

"It is a statement prepared to depict the output of a particular accounting period along with break-up of costs."

Cost sheet is an operating statement. It analyses and classifies the expenses on different items for a particular period in a tabular form. It may be prepared by weekly, monthly, quarterly, half yearly or yearly at any convenient interval of time. Similarly, it may be prepared on the basis of actual or estimated cost depending on the purpose to be achieved. It is online memorandum statement, not an account. It does not form a part of the double entry system.

5.4.1 Purposes of Cost Sheet

A properly prepared statement of cost serves the following purposes:

- It helps in fixing selling prices more accurately.
- It helps comparisons of costing of similar jobs or between costs of similar periods.
- It gives information for compilation of estimates quotations or tenders.

- It provides useful information to trace wastage, losses and inefficiencies and those affect economics.
- It acts as a guide to the producer and helps him in formulation a definitive complete production policy.

5.4.2 Elements of Cost Sheet

Accounting to natural characteristics, costs can be classified into three groups (a) materials cost, (b) labour costs and (c) expenses. They are known as elements of cost. There are three elements may be further sub-divided as shown below:

1. **Materials Cost:** Materials cost is the cost of materials used to manufacture a product or provide a service.
 - (a) *Direct material:* Direct materials are those materials, which can be identified with and allocated to cost unit covertly. They become part of the production. For example, wood cost is direct material for any furniture item.
 - (b) *Indirect material:* Material used in the manufacture of a job a product which cannot be readily identified with, it will be indirect materials. For example, cost of nails, glue, polish, etc. for any furniture.
2. **Labour Cost:** It describe all costs incurred by an employer from the employment of labour.
 - (a) *Direct labour:* Direct labour is the wages which can be conveniently identified with and allocated to cost units. These comprise wage paid to workers who are engaged to produce a product in a manufacturing concern. As, in printing press, wages are paid on composites.
 - (b) *Indirect labour:* Indirect labour is the wages which cannot be conveniently included or allocated with cost units. It implies that the time paid for was not used for a particular cost unit but for work in general as wages are paid to storekeeper in a printing press.
3. **Expenses:** Money spend on cost incurred in an organisation efforts to generate revenue, representing the cost of doing business.
 - (a) *Direct expenses:* Direct expenses consist of any expenditure (other than direct material and direct labour) which can be identified with and allocated to cost units. These are called as chargeable expenses. The examples of direct expense are:
 - (i) Fees paid to architects of building.
 - (ii) Hire of equipment for particulars.
 - (iii) Cost of special layout, design or drawing
 - (iv) Royalty paid to concerned parties
 - (v) Experiment work cost
 - (b) *Indirect expenses:* Indirect expenses cannot be conveniently allocated to cost units. As for example, (i) rent, rates, insurance of factory premises, (ii) depreciation and repairs of machine and (iii) welfare and medical expenses.

Actually, indirect expenses divided under three groups (a) factory overhead, (b) office and administrative overhead and (c) selling and distribution overhead.

5.5 DIRECT COST CLASSIFICATION

Under this classification, the direct costs of the product or service are added together to know the volume of total direct cost. The total volume of direct cost is known as "Prime Cost."

Direct Materials + Direct Labour + Direct Expenses = Prime cost

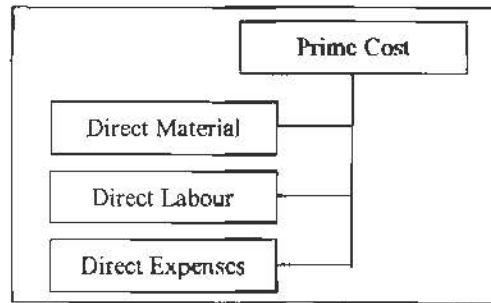


Figure 5.1: Elements of Prime Cost

1. **Direct Material Cost:** It includes:
 - (a) Materials including component parts, raw materials, specially purchased material for a specified job, order or processes
 - (b) Materials passing from one operation or process to another
 - (c) Primary packing materials such as cartoons, cardboard boxes
2. **Direct Labour Cost:** It includes:
 - (a) Labourer engaged in altering the condition, confirmation and composition of the product
 - (b) Inspector, analyst, designer, expert specially required for production
 - (c) If specially identified, the wage of foreman, shop clerks, the wages of internal transport personnel
3. **Direct Expenses:** It includes:
 - (a) Cost of special designs, drawings or layouts
 - (b) Hire of special tools and equipment for a particular job
 - (c) Maintenance cost of these special tools and equipment

The next stage in the cost accounting is to find out the factory cost. The factory cost could be computed by the combination of the indirect cost classification.

5.6 INDIRECT COST CLASSIFICATION

Among the classification of the overheads, the first and foremost is factory overheads. The factory overheads and work overheads are synonymously used. The factory overheads are nothing but the indirect costs incurred at the factory site. The total factory cost or works cost incurred in the factory could be derived by adding the both direct cost and indirect cost incurred during the factory process.

Factory Cost = Prime cost + Factory Overheads

Prime costs include direct labour, materials, bought-outs and sub-contracts, while factory overheads are nothing but the indirect expenses incurred during the individual process.

Example: Calculate the factory cost for the following data:

Cost of Direct Materials	2,00,000
Direct Wages	50,000
Direct Expenses	10,000

Wages of Foreman	5,000
Electric Power	2,000
Lighting of the Factory	4,000
Storekeeper's Wages	2,500
Oil and Water	1,000
Rent of the Factory	10,500
Depreciation in Plant	1,000
Consumable Store	5,000
Repairs and Renewal Plant	7,000

Solution:

Factory Cost = Prime Cost + Factory Overheads

Prime Cost = Cost of Direct Materials + Direct Wages + Direct Expenses
 = ₹ 2,00,000 + ₹ 50,000 + ₹ 10,000
 = ₹ 2,60,000

Factory Overheads = Wages of Foreman + Electric Power + Lighting of the Factory
 + Storekeeper's Wages + Oil and Water + Rent of the Factory
 + Depreciation in Plant + Consumable Store + Repairs and
 Renewal Plant
 = 2,00,000 + 50,000 + 10,000 + 5,000 + 2,000 + 4,000 + 2,500 +
 1,000 + 10,500 + 1,000 + 5,000 + 7,000
 = ₹ 2,98,000

Hence, Factory Cost = 2,60,000 + 2,98,000
 = ₹ 5,58,000

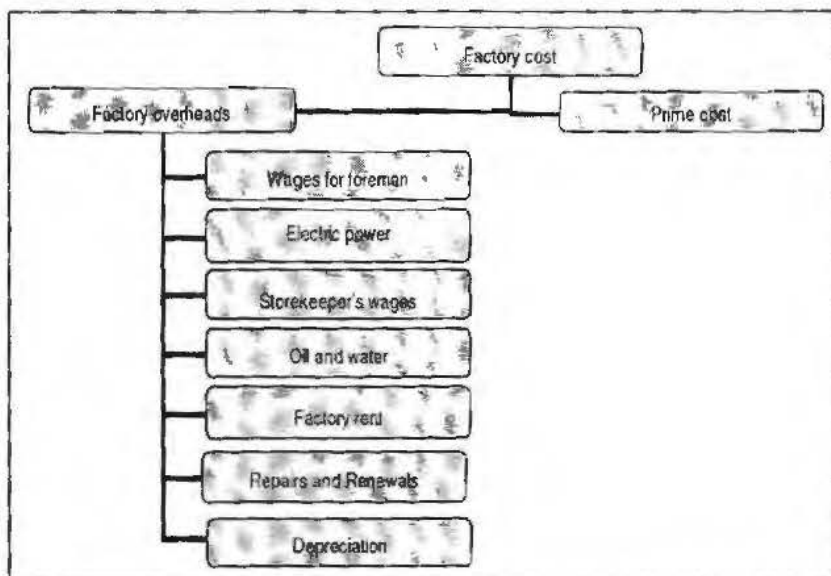


Figure 5.2: Elements of Factory Cost

The next stage in the process of the unit costing is to find out the cost of the production. The cost of production is the combination of both the factory cost and administrative overheads.

$$\text{Cost Production} = \text{Factory Cost} + \text{Administrative Overheads}$$

An **administrative overhead** is the indirect expenses incurred during the office administration for the smooth flow production of finished goods.

Example: In the example discussed to measure factory cost, if the following data is added

Office Rent	6,000
Office Lighting	1,250
Office Depreciation	3,500
Director's Fees	2,500
Manager's Salary	10,000
Office Stationery	1,000
Telephone Charges	500
Postage and Telegrams	250

Calculate Production Cost.

Solution:

$$\text{Production Cost} = \text{Factory Cost} + \text{Administrative Cost}$$

$$\text{Factory Cost} = 5,58,000 \text{ (from the previous example)}$$

$$\begin{aligned} \text{Administrative Cost} &= \text{Office Rent} + \text{Office Lighting} + \text{Office Depreciation} + \\ &\quad \text{Director's Fees} + \text{Manager's Salary} + \text{Office Stationery} + \\ &\quad \text{Telephone Charges} + \text{Postage and Telegrams} \\ &= 6,000 + 1,250 + 3,500 + 2,500 + 10,000 + 1,000 + 500 + \\ &\quad 250 \\ &= 25,000 \end{aligned}$$

$$\begin{aligned} \text{Hence, Production Cost} &= 5,58,000 + 25,000 \\ &= 5,83,000 \end{aligned}$$

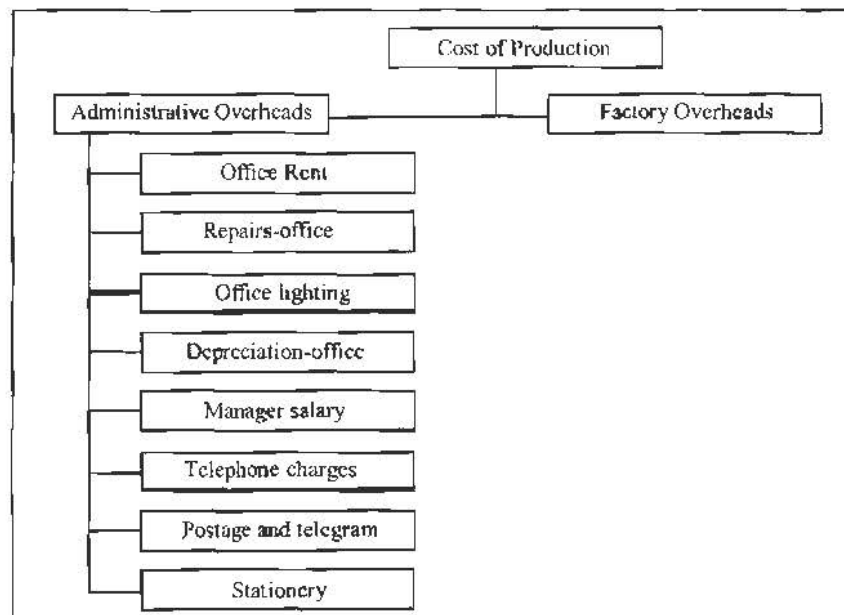


Figure 5.3: Elements of Cost of Production

Immediate next stage to determine in the process of unit costing is the component of cost of sales. The cost of sales is the blend of both, selling overheads and cost of production.

Whatever the cost involved in the production process in the factory as well in the administrative proceedings are clubbed with the selling overheads to determine the cost of sales.

$$\text{Cost of Sales} = \text{Cost of Production} + \text{Selling Overheads}$$

Selling overheads are nothing but the indirect expenses incurred by the firm at the moment of selling products. In brief, whatever the expenses in relevance with the selling and distribution are known as selling overheads.

Example: In the example continued, if we add the following data,

Salesman's Salary	10,500
Travelling Expenses	1,000
Carriage Outward	750
Advertising	3,500
Warehouse Charges	1,000

Calculate the cost of sales.

Solution:

$$\text{Cost of Sales} = \text{Cost of Production} + \text{Selling Overheads}$$

Cost of Production = ₹ 5,83,000 (from the previous example)

$$\begin{aligned} \text{Selling Overheads} &= \text{Salesman's Salary} + \text{Travelling Expenses} + \text{Carriage Outward} + \\ &\quad \text{Advertising} + \text{Warehouse Charges} \\ &= 10,500 + 1,000 + 750 + 3,500 + 1,000 \\ &= ₹ 16,750 \end{aligned}$$

$$\begin{aligned} \text{Hence, Cost of Sales} &= 5,83,000 + 16,750 \\ &= ₹ 5,99,750 \end{aligned}$$

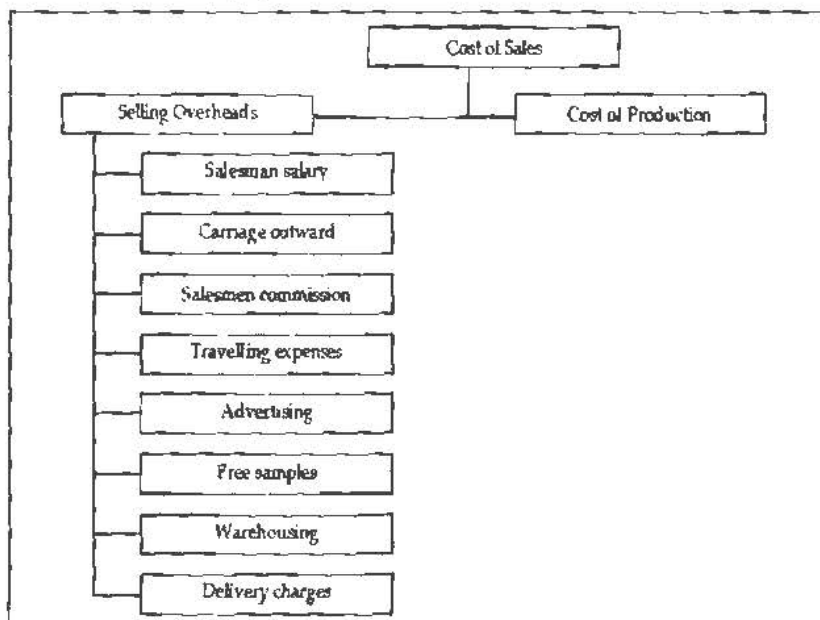


Figure 5.4: Elements of Cost of Sales

The last but most important stage in the unit costing is determining the selling price of the commodities. The selling price of the commodities is fixed by way of adding both the cost of sales and profit margin out of the product sales.

$$\text{Sales} = \text{Cost of Sales} + \text{Margin of Profit}$$

Example: In the example continued, if we add the profit that can be earned to be ₹ 48,900. Calculate the product sales expected.

Solution:

$$\begin{aligned} \text{Sales} &= \text{Cost of Sales} + \text{Margin of Profit} \\ &= 5,99,750 \text{ (from the previous example)} + 48,900 \\ &= ₹ 6,48,650 \end{aligned}$$

Under the unit costing, the selling price of the product can be determined through the statement form.

Example: Calculate the prime cost, factory cost, cost of production cost of sales and profit from the following particulars:

Direct materials	2,00,000	Office stationery	1,000
Direct wages	50,000	Telephone charges	250
Direct expenses	10,000	Postage and telegrams	500
Wages of foreman	5,000	Salesmen's salaries	2500
Electric power	1,000	Travelling expenses	1,000
Lighting: Factory	3,000	Repairs and renewal plant	7,000
Office	1,000	Office premises	1,000
Storekeeper's wages	2,000	Carriage outward	750
Oil and water	1,000	Transfer to reserves	1,000
Rent: Factory	10,000	Discount on shares written off	1000
Office	5,000	Advertising	2,500
Depreciation Plant	1,000	Warehouse charges	1000
Office	2,500	Sales	3,79,000
Consumable store	5,000	Income tax	20,000
Managers' salary	10,000	Dividend	4,000
Directors' fees	2,500		

Solution:

Cost Statement/Cost Sheet

Particulars		
Direct Materials	2,00,000	
Direct wages	50,000	
Direct expenses	10,000	
Prime Cost		2,60,000
Factory Overheads:		
Wages of foreman	5,000	
Electric power	1,000	
Lighting : Factory	3,000	
Storekeeper's wages	2,000	

Contd.

Oil and water	1000	
Rent: Factory	10,000	
Depreciation Plant	1000	
Consumable store	5,000	
Repairs and Renewal Plant	7,000	35,000
Factory Cost		2,95,000
Administration Overheads:		
Rent Office	5,000	
Depreciation office	2,500	
Managers Salary	10,000	
Directors Fees	2,500	
Office stationery	1,000	
Telephone charges	250	
Postage and telegrams	500	
Office premises	1,000	
Lighting: Office	1,000	23,750
Cost of production		3,18,750
Selling and distribution overheads:		
Carnage outward	750	
Salesmen's salaries	2500	
Travelling expenses	1,000	
Advertising	2500	
Warehouse charges	1000	
	7,750	
Cost of Sales		3,26,500
Profit		52,500
Sales		3,79,000

The next stage in the preparation of the cost statement is to induct the stock of raw materials, work in progress and finished goods.

5.6.1 Stock of Raw Materials

The raw materials stock should be taken into consideration for the preparation of the cost sheet. The cost of the raw materials is nothing but the direct materials cost of the product. The cost of the materials is, in other words, cost of the materials consumed for the production of a product.

Particulars	
Opening stock of raw materials	XXXXX
(+) Purchases of raw materials	XXXXX
(-) Closing stock of raw materials	XXXXX
Cost of materials consumed	XXXXX

5.6.2 Stock of Semi-finished Goods

The treatment of the stock of semi-finished goods is mainly depending upon the two different approaches, viz.

1. Prime cost basis, and
2. Factory cost basis.

The factory cost basis is considered to be predominant over the early one due to the consideration of factory overheads at the moment of semi-finished goods treatment. The indirect expenses are the expenses converting the raw materials into semi-finished goods which should be relatively considered for the treatment of the stock valuation rather than on the basis of prime cost.

Particulars	
Prime cost	XXXXXX
(+) Factory overheads incurred	XXXXXX
(+) Opening work in progress	XXXXXX
(-) Closing work in progress	XXXXXX
Factory cost	XXXXXX

5.6.3 Stock of Finished Goods

The treatment of the stock of finished goods should be carried over in between the opening stock and closing stock and adjusted among them before the finding the cost of goods sold.

Particulars	
Cost of production	XXXXXX
(+) Opening stock of finished goods	XXXXXX
(-) Closing stock of finished goods	XXXXXX
Cost of goods sold	XXXXXX

Example: The following data has been from the records of Centre Corporation for the period from June 1 to June 30, 2005.

	2005 1 st Jan	2005 31 st Jan
Cost of raw materials	60,000	50,000
Cost of work in progress	24,000	30,000
Cost of finished good	1,20,000	1,10,000
Transaction during the month		
Purchase of raw materials		9,00,000
Wages paid		4,60,000
Factory overheads		1,84,000
Administration overheads		60,000
Selling overheads		40,000
Sales		18,00,000

Draft the cost sheet.

Solution:

Cost Sheet

Particulars		
Opening stock of raw materials 1 st Jan	60,000	
(+) Purchase of raw materials	9,00,000	
(-) Closing stock of raw materials 31 st Jan	50,000	
Raw materials consumed during the year		9,10,000
(+) Wages paid		4,60,000

Contd.

Prime cost		13,70,000
Factory overheads	1,84,000	
(+) Opening stock of semi-goods	24,000	
(-) Closing stock of semi-goods	30,000	
Factory overheads		1,78,000
Factory or Works cost		15,48,000
(+) Administration overheads		60,000
Cost of Production		16,08,000
(+) Opening stock of finished goods	1,20,000	
(-) Closing stock of finished goods	1,10,000	
Cost of goods sold		16,18,000
(+) Selling overheads		40,000
Cost of Sales		16,58,000
Net profit		1,42,000
Sales		18,00,000

Example: From the following information which is extracted from the records of the M/s Sundaram & Co.

The stock position of the firm is given below:

Particulars	1-4-1994	31-3-1995
Stock of raw materials	80,000	1,00,000
Stock of finished goods	2,00,000	3,00,000
Stock of work in progress	20,000	28,000

Particulars		Particulars	
Indirect labour	1,00,000	Administrative expenses	2,00,000
Oil	20,000	Electricity	60,000
Insurance on fixtures	6,000	Direct labour	6,00,000
Purchase of raw materials	8,00,000	Depreciation on Machinery	1,00,000
Sale commission	1,20,000	Factory rent	1,20,000
Salaries of salesmen	2,00,000	Property tax on building	22,000
Carriage outward	40,000	Sales	24,00,000

Prepare cost statement of M/s Sundaram & Co.

Solution:

Cost sheet

Particulars		
Opening stock of raw materials on 1 st April, 1994	80,000	
(+) Purchase of raw materials	8,00,000	
(-) Closing stock of raw materials on 31 st Jan	1,00,000	
Raw materials consumed during the year		7,80,000
(+) Direct labour		6,00,000
Prime cost		13,80,000
Factory overheads:		
Indirect labour	1,00,000	
Oil	20,000	
Insurance on fixtures	6,000	

Contd...

Depreciation on machinery	1,00,000	
Factory rent	1,20,000	
Property tax on factory building	22,000	4,28,000
(+) Opening stock of semi-finished goods		20,000
(-) Closing stock of semi-finished goods		28,000
Factory cost		18,00,000
(+) Administration overheads		2,00,000
Cost of Production		20,00,000
(+) Opening stock of finished goods		2,00,000
(-) Closing stock of finished goods		3,00,000
Cost of goods sold		19,00,000
Selling overheads:		
Sales commission		1,20,000
Salaries of salesmen		2,00,000
Carriage outward		40,000
Cost of sales		22,60,000
Profit margin		1,40,000
Sales		24,00,000

Note: Property tax on the plant is to be included under the factory overheads. The tax is paid by the firm on the plant which is engaged in the production process.

5.7 TENDER OR QUOTATION SHEET

A manufacturing concern is frequently required to give tenders or quotations for supply of goods manufactured by it. Again sometimes, it needed to make and estimate of the price of the product to plan the production wisely. The price at which a manufacturing concern agrees to supply its goods is known as tender or quotation price. Similarly, an estimation of the price of the product in advance is known as price estimation.

A tender or quotation is a formal written detail to supply goods or services or to do a job for an agreed price *i.e.* tender or quotation price. Very often a manufacturer or producer is asked to submit a tender or cost-estimate for the supply of the product in future. The price quoted for future production is called Quotation Price or Tender Price. This price is ascertained on the basis of previous cost sheet or production account. In ascertaining expected cost in the future, the items of previous elements of cost are considered with due regard to expected changes in the future. Estimated cost is increased by desired profit to ascertain tender price or quotation.

A producer in response to an advertisement in the press is required to submit a tender or to quote prices for the supply of the commodities he produces or for completing a job. A tender has to be prepared very carefully as the receipt of orders depends upon the acceptance of quotations or tender supplied by the manufacturer. The preparation of tenders requires information regarding price cost, works, administration and selling overheads and profit of the preceding period. The manufacturer has to ascertain and find out the possible changes in prices of material, rates of wages and other costs. He has to ascertain the amount of variable, semi-variable and fixed overheads on the basis of past experience. He must also have a reasonable amount of profit by taking into consideration the market condition, in preparation of estimates or tenders, overheads are generally not given. They are estimated as percentage *i.e.* works overheads on wages and administration, selling and distribution overheads on works cost basis.

5.7.1 Preparation of Tender Sheet

Tender or quotation price is estimated price for future period. For determination of tender or quotation price generally the following bases are used:

On the Basis of Percentages of Overheads

When we separate materials costs and labour costs, other overheads are given and information for units is not given. Then tender or quotation price is determined on the basis of percentages of overheads. In this situation, the following formulae are used to determine the percentages of overheads:

On the Basis of Output Units

When units or quantity of production for previous period and units or quantity for tender or quotation are given but not the separate materials and labour costs for tender or quotation, then tender or quotation price is determined on the basis of per unit cost. In this situation, the following steps are used:

- (i) The period cost-sheet is prepared by taking by previous period data and by determining cost per unit of different components of costs.
- (ii) Then after, an estimated cost sheet (i.e. statement of tender or quotation) is prepared by multiplying tender or quotation units by cost per unit of each component of past cost-sheet.

On the Basis of Special Instruction

If specific instructions are given regarding materials, labour and different overheads for tender or quotation, then such instructions should be followed according to determined tender or quotation price.

Example: The accounts of Pleasant Company Ltd. are shown for the year 2004:

Materials	₹ 350000
Labour	₹ 270000
Factory overhead	₹ 81000
Administration overhead	56080

What price should the company quote for a refrigerator? It is estimated that ₹ 1000 in materials and ₹ 700 in labour will be required for one refrigerator. Absorb factory overhead on the basis of labour and administration overheads on the basis of works cost. A profit of 12.5% on selling price is required.

Statement of Cost

Material	350000
Labour	<u>270000</u>
Prime cost	620000
Factory overhead	<u>81000</u>
Work cost	701000
Administration overhead	<u>56080</u>
Total Cost of Production	757080

Percentage of factory overhead to labour:

$$\frac{\text{Factory overhead}}{\text{Labour}} \times 100 = \frac{81000}{270000} \times 100 = 30\%$$

Percentage of administration overhead to work cost:

$$\frac{\text{Administration Overhead}}{\text{Work Cost}} \times 100 = \frac{56000}{701000} \times 100 = 8\%$$

Statement of the selling price of a Refrigerator	
Material	1000
Labour	<u>700</u>
Prime cost	1700
Add Factory overhead (30% on labour)	<u>210</u>
Work cost	1910
Add : Administration Overhead (8% of work cost)	152.80
Total cost of production	2062.80
Add. Profit (1/8 on sales or 1/7 of cost)	294.69
Selling price	2357.49

5.7.2 Tenders of Similar Type Commodity

When cost of same type and quality of commodity is to be calculated, normally cost per unit of each element of cost will be taken up. If there is any expected change in these elements, the change will be adjusted accordingly. Following examples will explain the technique.

Example: On 15th August, 2005 the Standard Cycle Co. was required to quote for a contract for the supply of 500 bicycles. From the following details prepare a statement showing the price to be quoted to give the same percentage of net profit on turnover as was realised during the six months to 30th June 2005.

Stock of materials on 1 st January, 2005	50,000
Stock of materials on 30 th June, 2005	7,000
Purchase of material during 6 month to 30 th June, 2005	75,000
Factory wages	1,50,000
Indirect charges	25,000
Sales	2,70,000
Completed stock-in-hand on 1 st January, 2005	Nil
Completed stock-in-hand on 30 th June 2005	50,000

The number of bicycles manufactured during the six months was 2,000 including those sold and those in stock at the end of the period. The bicycles to be quoted for are to be of uniform size and quality and similar to those manufactured during the six months to 30th June 2005. As from 1st August, the cost of factory labour has increased by 10 per cent and that of materials by 15 per cent.

Solution:

**Statement of Cost/Cost Sheet
(for the half-year ending 30th, 2005)**

		Total (2,000 Bicycles)	Cost per unit or per Bicycle
Raw Materials consumed:			
Stock of Materials as on Jan. 1	50,000		
Materials Purchased	75,000		
	<u>1,25,000</u>		
Less Stock of Materials as on June 30	<u>7,000</u>	1,18,000	59,00
Direct Wages		1,50,000	75,00
	Prime Cost	<u>2,68,000</u>	<u>134,00</u>
Indirect Charges		25,000	12,50
	Cost of Production	<u>2,93,000</u>	<u>146,50</u>
Less Completed Stock on 30 th June		50,000	
Cost of Sales		<u>2,43,000</u>	
Profit		27,000	
Selling Price		<u>2,70,000</u>	

$$\text{Percentage of Profit on Selling Price} = \frac{\text{Profit}}{\text{Selling Price}} \times 100 = \frac{27,000}{2,70,000} \times 100 = 10\%$$

**Statement of Cost for Tender
(For 500 Bicycles)**

		Total (500 Bicycles)	Per Bicycle
Materials			
1,185,000 × 500/2000 and Add 15% of it		33,925	67,85
Direct Wages			
1,50,000 × 500/2000 and Add 10% of it		41,250	82,50
	Prime Cost	<u>75,175</u>	<u>150,35</u>
Indirect Charges (25,000 × 500/2000)		6,250	12,50
	Cost of Production	<u>81,425</u>	<u>162,85</u>
Profit (10% on selling price or 81,425 × 10/90)		9,047	18,09
	Selling Price	<u>90,472</u>	<u>180,94</u>

5.7.3 Tenders for Different Product

When the tender or quotation price is to be ascertained for a different product, the cost of direct material, direct labour and other direct expenses will be estimated. The total of these will be prime cost works overheads, office overheads and selling overheads

will be added there to on the basis of absorption rates. Normally works overhead is charged or absorbed on the basis of percentage of works overhead on wages. Thus percentage is calculated on the basis of past records.

$$\text{Works Overhead Rate} = \frac{\text{Works Overhead}}{\text{Wages}} \times 100$$

It may be alternatively charged on the basis of Machine Hour Rate or Labour Hour Rate. Office overheads may be absorbed on the basis of percentage of office overheads on works cost or works overheads.

$$\text{Office Overhead Rate} = \frac{\text{Office Overhead}}{\text{Wages}} \times 100$$

The total of Prime Cost plus absorbed works overheads and office overheads will be Cost of Production. Selling overheads, if any, may be added there to on the basis of its absorption rate. It may be a percentage on cost of production or sales or at selling overheads per unit. By adding desired profit Tender Price or Quotation Price will be known.

Following examples will explain the technique:

Example: The accounts of X Ltd. Show for months ending 30th June 2010

Materials used	10,00,000
Direct Manual and Machine Labour Wages	15,00,000
Works Overhead Expenditure	3,00,000
Establishment and General Expenses	2,24,000

Show the Works Cost, the Total cost of manufacturer, the percentage that the Works overhead cost bears to the Manual and machine labour wages and the percentage that the Establishment and General Expenses bear to the Works Costs.

What price should the company quote on the basis of the above to the manufacture of an Electric washing machine, which it is estimated, will require an expenditure of ₹ 800 in Materials and ₹ 600 in Wages so that it will yield a profit of 15 per cent of the total cost.

Solution:

Statement of Cost
(For the three months ending June 30, 2010)

Materials		10,00,000
Direct Manual and Machine Labour Wages		15,00,000
	Prime Cost	25,00,000
Works Overhead Expenditure		3,00,000
	Works Cost	28,00,000
Establishment and General Expenses		2,24,000
	Cost Cost	30,24,000

(a) The percentage that the works overhead cost bears to the manual and machine labour wages:

$$= \frac{\text{Works overhead}}{\text{Wages}} \times 100 \text{ or } \frac{3,00,000 \times 100}{15,00,000} = 20\%$$

(b) The percentage that the establishment and general expenses bear to the works cost.

$$\frac{\text{Establishment and General Exps.}}{\text{Works Cost}} \times 100 \text{ or } \frac{2,24,000}{28,00,000} \times 100 = 8\%$$

Quotation for Electric Washing Machine

Materials	800.00
Wages	600.00
Prime Cost	1,400.00
Works Overhead Expenditure (20% of Wages i.e., 600 × 20/100)	120.00
Works Cost	1,520.00
Establishment and General Expenses (8% of Works Cost i.e., 1520 × 8/100)	121.60
Total Cost	1,641.60
Profit (15% of the Total Cost i.e., 1641.60 × 15/100)	246.24
Selling Price	1,887.84

Example: The accounts of a manufacture, of a uniform type of product, supply you the following information about the expenditure incurred during the year ended December 31, 2009.

Materials Consumed	4,50,000
Wages Paid and Outstanding	3,60,000
Rent, Rates and Taxes:	
Office	7,000
Factory	25,000
General Manager's Salary and allowances	35,000
Works Manager's Salary and allowances	20,000
Other Establishment Expense:	
Office	9,132
Factory	3,000
Power used in the factory	65,000
Electric Charges for fans, light etc.	
Office	800
Factory	200
Advertisement	12,000
Depreciation on Furniture:	
Office	400
Factory	100
Oils and Lubricants used	2,000
Machinery and spare parts consumed	13,000
Printing and Stationery:	

Office	2,500
Factory	500
Postage and Telegrams	3,000
Sundry Charges:	
Office	15,000
Factory	10,000
Depreciation of Plant and Machinery	16,000

Assuming that the rates of Factory and Office overhead charges for the year 2010 are normal, calculate what should be selling price of a commodity for which the cost of Raw Materials is ₹ 5,000 and that of Labour is ₹ 4,000, if a profit of 10 per cent on the total cost is earned, (assume that the factory overhead charges bear a fixed percentage to Direct Wages and Office overhead charges bear another fixed percentage to Factory Cost).

Solution:

**Statement of Cost
For the year ending December 31, 2009**

Materials consumed		4,50,000
Wages paid and Taxes		3,60,000
	Prime Cost	8,10,000
Factory Overheads:		
Rent, Rates and Taxes	25,000	
Works, Manager's Salary and Allowances	20,000	
Other Establishment Expenses	3,000	
Power used	65,000	
Electric charges	200	
Depreciation of Plant and Machinery	16,000	
Depreciation of Furniture	100	
Oils and Lubricants used	2,000	
Machinery and spare parts	13,000	
Printing and Stationery	500	
Sundry Charges	10,000	1,54,000
	Factory Cost	9,64,000
Office Overheads:		
Rent, Rates and Taxes	7,000	
General Manager's Salary	35,000	
Other Establishment Expenses	9,132	
Electricity charges	800	
Advertisement	12,000	
Depreciation of Furniture	400	
Printing and Stationery	2,500	
Postage and Telegrams	3,000	
Sundry Charges	15,000	84,832
	Total Cost	10,49,832

(a) Percentage of factory Overheads to Direct wages:

$$\frac{\text{Factory overhead}}{\text{Direct Wages}} \times 100 \text{ or } \frac{1,54,000 \times 100}{3,60,000} \times 100 = 43\%$$

(b) Percentage of Office Overhead Charges to Factory Cost:

$$\frac{\text{Office overhead}}{\text{Factory Cost}} \times 100 \text{ or } \frac{84,832 \times 100}{9,64,800} = 8.7927\%$$

Statement Showing Selling Price of a Commodity (2010)

Materials		5,000
Wages		4,000
	Prime Cost	9,000
Factory Overheads Expenditure (20% of Wages)		1,720
	Factory Cost	10,720
Office Overheads (8.79% of Factory Cost)		942
	Total Cost	11,662
Profit (10% on Total Cost)		1,166
	Selling Price	12,828

Example: In respect of a factory the following figures have been obtained for the year 2009.

Cost of Materials	6,00,000
Wages for Labour	5,00,000
Factory Overheads	3,00,000
Administration Charges	3,36,000
Selling Charges	2,24,000
Distributions Charges	1,40,000
Profit	4,20,000

A work order has been executed in 2010 and the following expenses have been incurred.

Materials	8,000
Wages of labour	5,000

Assuming that in 2010 the rate of Factory Overheads has gone up by 20 per cent. Distribution charges have gone down by 10 per cent and Selling and Administration Charges have each gone up by 12 per cent. Show that at what price the product should be sold, so as to earn the same rate of profit on the selling price as in 2003.

Factory Overheads are based on Direct Labour and Administration. Selling and Distribution Overheads are based on Factory Cost.

Solution:

**Statement of Cost
(For the year 2009)**

Materials Consumed		6,00,000
Direct Labour		5,00,000
	Prime Cost	11,00,000
Factory Overheads		3,00,000
	Factory Cost	14,00,000
Administration Charges		3,36,000
Selling Charges		2,24,000
Distribution Charges		1,40,000
	Total Cost	21,00,000
Profit (20% on cost or $16\frac{2}{3}\%$ of S.P.)		4,20,000
	Selling Price	25,20,000

Percentages:

1. Percentage of factory Overheads to Direct Labour:

$$\frac{\text{Factory Overhead}}{\text{Direct Labour}} \times 100 = 60\%$$

2. Percentage of Administration Charges on Factory Cost:

$$\frac{\text{Administration Exps.} \times 100}{\text{Factory Cost}} = 24\%$$

3. Percentage of Selling Charges on Factory Cost:

$$\frac{\text{Selling Charges} \times 100}{\text{Factory Cost}} = 16\%$$

4. Percentage of Distribution Charges on Factory Cost:

$$\frac{\text{Distribution Exps.} \times 100}{\text{Factory Cost}} = 10\%$$

Statement of Cost of Works Order (2010)

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Unit Costing and
Cost Sheet

Materials	8,000
Wages	5,000
Prime Cost	13,000
Factory Overheads (20% of Wages Add 20% of it = 27% on Factory Cost)	3,600
Factory Cost	16,600
Administration Overheads: (24% on Factory Cost Add 12% of it = 27% on Factory Cost)	4,482
Selling Overheads: (16% on Factory Cost Add 12% of it = 18% on Factory Cost)	2,988
Distribution Overheads: (10% on Factory Cost Less 10% of it = 9% on Factory Cost)	1,494
Total Cost	25,564
Profit (20% on Cost)	5,113
Selling Price	30,677

Example: The All-India Waterproof Manufacturers Ltd. manufactured and sold 850 waterproofs in the year ending 31st March 2009. The summarised Trading and Profit and Loss Account is given below:

To Cost of Materials	64,000	By Sales	6,00,000
To Direct Wages	96,000		
To Manufacturing Expenses	40,000		
To Gross Profit	1,20,000		
	3,20,000		3,20,000
To Office Salaries	48,000	By Gross Profit b/d	1,20,000
To Rent, Rates and Taxes	8,000		
To Selling Expenses	16,000		
To General Expenses	24,000		
To Net Profit	24,000		
	1,20,000		1,20,000

For the year ending 31st March, 2010 it has been estimated that:

- Output and Sales will be 1,000 waterproofs.
- Price of materials will rise by 25% on the previous year's level.
- Wages will rise by 12.5%.
- Manufacturing expenses will rise in proportion to the combined cost of materials and wages.
- Selling expenses per unit will remain unaffected by the rise in the output.
- Other expenses will remain unaffected by the rise in the output.

Prepare a Cost Statement, showing the price at which the waterproofs would be marketed so as to show a profit at 12% on the selling price.

Solution:

**Cost Sheet for the year ending 31st March 2009
(Output 850 Waterproofs)**

	Total Cost	Cost Per Unit
Cost of Materials	64,000	75,2941
Direct Wages	96,000	112,9412
Prime Cost	1,60,000	1,88,2353
Manufacturing Expenses (25% of Materials and Labour)	40,000	47,0588
Works Cost	2,00,000	235,2941
Office and General Expenses		
Office Salaries	48,000	56,4706
Rent, Rates and Taxes	8,000	9,4118
General Expenses	24,000	28,2353
Cost of Production	2,80,000	329,4118
Selling expenses	16,000	18,8235
Total Cost	2,96,000	348,2353
Net Profit	24,000	28,2353
Sales	3,20,000	376,4706

Statement of Cost (Estimate for the year ending 31st Dec. 2010)

<i>Estimated Output 1,000 Waterproofs</i>	Total Amount	Per Unit
Materials $\frac{64,000}{850} \times 1000 =$	75,294	
<i>Add increase 25%</i>	18,824	
Wages $\frac{96,000}{850} \times 1000 =$	1,12,941	
<i>Add increase 12%</i>	14,118	
Prime Cost	1,27,059	127,059
Manufacturing Expenses (in proportion to the Combined cost of Materials & wages) i.e., 25% of Prime Cost	2,21,177	221,177
Manufacturing Cost	55,294	55,294
Other expenses (Office and General): (unaffected by the rise in output)	2,76,471	276,471
Office Salaries		
Rent, Rates and Taxes	48,000	48,000
General Expenses	8,000	8,000
Office Cost	24,000	24,000
Selling expenses (per unit remain uncharged)		
Total Cost	3,56,471	3,56,471
Profit (12% on the Selling Price i.e., $3,75,295 \times 12/88$)	18,824	18,824
Selling Price	3,75,295	3,75,295
	51,177	51,177
	4,26,472	4,26,472

5.8 MANUFACTURING ACCOUNT

When the data related with the cost of goods manufactured of a commodity are presented in a conventional form of account i.e. in T shape form, and then it is known as manufacturing account. Generally, a manufacturing concern prepares this account to exhibit cost of production or cost of goods manufactured.

Pro Forma Manufacturing Account

Direct Materials			Closing Stock:	
Opening Stock:			Raw Materials	xx
Raw Materials	xx		Work-in-Progress	xx
Work-in-Progress	xx	xx	Cost of the goods	
Purchases:			transferred to Trading	
Raw Materials	xx		Account	xx
Work-in-Progress	xx	xx		
Carriage inwards		xx		
Direct Labour				
Factory wages		xx		
Direct Expense				
Factory rent	xx			
Fuel, power, gas etc.	xx			
Factory Insurance	xx			
Depreciation on				
Factory building				
etc	xx	xx		
Manufacturing overheads		xx		
		xx		xx

5.8.1 Preparation of Manufacturing Account

A manufacturing account is based on the principle of national account. Therefore, it shows opening stock of work-in-progress and other direct and indirect costs of goods manufactured (i.e. factory costs) on its debit side and closing side and closing stock of work-in-progress and sale of scrap or wastage on its credit side. Generally, the balancing figure takes place in credit side which is called "cost of goods manufactured or cost of production C/D". This account shows the cost production which is transferred to the trading account.

5.8.2 Manufacturing Account for Manufacturing Profit and Loss

When a manufacturing account is prepared to ascertain manufacturing profit and loss, then trading value of manufacturing cost is kept in credit side inserted of cost of production. In other words, all items on debit and credit side will be the same as mentioned above. But trading price or trading value of cost of production will be shown on the credit side and balancing figure or trading value of cost of production will be shown on the credit side and balancing figure will be put on debit side of this account as "manufacturing profit" or "manufacturing loss".

Check Your Progress

Fill in the blanks:

1. The factory overheads are nothing but the _____ incurred at the factory site.
2. The total _____ incurred in the factory could be derived by adding the both direct cost and indirect cost incurred during the factory process.
3. The _____ is the combination of both the factory cost and administrative overheads.
4. The _____ is the blend of both, selling overheads and cost of production.
5. The cost of the _____ is nothing but the direct materials cost of the product.
6. The treatment of the stock of _____ should be carried over in between the opening stock and closing stock and adjusted among them before the finding the cost of goods sold.
7. The _____ are the expenses converting the raw materials into semi-finished goods which should be relatively considered for the treatment of the stock valuation rather than on the basis of prime cost.

5.9 LET US SUM UP

- Cost sheet is a statement which is prepared periodically to provide detailed cost of a cost unit or cost centre.
- A cost sheet not only shows the total cost but also the various components of the total cost.
- During the preliminary stage of preparing the cost statement of the product, there are two things to be kept in our mind at the moment of classification.
 - ❖ Direct cost classification
 - ❖ Indirect cost classification
- Under this classification, the direct costs of the product or service are added together to know the volume of total direct cost. The total volume of direct cost is known as "Prime Cost".
- The total factory cost or works cost incurred in the factory could be derived by adding the both direct cost and indirect cost incurred during the factory process.
- The cost of production is the combination of both the factory cost and administrative overheads.
- The cost of sales is the blend of both, selling overheads and cost of production.
- The selling price of the commodities is fixed by way of adding both the cost of sales and profit margin out of the product sales.
- The cost of the raw materials is nothing but the direct materials cost of the product. The cost of the materials is, in other words, cost of the materials consumed for the production of a product.

- The indirect expenses are the expenses converting the raw materials into semi-finished goods which should be relatively considered for the treatment of the stock valuation rather than on the basis of prime cost.
- The treatment of the stock of finished goods should be carried over in between the opening stock and closing stock and adjusted among them before the finding the cost of goods sold.

5.10 UNIT END ACTIVITY

Mr. Vivek provides the following information which is related to the product of his enterprise for the month of December 1995.

Raw materials consumed	30,000
Direct labour charges	18,000
Machine hours worked	1,800
Machine hour rate	10
Administrative overheads	20% on works cost
Selling overheads	1 per unit
Units produced	26,400 units
Units sold	25,000 units 8 per unit

Draft the cost statement and determine the cost per unit, profit per unit sold and profit during the period.

5.11 KEYWORDS

Cost sheet: It is a statement prepared for the computation of cost of a product/service.

Direct cost: Cost incurred which can be easily ascertained and measured for a product.

Indirect cost: Cost incurred cannot be easily ascertained and measured for a product. It is the combination of various overheads.

Prime cost: It combination of all direct costs viz. direct materials, direct labour and direct expenses.

Factory cost: It is the total cost incurred both direct and indirect at the work spot during the production of an article.

Cost of production: It is the combination of cost of manufacturing an article or a product and administrative cost.

Cost of sales: It is the entire cost of a product.

Selling price or Sales price: It is the summation of cost of sales and profit margin.

5.12 QUESTIONS FOR DISCUSSION

1. Define cost unit. Give five examples of cost unit applicable to different industries.
2. Distinguish between direct cost and indirect cost.
3. What are the components of total cost? Draw a format of cost sheet.

4. Prepare a cost sheet to show the total cost of production and cost per unit of goods manufactured by a company for the month of Jan. 2005. Also find the cost of sale and profit.

Particulars		Particulars	
Stock of raw materials 1.1.2005	6,000	Factory rent and rates	6,000
Raw materials procured	56,000	Office rent	1,000
Stock of raw material 31.1.2005	9,000	General expenses	4,000
Direct wages	14,000	Discount on sales	600
Plant depreciation	3,000	Advertisement expenses	1,200
Loss on the sale of plant	600	Income tax paid	2000
Sales	1,50,000		

5. XYION Co. Ltd. is an export oriented company manufacturing internal-communication equipment of a standard size. The company is to send quotations to foreign buyers of your product. As you, the chief of cost accounts, are required to help the management in the matter of submission of the quotation of a cost estimate based on the following figures relating to the year 1984.

Total output (in units) 20,000.

Particulars		Particulars	
Local raw materials	20,00,000	Excise duty	4,00,000
Imports of raw materials	2,00,000	Administrative office expenses	4,00,000
Direct labour in works	20,00,000	Salary of the managing director	1,20,000
Indirect labour in works	4,00,000	Salary of the joint managing director	80,000
Storage of raw materials and spares	1,00,000	Fees of directors	40,000
Fuel	3,00,000	Expenses on advertising	3,20,000
Tools consumed	40,000	Selling expenses	3,60,000
Depreciation on plant	2,00,000	Sales deposit	2,40,000
Salaries of works personnel	2,00,000	Packaging and distribution	2,40,000

Prepare the cost statement in columnar form.

6. How would you determine and find the cost sheet format of a company and how does it finalise the product cost?
7. In a cost sheet, should the administration overheads come before or after the adjustments for the opening and closing stock of finished goods? Support your answer with reasons.
8. In a factory, there are two different types of hard disk drives manufactured viz SUMO 160 GB and BRAYON 320 GB models. From the following particulars, prepare the cost sheet showing all the necessary information of cost as well as profit per USB sold. There is no opening and closing stock.

Particulars	SUMO 160 GB	BRAYON 320 GB
Materials	54,600	2,17,360
Labour	31,200	1,25,840

Works overhead is charged at 80% on labour and office overhead is taken at 15% on works cost. The selling price of both hard disk drives amounted to ₹ 2,000. 156 SUMO 160 GB and 572 BRAYON 320 GB hard disks were sold.

9. From the following information, prepare the balance sheet from the cost records of Aditya Chemicals Ltd. for 1993.

Particulars	
Finished goods on 1-1-1993	50,000
Raw material on 1-1-1993	10,000
Work in progress 1-1-1993	14,000
Direct labour	1,60,000
Purchase of raw material	98,000
Indirect labour	40,000
Heat, light and power	20,000
Factory, Insurance and Taxes	5,000
Repairs to plant	3,000
Factory supplies	5,000
Depreciation of factory building	6,000
Depreciation of plant	10,000
Factory cost of goods produced in 1993	2,80,000
Raw material consumed in 1993	95,000
Cost of goods sold in 1993	1,60,000

No office and administration expenses were incurred during the year 1993. Prepare a statement of cost for the year ending 1993 giving maximum possible information and its break up.

10. Discuss analytically, direct and indirect costing.
11. What is Tender or Quotation sheet?
12. Explain on what basis tender sheet is prepared.
13. Write a short note on manufacturing account.
14. Following are the particulars for the production of 2000 sewing machines of ABC Co Ltd. for the year 2007:

Cost of materials ₹ 1,80,000; Wages ₹ 3,40,000; Manufacturing expenses ₹ 1,20,000; Salaries ₹ 1,00,000; Rent, Rates and Insurance ₹ 40,000; Selling expenses ₹ 40,000; General expenses ₹ 30,000 and Sales ₹ 9,00,000.

Prepare cost sheet at a profit of 10% of selling price.

15. The accounts of Pleasant Company Ltd. show details for the year 2004:

Materials	₹ 550000
Labour	₹ 300000
Factory overhead	₹ 70000
Administration overhead	₹ 59080

What price should the company quote for a refrigerator? It is estimated that ₹ 2000 in materials and ₹ 900 in labour will be required for one refrigerator. Absorb factory overhead on the basis of labour and administration overheads on the basis of works cost. A profit of 10.5% on selling price is required.

Check Your Progress: Model Answer

1. Indirect costs
2. Factory cost or works cost
3. Cost of production
4. Cost of sales
5. Raw materials
6. Finished goods
7. Indirect expenses

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UNIT 6

OVERHEAD COSTING

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6.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Understand the concept of overheads
- Discuss the procedure for accounting and control of overheads
- Explain the allocation and apportionment of expenses
- Learn the apportionment of service department costs to production department
- Understand the meaning of absorption of overheads
- Discuss the determination of overhead rates
- Describe the different methods of absorption of overheads

6.1 INTRODUCTION

Overheads are those costs required to run a business, but which cannot be directly attributed to any specific business activity, product or service. Overhead expenses are all costs on the income statement except for direct labour, direct materials and direct expenses. Overhead costs do not directly lead to the generation of profits. Overhead is still necessary, since it provides critical support for the generation of profit-making activities. The cost of any product is normally classified into two main segments viz Direct and Indirect Cost. The entire segments of indirect costs are known as overheads, which normally include indirect material, indirect labour and indirect expenses for the benefit of many cost centres. The indirect cost component is a component of cost which cannot be easily or conveniently identified for a particular product is known as overhead. In general, any expense which is incurred over and above the prime cost of the product is known as overheads viz. Factory overheads, Administrative overheads, Selling and Distribution overheads. These overheads are nothing but indirect expenses at every level not only for the manufacture of the products but also for selling and distribution of products in the market.

In this lesson, we will study the concept of overheads, classification of overheads, procedure for accounting and control of overheads. We will also study the allocation and apportionment of expenses and at the end, we will study the apportionment of service department costs to production departments.

6.2 CONCEPT OF OVERHEAD

Overhead has been defined by the Institute of Cost and Work Accountants, London as, 'The aggregate of indirect material cost, indirect wages and indirect expenses'. By indirect, it means one which cannot be allocated, but which can be apportioned to or

absorbed by cost centre or cost unit. Overheads are those indirect costs which cannot be directly related to any product, job or process, because they cannot be directly attached to production activities. A major part of the total cost is overheads. The total cost is divided into: Prime Cost, Factory Cost and Administrative Cost. Overhead comprises indirect material, indirect labour and indirect expenses.

Blocker has defined the overhead costs as, "*Operating of a business enterprise which cannot be traced directly to a particular unit of output*". Overheads are the indirect costs which cannot be directly allocated to any particular job and production activity or process as they are not capable of being specifically identified to any particular activity.

6.2.1 Elements of Overheads

Overheads have three indirect elements of cost. The three elements are:

- Indirect material
- Indirect labour
- Indirect expenses

These indirect elements of cost have no bearing whatsoever with the level of activity or volume of production.

6.2.2 Importance of Overhead Costs

Due to rapid industrialization, huge expenses were incurred by the industries, which were not able charge for a particular unit. These expenses play significant part in the total cost of a product, which warrants careful analysis not only to know the reasons for ascertainment but also to control them. Normally, the overheads cannot be allocated but they are suitably apportioned and absorbed through suitable methods.

Is an increase in the overhead an indication of inefficiency?

No, an increase in the overhead may be due to many reasons, but not due to inefficiency of the organisation. The hike in the volume of overheads owing to the following reasons:

1. Due to mechanized large scale of production
2. Due to increase in the efficiency of the labour force which may in turn increase the level of productivity of the organisation
3. Due to application of capital intensive technology rather than labour intensive technology
4. More use of mechanized devices leads to incur greater amount of overheads due to greater depreciation, maintenance charges, fuel, oil, power and so on.
5. The methods of work study paves way for the organisation to bring down only the direct cost component of the product but not the overhead. The reduction of direct cost component due to work-study leads to increase in the volume of indirect unintentionally and unknowingly.

That is why, the overhead costing plays vital role in the costing and management accounting.

6.3 CLASSIFICATION OF OVERHEADS

The overhead classification depends upon the type and size of the business, nature of product, services of the product and various policies of the management regarding

product or output. The following are the important bases of classification of overheads:

- (i) Nature-wise Classification,
- (ii) Function-wise Classification,
- (iii) Variability-wise Classification,
- (iv) Controllability-wise Classification, and
- (v) Normality-wise Classification.

The following chart shows their classification at a glance:

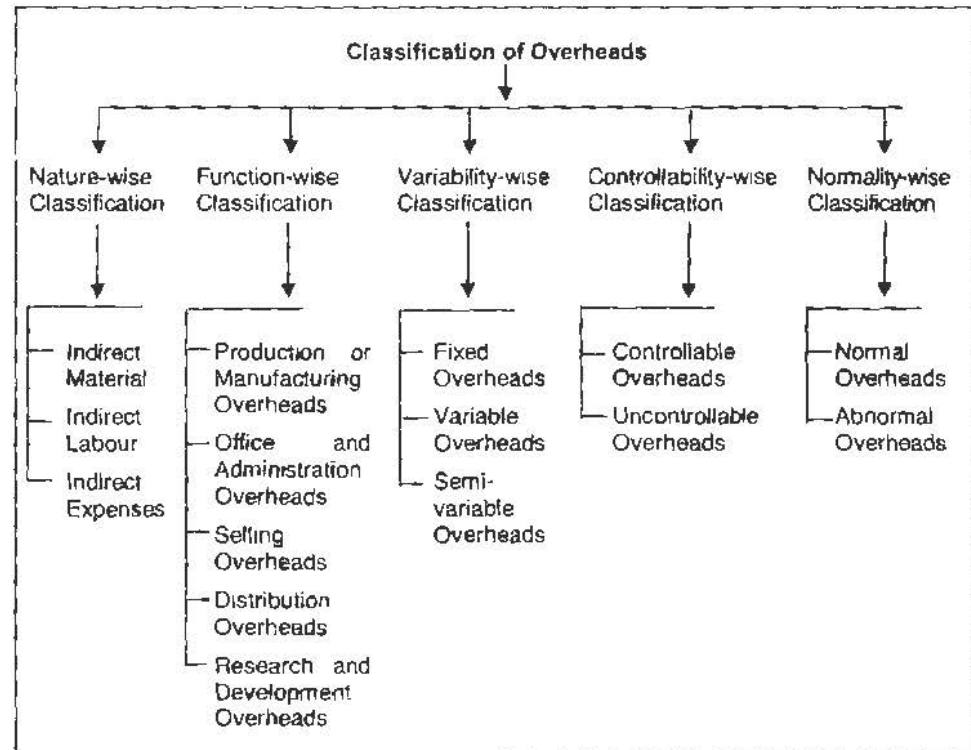


Figure 6.1: Classification of Overheads

6.3.1 Nature-wise Classification

Under this classification, expenditures are classified into three categories:

- **Indirect Material:** Indirect materials which are used in the manufacturing process, which cannot be allocated to a particular job or production but is absorbed by cost centres or cost units. The examples of indirect materials are consumable stores, lubricating oil, loose tools, cotton waste, etc.
- **Indirect Labour:** It includes such wages which cannot be allocated, but which can be apportioned by cost centre or cost unit. The examples of indirect labour are salary of foremen, supervisors, works manager, store-keepers, wage of maintenance, idle time cost, holiday pay, workers compensation, employer's contribution to provident fund, overtime wages, etc.
- **Indirect Expenses:** The expenses which cannot be allocated directly but which can be apportioned to or absorbed by cost centre or cost unit. The examples of indirect expenses are factory rent charge, charges of lighting and heating, depreciation, insurance, factory expenses, administration, selling and distribution expenses, etc.

6.3.2 Function-wise Classification

Under this classification, the various functions performed by the industry or organisation. In this classification, overheads are classified as follows:

- **Production or Manufacturing Overheads:** It is also known as factory overhead, works overhead or manufacturing overhead. The production overhead is the indirect cost which includes indirect material, indirect labour and indirect factory expenses. It includes all overheads incurred from the stage of production of materials till the completion of the manufacture. Following are the production overheads e.g. rent, municipal taxes, depreciation, insurance of the factory, machines and equipments, factory lighting, heating and air-conditioning, fuel and power, drawing expenses, factory manager salary, consumable stores, small tools, repairs of factory buildings, plant, machines and equipment, store-keeping expenses, cost of idle time, overtime, holiday pay, workers training and welfare expenses, inspection, factory telephone and stationery expenses.
- **Office and Administration Overheads:** These are also known as general overheads. It is the indirect expenditure incurred in formulating the policy, directing the organisation and controlling the operations of an undertaking which is not related directly to research and development or production and selling activities. The administrative overhead costs may include the following: account office expenses, audit fees, office staff salaries, postage, stationery, telephone and telegrams, legal expenses, depreciation, insurance, rent of the office building, office equipments and office furniture, bank charges, salary to general manager and office electricity expenses.
- **Selling Overheads:** It is the expenditure incurred in promoting sales and retaining customers. It includes: advertisement, bad debts, quotations, price lists, salaries and commission of salesmen, selling agents, travelling expenses, postage, telephones, stationery of sales office, salary of sales manager and sales office staff, window-dressing expenses, etc.
- **Distribution Overheads:** The expenses pertaining to delivery of goods to the customers fall under this distribution overhead. It includes: packing material and expenses, carriage outward, transport expenses, maintenance, repairs, depreciation of delivery vans, depreciation, repairs of the warehouse, salary of warehouse staff, insurance of warehouse, losses in warehouse, wastage of finished goods, etc.
- **Research and Development Overheads:** The research expenses are the cost of searching for new and improved products, new applications of products and improved methods and techniques. The development cost is the cost of the process which begins with the implementation of the decision to produce a new or improved method and ends with the commencement of formal production of the product.

6.3.3 Variability-wise Classification

The overheads can be classified according to variability into:

- **Fixed Overheads:** Fixed overhead is one which tends to be unaffected by variation in volume of output. But they are fixed up to a level of production. The fixed overheads are related to the periods, and so the fixed costs are also known as Period Costs. The examples of fixed overheads are: rent and taxes of the factory and office buildings, insurance charge of plant, machine and building of factory and office, depreciation of building and machine of factory and office, salaries of foreman, works manager and other managerial staff, interest on capital, watchman's salary, monthly repairing charges, fixed charges of telephone,

depreciation of office furniture, salaries of permanent staff of sales department, rent and depreciation of the sales office or the warehouse, depreciation on delivery vans, fixed expenses of guest house, etc.

A feature of the fixed overhead is that the rate of output per unit reduces as the production increases and vice versa. For example, the fixed overhead cost is ₹ 4,000. If 100 units are produced, the cost per unit will be ₹ 40 and if the production increases to 200 units, the cost per-unit will go down to ₹ 20 per unit. The cost per unit changes but the total cost remains the same.

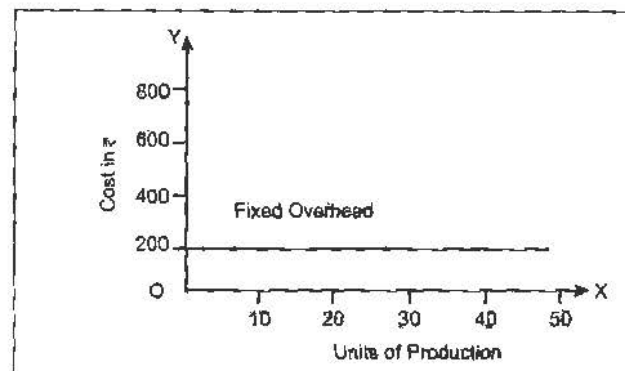


Figure 6.2: Fixed Overheads

- **Variable Overheads:** These costs change in the same ratio in which the output changes. It means the variable overhead is one which tends to vary directly with volume of output. The variable cost increases in direct proportion with the increase in production and decreases in the same proportion with decrease in production. It is known as direct cost. The examples of variable overhead are: fuel and power, lighting, heating, overtime, small tools, store expenses, postage, stationery, salesman's commission, discounts to customers, bad debts, branch expenses, travelling salesman's expenses, packing charges, carriage outward, variable expenses on delivery vans, etc.

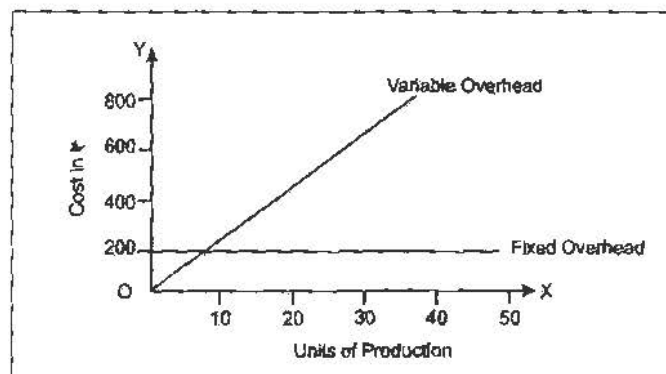


Figure 6.3: Variable Overheads

On making a comparison between fixed cost and variable cost, we find that the total fixed cost remains constant, while the total variable cost changes proportionately.

- **Semi-variable Overheads:** Semi-variable overheads are also known as semi-fixed overheads. It is an overhead which is partly fixed and partly variable. There is hardly any difference between these two terms. However, if the fixed part of the item of expense is more than the variable, it may be called semi-fixed. Similarly, where variable part is greater than the fixed part, it may be called semi-variable.

Examples of semi-variable overheads are charges of telephone and electricity. The following figure shows the semi-variable overheads:

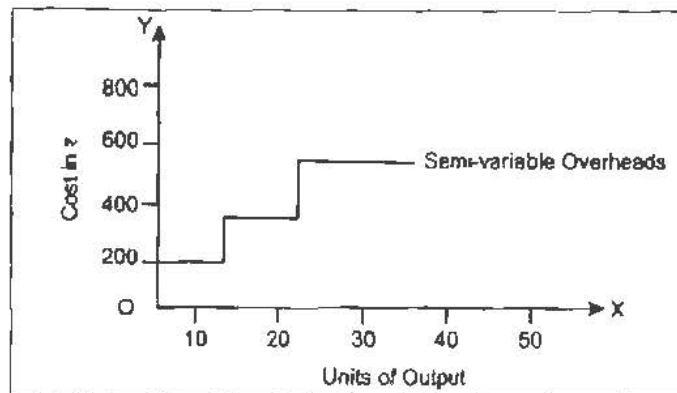


Figure 6.4: Semi-variable Overheads

6.3.4 Controllability-wise Classification

On the basis of controllability, overheads may be classified into two categories. They are as follows:

- **Controllable Overheads:** Those overhead costs which can be controlled by managerial influence fall under this category. All variable costs are controllable.
- **Uncontrollable Overhead:** The overhead costs which are beyond the control of managerial decisions are uncontrollable costs. All fixed overhead costs fall under this category.

6.3.5 Normality-wise Classification

On the basis of normality, overheads may be classified into two categories. They are as follows:

- **Normal Overheads:** Normal overheads refer to such overheads which are expected to be incurred in attaining a given output. These overheads are unavoidable. They are, therefore, included in production costs.
- **Abnormal Overheads:** They refer to those overhead costs which are not expected to be incurred in attaining a given output, e.g., cost of abnormal idle time. Such costs are charged to costing profit and loss account.

6.4 PROCEDURE FOR ACCOUNTING AND CONTROL OF OVERHEADS

Under a normal costing approach, actual overhead costs are never assigned to jobs. Overhead is applied to each individual job using a predetermined overhead rate. Even with this system, however, a company must still account for actual overhead costs incurred. Thus, we will first describe how to account for applied overhead and then discuss accounting for actual overhead.

6.4.1 Accounting for Overhead Application

Assume that Bob has estimated overhead costs for the year at ₹ 9,600. Additionally, since he expects business to increase throughout the year as he becomes established, he estimates 2,400 total direct labour hours. Accordingly, the predetermined overhead rate is as follows:

$$\text{Overhead rate} = ₹ 9,600 / 2,400 \text{ hrs.} = ₹ 4 \text{ per direct labour hour}$$

Overhead costs flow into work-in-process inventory via the predetermined rate. Since direct labour hours are used to assign overhead into production, the time tickets serve as the source documents for assigning overhead to individual jobs and to the controlling work-in-process inventory account.

For Job 101, with a total of 60 hours worked, the amount of overhead cost posted is ₹ 240 ($₹ 4 \times 60$). For Job 102, the overhead cost is ₹ 100 ($₹ 4 \times 25$). A summary entry reflects a total of ₹ 340 (i.e. all overheads applied to jobs worked on during January) in applied overhead.

Work-in-Process inventory	340
Overhead Control	340

The credit balance in the overhead control account equals the total applied overhead at a given point in time. In normal costing, only applied overhead ever enters the work in-process inventory account.

6.4.2 Accounting for Actual Overhead Costs

To illustrate how actual overhead costs are recorded, assume that All Signs Company incurred the following indirect costs for January:

Lease payment	₹ 200
Utilities	50
Equipment depreciation	100
Indirect Labour	<u>65</u>
Total Overhead Costs	₹ <u>415</u>

The usual procedure is to record actual overhead costs on the debit side of the overhead control account. For example, the actual overhead costs would be recorded as follows:

Overhead Control	₹ 415
Lease Payable	200
Utilities Payable	50
Accumulated Depreciation- Equipment	100
Wages Payable	65

Thus, the amount of the debit side of the overhead control gives the total actual overhead costs at a given point in time. Since actual overhead costs are on the debit side of this account and applied overhead costs are on the credit side, the balance in overhead control is the overhead variance at a given point in time. For All Signs Company, at the end of January, the actual overhead of ₹ 415 and applied overhead of ₹ 340 emerge s under applied overhead variance of ₹ 75 ($₹ 415 - 340$).

6.5 ALLOCATION AND APPORTIONMENT OF OVERHEADS

This section will help you understand the meaning of allocation and apportionment of overheads, difference between allocation and apportionment of overheads and basis of apportionment of factory overheads.

6.5.1 Allocation of Overhead

Allocation of overhead cost refers to the allotment of whole items of overhead costs to cost centre or cost unit. In other words, allocation implies the identification of the overhead costs with reference to particular cost centre, i.e., production and service departments to which they relate. It involves charging to a cost centre those overheads which arise solely from the existence of that centre. Obviously, prior to charging overhead to a particular department or cost centre or cost unit, the exact amount of overhead expense attributable to it must be known allocation of overheads. Allocation of overheads is, therefore, the process of distribution of overhead expenses on a departmental basis. Some items like wages paid to maintenance workers cannot be directly attributed to product but can be specifically attributed to the maintenance service department. Such items of cost as indirect materials, indirect labour, etc., can also be allocated to different departments or cost centre.

Cost allocation is the allotment of whole item of cost-to-cost centres or cost units. It means that the charging of expenses is wholly allotted with a particular department or cost centre.

For example, overtime wages paid to the workers normally could be identified through the payment, which has been made to whom. This could be easily identified that overtime wages are paid to the workers of the particular department.

In a nutshell, the allocation of overheads could be registered as an allotment of whole item of overheads without any break ups to a particular department or cost centre is known as allocation of overheads.

6.5.2 Apportionment of Overhead

Apportionment refers to the distribution of overheads among different departments or cost centre on suitable basis. It involves charging a share of the total overhead cost to a number of cost centres, indirect expenses such as rent, lighting and telephone charges, general manager's salary, etc., incurred for the entire factory need to be apportioned between different production and service departments on an equitable basis. The service department overhead costs, in turn, need to be apportioned among the production departments. Finally, the aggregate overhead cost of each production department is charged to the cost centre or cost unit, i.e., products, processes or jobs. This type of apportionment is known as absorption of overhead.

Cost apportionment is the allotment of overheads to various cost centres or cost units, which cannot be easily identified exclusively for a particular cost centre or cost unit. It normally arises to the expenses, which are general in character not only to a particular cost centre but also for many in numbers, attained through division of expenses.

6.5.3 Distinction between Allocation and Apportionment

The terms allocation and apportionment are often used interchangeably. Although, the purpose of both is the identification and allotment of overheads to cost centre or cost unit, but there is difference between the two. The following points will make the distinction clear:

- (i) Allocation refers to the distribution of overheads on departmental basis, while apportionment is a process of distribution of overhead costs of one department to the other department.
- (ii) Allocation is a much wider term than apportionment, as it leads to apportionment. Overheads cannot be usually allocated to products as they cannot be identified easily, but they can be apportioned to products on some equitable basis.

- (iii) Certain overheads like telephone and electricity charges can only be allocated to products, if they are apportioned on sound equitable basis.
- (iv) Allocation needs no basis for the distribution of overheads among production and service departments, while apportionment needs an equitable basis for the distribution of one department overhead cost to other departments or cost centres or cost units.
- (v) Cost allocation deals with whole items, whereas cost apportionment is concerned with charging a share of the aggregate overhead to a number of departments or cost centres or cost units.

Thus, both allocation and apportionment are concerned with the distribution of overheads. Whereas allocation is the direct allotment of identifiable overheads to the relevant cost centre, apportionment is the proportionate allotment of one department overhead to other departments on an equitable basis.

6.6 BASIS OF APPORTIONMENT OF FACTORY OVERHEADS

The following are the bases of apportionment of factory overheads:

- (a) **Floor Area of Departmental Buildings:** The overheads are apportioned on the basis of floor area occupied by each department. This is a simple and better method. The values of the buildings are not uniform to cover expenses like lighting, heating, rent, etc.
- (b) **Number of Employees in Each Department:** Overheads like canteen expenses, labour, labour welfare expenses, wages of time-keepers, wages of factory manager, dispensary expenses, etc., are apportioned on the basis of number of employees in each department.
- (c) **Percentage or Proportion of Buildings and Plants:** Overheads related to buildings and plants are apportioned in the ratio of their values, e.g. depreciation, insurance, rent, interest on capital, etc.
- (d) **Departmental Production Hours:** The overheads are apportioned on the basis of production hours worked in each department. These hours may be machine hours or the direct labour hours. The expenses of factory management, administration, supervision, research and development, etc., are apportioned on this basis.
- (e) **Technical Basis:** Technical basis is applied to apportion the following expenses: Expenses of electricity, air, gas, steam and water.
 - (i) Electricity expenses can be apportioned on the basis of number of bulbs, tube-lights, fans or watts of electricity used in each department. If the departments have their separate meters, the expenses of electricity can be apportioned in the ratio of separate meter readings.
 - (ii) Air, Gas, Steam and Water expenses can also be apportioned on technical basis in the ratio of meter readings.

The following is a list of more conventional basis of apportionment commonly used in manufacturing organisations or industries:

Table 6.1: List of more Conventional Basis of Apportionment

S.No.	Overhead Cost	Basis of Apportionment
(i)	Personnel Department	Number of employees in each department or Labour hours worked.
(ii)	Time keeping Department	Number of workers in each department Machine hours or Total labour
(iii)	Maintenance Department	Hours used, No. of cards punched, etc
(iv)	Store-keeping Department	Quantity or Cost of materials used or No. of requisitions.
(v)	Purchase Department	Cost of material purchased or No. of purchase orders placed.
(vi)	Building Service Department	Space occupied by each department.
(vii)	Factory Rent, Rates and Taxes, Heating and Lighting, Repairs, Depreciation and Insurance of Factory Buildings.	Floor space occupied or Floor area.
(viii)	Air Conditioning	Floor space occupied.
(ix)	Depreciation and Insurance of Plant, Machinery and Equipment	Capital value of machinery
(x)	Electric Power	Horse power, kwh, HP multiplied by hours, machine capacities
(xi)	Electric Light	Number of light points, floor space occupied, hours used, or watts if separate meters are available.
(xii)	Steam	Based on a consumption return or potential consumption.
(xiii)	Canteen Expenses, Labour Welfare Expenses, Time-keeping and Other Benefits.	Number of workers or wages for each department.
(xiv)	Machine Shop	Machine hours, Labour hours.
(xv)	Delivery Expenses	Weight, volume, ton-mile, etc.
(xvi)	Internal Transport	Weight or Value of products handled.
(xvii)	Audit Fees	Sales or Total cost.
(xviii)	Tabulation Expenses	Hours used, Number of cards punched, etc.

Example: The Kartik Company is divided into four departments. A, B and C are production departments, and D is a service department. The actual costs for a period are as follows:

Expenses

Rent	10,000
Repairs	6,000
Depreciation of plant	4,500
Light expenses	1,000
Supervision	5,000
Fire insurance	5,000
Power	9,000
Employer's liability insurance	1,500

The following information is available in respect of the four departments:

Departments	Area Sq. ft.	No. of Employees	Total Wages (₹)	Value of Plant (₹)	Value of Stock (₹)
A	1,500	200	60,000	2,40,000	1,50,000
B	1,100	150	40,000	1,80,000	90,000
C	900	100	30,000	1,20,000	60,000
D	500	50	20,000	60,000	₹

Apportion the costs to the various departments on the most equitable method.

Solution

Statement of Departmental Overhead Primary Distribution

Items of Expenses	Basis of Apportionment	Production Departments			Service Dept D	Total (₹)
		A (₹)	B (₹)	C (₹)		
Rent	Floor area	3,750	2,750	2,250	1,250	10,000
Repairs of Plant	Plant value	2,400	1,800	1,200	600	6,000
Dept. of Plant	Plant value	1,800	1,350	900	450	4,500
Light exp.	Floor area	375	275	225	125	1,000
Supervision	No. of employees	6,000	4,500	3,000	1,500	15,000
Fire Insurance	Stock value	2,500	1,500	1,000	₹	5,000
Power	Plant value	3,600	2,700	1,800	900	9,000
Employer's liability Insurance	Total wages	600	300	400	200	1,500
	Total	21,025	15,275	10,675	5,025	52,000

Working note: Lighting should always be apportioned on the basis of the number of light points. In the absence of this information, the floor space occupied may be used as the basis. In this case, fire insurance is assumed to relate to only stock and has been apportioned on the basis of value of stock.

6.7 PRINCIPLES OF APPORTIONMENT

The principles of apportionment are given below:

- Service or use or benefit accrued:** The apportionment of overheads should be carried out on the basis of benefits extracted or used or accrued. The maintenance charges/expenses are normally apportioned on the basis of the worth of machines involved or on the basis of machine hours.
- Ability to pay method:** The overheads are apportioned on the basis of ability of the departments i.e. ability to earn. The department, which has greater ability to earn, should be apportioned more overheads than the departments which have lesser ability to earn. This method of apportionment is taking place at the cost of the efficient firms.
- Efficiency method:** The apportionment of overheads is taking place on the basis of efficiency of the departments.
- Survey method:** It is most important method which facilitates the organisation to apportion the overheads not on the basis of benefits accrued. The measurement of benefits may be subject to variability, which is normally carried out through the survey. The surveys are conducted to know the extent of various factors of influence in apportioning the overheads, more particularly in terms of benefits.

Example: The woolen company is divided into four departments viz W, X, Y are the producing departments and Z is a service department. The actual cost for a period is as follows:

Particulars		Particulars	
Rent	1,000	Supervision	1,500
Repairs to plant	600	Fire insurance in respect of stock	500
Depreciation of plant	450	Power	900
Employers' Liability for insurance	150	Light	120

The following information is available in respect of the four departments:

Particulars	Dept. W (₹)	Dept. X (₹)	Dept. Y (₹)	Dept. Z (₹)
Area (Sq. meters)	1,500	1,100	900	500
Number of employees	20	15	10	5
Total wages	6,000	4,000	3,000	2,000
Value of plant	24,000	18,000	12,000	6,000
Value of stock	15,000	9,000	6,000	---
H. P. of Plant	24	18	12	6

Apportion the costs to the various departments on the most equitable basis

S. No.	Item	Basis of apportionment	Total Amount (₹)	Production Department			Service Department
				W (₹)	X (₹)	Y (₹)	Z (₹)
1	Rent	Floor Area	1,000	375	275	225	125
2	Repairs to plant	Plant value	600	240	180	120	60
3	Depreciation	Plant value	450	180	135	90	45
4	Light	Floor area	120	45	33	27	15
5	Power	H.P. of Plant	900	360	270	180	90
6	Supervision	No of employees	1,500	600	450	300	150
7	Fire insurance	Stock value	500	250	150	100	—
8	Employers' Liability for insurance	No of employees	150	60	45	30	15
	Total		5,220	2,110	1,538	1,072	500

6.8 RE-APPORTIONMENT OF OVERHEADS OF SERVICE DEPARTMENT TO THE PRODUCTION DEPARTMENT

The service department costs are normally apportioned to the production departments at where the production is taking place. This apportionment of overheads of the service department to production departments immediately after the primary distribution overheads is known as secondary distribution of overheads, in other

words, as Re-apportionment of overheads. For re-apportioning the overheads, the following bases are considered.

Sl. No	Service Department cost	Basis of Apportionment
1.	Maintenance Department	Hours of service rendered for each department
2.	Pay roll department	No. of employees in each department
3.	Store keeping department	Value of materials of stored by each department
4.	Personnel department	No. of employees in each department
5.	Welfare and other amenities	No. of employees in each department
6.	Purchase department	No. of purchase orders or value of materials required by each department
7.	Civil engineering department	No. of buildings/Relative area occupancy of the building
8.	Internal transport service	Weight and value of the goods transported or Weight and distance carried out
9.	Transport department	Crane hours, mileage, truck mileage, tonnage handled, number of packages
10.	Power house	Floor area, cubic content

There are various renowned re-apportionment methods, which are mentioned as following:

- Direct distribution method
- Step method
- Reciprocal Service method

6.8.1 Direct Distribution Method

Under this methodology, the apportionment of overheads of the service department is taking place directly to the production departments without considering the services rendered by one service department to another. This method is apportioning the overheads not scientifically to the production departments, which leads to either the overcharge or undercharge of overheads in addition to the primary distribution of overheads. This does not pave way for the accurate computation of the overheads of each department due to inadequate importance is given to the service departments.

Example: In a XYZ engineering factory, the following particulars have been collected for three months period ended on 31st March 2007. You are required to prepare production overheads distribution summary illustrating clearly the basis of apportionment where that is required.

The expenses for the period were:

Motive power ₹ 1,100; Lighting power ₹ 200; Stores overheads ₹ 800; Amenities to staff ₹ 3,000; Depreciation ₹ 30,000; Repairs and maintenance ₹ 6,000; General overheads ₹ 12,000 and Rent and Taxes ₹ 550

Apportion the above expenses of service department E in proportion of 3:3:4 and those of service department D in the ratio of 3:1:1 to departments A, B, and C respectively.

Item	Production Departments			Service Departments	
Direct wages (₹)	2,000	1,000	4,000	1,000	2,000
Direct material (₹)	1,000	2,000	2,000	1,500	1,500
Staff Nos.	100	150	150	50	50
Electricity Kwh	4,000	3,000	2,000	1,000	1,000
Light Points Nos.	10	16	4	6	4
Asset value (₹)	60,000	40,000	30,000	10,000	10,000
Area occupied Sq. m	150	250	50	50	50

**Production overhead distribution summary
for the quarter ending 31st Mar, 2007**

Sl. No	Particulars	Production Departments			Service Departments		Total
		A	B	C	D	E	
1.	Direct wages				1,000	2,000	3,000
2.	Direct material				1,500	1,500	3,000
3.	Motive power	400	300	200	100	100	1,100
4.	Lighting power	50	80	20	30	20	200
5.	Stores overheads	100	200	200	150	150	800
6.	Amenities to staff	600	900	900	300	300	3,000
7.	Depreciation	12,000	8,000	6,000	2,000	2,000	30,000
8.	Repairs and maintenance	2,400	1,600	1,200	400	400	6,000
9.	General Overheads	2,000	3,000	4,000	1,000	2,000	12,000
10.	Rent and Taxes	150	250	50	50	50	550
11.	Total	17,700	14,330	12,570	6,530	8,520	59,650
12.	Dept. E (3:3:4)	2,556	2,556	3,408		(8,520)	
13.	Dept. D (3:1:1)	3,918	1,306	1,306	(6,530)		
14.		24,174	18,192	17,284	-----	-----	59,650

The next method is step method in re-apportioning the overheads.

6.8.2 Step Method

Under this method, the overheads of the serviceable departments are considered for apportionment. The costs of the first service department are apportioned to the remaining service and production departments. This process is ever going process till the costs of the last service department are apportioned to all production departments.

6.8.3 Reciprocal Service Method

Under this method, the service rendered to the other service departments are considered unlike the earlier i.e. step method. For charging the overhead to service departments, if there are two service departments, each department should be in a position to render service to the other.

The following are the various methodologies:

- Simultaneous Equation Method
- Repeated Distribution Method
- Trial and Error Method

Simultaneous Equation Method

Under this method, the original cost of the service departments are ascertained at first, and then those are apportioned to the various departments in accordance with the given percentage. It is being determined by way of establishing the simultaneous equations among the service departments.

Repeated Distribution Method

Under this method, the volume of overheads of the various service departments is apportioned to the production departments according to the certain percentages until the figures become smaller not further having the possibility to apportion the overheads.

Trial and Error Method

Under this method, the overheads of the first service department are apportioned to another cost centre. The cost of another service centre and the share received from the first service centre is to be apportioned to the other cost centres. This process has to be prolonged till the overheads of the service departments are negligible in volume.

6.9 DETERMINATION OF OVERHEAD RATES

The rate at which overheads are to be absorbed in cost units is referred to as overhead absorption rate. There are several methods in use for determining overhead rates. Fixing of overhead rates is necessary for absorption of overheads to cost units on a logical and equitable basis. The total overheads divided by the quantity or the value of the base selected determines the overhead rate. The following are the overhead rates:

- (i) Actual overhead rate,
- (ii) Predetermined overhead rate, and
- (iii) Standard rate.

(i) **Actual overhead rate:** Actual overhead rate is determined by dividing the overhead expenses incurred during the accounting period by the actual quantum of the base selected, such as unit of products, direct wages, direct material cost, labour hours or machine hours. The basic principle in costing is that the recovery

of overhead should be made on actual basis, as far as possible, so that overheads may be directly charged to jobs, processes, operations or products.

$$\text{Actual Rate} = \frac{\text{Actual overhead expenses incurred during a period}}{\text{Actual quantity or value of the base for the period}}$$

OR

$$\text{Actual Rate} = \frac{\text{Actual overheads}}{\text{Actual base}}$$

Actual overhead rate method is not helpful as the actual rate can be ascertained only after the accounting period is over when the actual figures would be available. This calculation causes delay in finding out the costs of present production.

- (ii) **Predetermined overhead rate:** Predetermined overhead rates are those which are established well in advance before commencement of production. Predetermined overhead rate is computed by dividing the budgeted overhead expenses by the budgeted base. Predetermination of overhead rates is of practical use in regard to managerial control over costs. On the basis of predetermined overhead rates, prompt preparation of cost estimate and quotations as well as fixation of sales prices is possible. Adoption of predetermined overhead absorption rates is practically useful in organisations following a budgetary control system.

$$\frac{\text{Estimated factory overhead for the budgeted period}}{\text{Estimated direct material cost of production}} \times 100$$

Predetermined overhead rate is practically used in costing. Predetermined overhead rate is calculated as follows:

$$\text{Predetermined Rate} = \frac{\text{Estimated or Budgeted overheads}}{\text{Estimated or Budgeted base}}$$

- (iii) **Standard rate:** Standard rate is used in place of predetermined rate and calculated from the following formula:

$$\text{Standard Rate} = \frac{\text{Standard overheads}}{\text{Standard base}}$$

6.10 METHODS OF ABSORPTION OF OVERHEADS

The next important step is to account the apportioned overheads. The method of overhead absorption could be explained that (How to recover the cost from the cost of production) The method of apportionment of overhead expenses to the cost centres or cost units is known as overhead absorption. It is nothing but the process of including the share of overhead expenses of one unit in the charge of total cost of a single unit. In simple sense, the absorption is distributing the overheads allotted to a particular department over the units manufactured in the department.

There are some important methods to absorb the overheads, which are as follows:

- Direct Material Cost Method
- Direct Labour Cost Method
- Prime Cost Method
- Direct Labour Hour Method
- Machine Hour Rate Method

- Rate per Unit of Production
- Sale Price Method

Let us discuss the methods of absorption of manufacturing overhead one after the other.

6.10.1 Direct Material Cost Method

In this method, factory expenses are denominated in terms of materials consumed in production and calculated as percentage to absorb manufacturing overheads.

$$\text{Overhead rate} = \frac{\text{Overhead expenses (Budgeted)}}{\text{Anticipated direct material cost}}$$

For example, if the anticipated factory expenses of the organisation are ₹ 50,000 and the expected materials cost is ₹ 1,00,000, Overhead rate = 50%, which means that the factory expenses are required to absorb out of the materials cost.

For example, the anticipated overhead expenses of a department are ₹ 20,000 and the estimated cost of direct materials is ₹ 80,000, then the overhead rate as a percentage of direct materials would be 25% or $(20,000 \div 80,000) \times 100 = 25\%$.

This method is most suitable for the factories, which have greater stability in the price of materials as well as only one product in its product line.

6.10.2 Direct Labour Cost Method/Direct Wage Method

This is another easier method to follow is Direct Labour Cost method, which is considered as renowned method of absorbing the overheads in terms of Labour. Under this method, wages are adopted as the base for the absorption of overhead costs. The overhead absorption rate is usually expressed as a percentage of direct labour cost or direct wages, and is obtained by dividing the total overhead expenses by the aggregate of direct labour cost of a cost centre and multiplying the result by 100.

For example, if the estimated overhead of a department is ₹ 5,000 and the direct wages are ₹ 10,000, the overhead absorption rate would be 50% or $(5,000 \div 10,000) \times 100 = 50\%$.

This method is suitable for industries where direct labour cost is predominant and the rates of pay and the method of payment are the same for majority of workers in the organisation.

It is most ideal tool where the performance of the workers is remaining constant as well as the mix in between the skilled and unskilled workers.

It is suited for the organisations, which have greater stability in the rate of labour charges than the cost of materials.

6.10.3 Prime Cost Method

Under this method, prime cost is adopted as the basis of overhead absorption. In order to overcome, the disadvantages of the direct materials and direct labour cost absorption method, prime cost is taken as the basis of absorption of overhead costs. Under this method, the absorption overhead is made through an aggregate of direct materials and direct labour of all products of a cost centre.

Since, prime cost gives rise to overhead, there is some logic in adopting second methods. Overhead absorption related is obtained by dividing the overhead cost of a cost centre by its prime cost and by multiplying the result by 100, so as to express the same in percentage. This method may be adopted where a standard article is produced requiring a constant quantity of materials and labour cost. This method is simple and

easy to operate, since the basic data require computing the overhead rate is readily available. The formula for calculating the rate can be expressed as:

$$\text{Overhead Rate} = \frac{\text{Estimated factory overheads for the budgeted period}}{\text{Estimated prime cost for normal output}} \times 100$$

This method is considered to be best method among the early two due to nullifying the drawbacks of the prime cost method.

6.10.4 Direct Labour Hour Method

The recovery rate of overheads is computed by dividing the overhead expenses by the summation of productive hours of the direct workers. Where labour is the most predominant cost factor, adoption of this method is suitable for absorbing manufacturing overheads to production centre. Since, most of the overheads like rent, depreciation, supervision, lighting, power, taxes, insurance, repairs, etc., accrue on the basis of time, the most equitable basis for their absorption should necessarily be the time factor involved in production. The rate is determined by dividing the overhead cost by the total production hours of direct labour. The formula for direct labour hour rate can be expressed as:

$$\text{Rate Per Hour of Direct Labour} = \frac{\text{Estimated factory overheads for the budget period}}{\text{Estimated direct labour hours}}$$

It is a method suitable for the organisation, which gives greater importance to labour.

This method never gives room for the fluctuation in the rate of labour but gives greater importance to the time factor.

Example: In a factory, there are three production departments P1, P2, P3 and one service department S1. The following figures are available for one month of 25 working days of 8 hours each day. All departments work all these with full attendance.

Expenses	Total	Service Dept. S1 (₹)	Production Dept. P1 (₹)	Production Dept. P2 (₹)	Production Dept. P3 (₹)
Power and Lighting	2,200	480	400	600	720
Supervisor's Salary	4,000	₹	₹	₹	₹
Rent	1,000	₹	₹	₹	₹
Welfare	1,200	₹	₹	₹	₹
Others	2,400	400	400	800	800
	10,800				

Particulars	S1	P1	P2	P3
Supervisor's Salary	20%	30%	30%	20%
Number of workers	10	30	40	20
Floor area in square metres	500	600	800	600
Service rendered by service dept. to production dept.	-----	50%	30%	20%

Calculate labour hour rate for each of the departments P1, P2, P3.

Overhead Distribution Summary

Items	Basis	Total	Service Dept.	Production Dept. 1	Production Dept. 2	Production Dept. 3
Power and Lighting	Direct (as illustrated)	2,200	480	400	600	720
Supervisor's Salary	Acc to ratio given	4,000	800	1,200	1,200	800
Rent	Floor area	1,000	200	240	320	240
Welfare	No. of workers	1,200	120	360	480	240
Others		2,400	400	400	800	800
		10,800	2,000	2,600	3,400	2,800
Allocation of service department	5:3:2		-2,000	1,000	600	200
	(i)	10,800	-----	3,600	4,000	3,000
Total labour hours $8 \times 25 = 200$ Hrs. \times No. of workers (ii)				6,000	8,000	4,000

Labour hour rate i/ii .60 P .50P .75P

Example: From the following particulars find out Direct Labour Rate

- (a) Total number of labourers working in the department 400
- (b) Total working days in a year 300
- (c) Number of working hours per day 8
- (d) Total departmental overheads per year ₹ 1,82,400
- (e) Normal idle time allowed. 5%

Solution

Calculation of Direct Labour Rate for Departmental Overheads

Total working days in a year	300
Number of working hours per day	8
Total working hours available per worker per year (300×8)	2,400
Less: normal idle time allowed (5% of 2,400 hrs)	120
Effective working hours per worker per year ($2400 - 120$)	2,280
Number of workers working in the department	400
Total effective working hours in the department (2280×400)	9,12,000
Total departmental overheads per year	₹ 1,82,000
Direct Labour Rate for absorption of overheads per hour	₹ 0.20
($\frac{₹ 1,82,000}{9,12,000 \text{ hrs.}} = ₹ 0.20$)	

6.10.5 Machine Hour Rate Method

Under this method, overhead absorption rate is determined by dividing the actual or predetermined overhead cost to be absorbed by the number of hours for which the machine or machines are operated or expected to be operated. It is cost of running a machine per hour and the factory expenses are absorbed through the production. It is most useful for the organisation, which greatly applies the capital intensive technology

rather than the labour intensive technology. This method facilitates the organisation, which mainly relies upon the machines and also incurs overhead expenses due to the operations of the same machines. In such cases, the overheads are allocated to the departments on the basis of operating hours of the machines.

It is very simple to compute the machine hour rate that total expenses incurred for machinery for running is divided by the number of working hours of the machine.

This method is most suitable:

- Where work is performed predominantly on machine,
- Where the production is not uniform or continuous during the period, and
- Where it is desired to charge each individual job with its share of indirect expenses.

The procedure adopted for the machine-hour rate is as follows:

- (i) The various factory overheads such as rent, repairs, depreciation, insurance, power, lighting, consumable stores, supervision, etc., are departmentalized on same equitable basis.
- (ii) The share of factory overheads charged to each department is further apportioned different machines or groups of machines on some suitable basis, treating each machine or a group of machines as a cost centre. While computing the rate for a group of machines, it is assumed that all the machines are similar and bear the same cost of operation.
- (iii) Machine-hour rates may be computed separately for fixed and variable overhead expenses pertaining to the particular machine cost centre. This would enable the absorption of idle time cost in the machine hour rate. The need for a separate machine-hour rate for fixed and variable cost arises due to the fact that certain items of overhead like supervision, rent, insurance, taxes, etc., are fixed in nature and arise even when the machines are idle, whereas other variable overheads like depreciation, repairs, power, consumable stores, etc., are directly related to machine operation.
- (iv) The working hours for which a machine is expected to run are calculated for the period for which overheads are to be apportioned and absorbed. While computing the number of hours for the given period, an allowance is made for the idle time or hours lost due to tool-setting, machine-cleaning, etc. The cost of idle time is either spread over the jobs actually completed, or separate rates are computed for the Running time or Getting up time. This ensures the absorption of idle time overhead cost by the machine cost centre.
- (v) Where a job is performed by a single machine, the overhead cost chargeable to the job is calculated by multiplying the hours spent on that machine for completing the job by the machine hour rate. If a job is worked by two or more machines, the hours worked on each machine are multiplied by the corresponding rates of each machine and the aggregate overhead cost of all machines constitutes the overhead chargeable to the job.

Example: The following annual charges are incurred with respect of a machine in a shop where manual labour is almost zero and the work is done by means of five machines of exactly similar type of specification:

(i) Rent and Rates (in terms of floor space occupied) for the shop	9,600
(ii) Depreciation on each machine	1,000
(iii) Repairs and maintenance of the five machines	2,000

- (iv) Power consumed (as per meter) @ 5 paise per unit for the shop 6,000
- (v) Electric charges for light in the shop 1,080
- (vi) Attendants: There are two attendants for the five machines and both are each paid ₹ 120 per month
- (vii) Supervision: For the five machines in the shop there is one supervisor whose emoluments are ₹ 500 per month.
- (viii) Sundry supplies such as lubricants, jute and cotton waste etc. for the shop ₹ 900
- (ix) Hire-purchase installment payable for the machine (including ₹ 600 as interest) 2,400

The machine uses 10 units of power per hour. Calculate the machine hour rate for the machine for the year.

Solution:

Total annual working hours of the machines are computed as follows:

- Total amount of the power consumed by the machines = ₹ 6,000
- Rate of power = .50 paise an hour
- Total working hours of the machines = ₹ 6,000/.50 paise = 12,000 Hrs.
- Working hours per machine = 12,000 Hours/ 5 = 2,400 Hrs.

Calculation of Machine Hour Rate

Particulars		
Standing charges:		
Rent and Rates (1/5 of ₹ 9,600)	1,920	
Lighting charges (1/5 of ₹ 1,080)	216	
Attendants Salary for machine (1/5 of ₹ 2,880)	576	
Supervision per machine (1/5 of ₹ 6,000)	1,200	
Sundry supplies to a machine (1/5 of ₹ 900)	180	
	4,092	
Hourly rate of standing charges = 4,092/ 2,400 hrs		1.705
Machine expenses:		
Depreciation ₹ 1,000/2,400 Hrs		.4167
Repairs and maintenance 2,000/5 = ₹ 400/2,400		.167
Power (10 units of power @ 5 paise per unit)		.50
Machine hour rate		2.7887

6.10.6 Rate per Unit of Production/Production Unit Method

It is the simplest of all the methods. The overheads of the department are divided by the units produced by the respective department and thus a rate per unit is ascertained. This method is good. The overhead absorption rate is obtained by dividing the overheads to be absorbed by the number of units produced. It is expressed in the form of formula as follows:

$$\text{Overhead Rate} = \frac{\text{Overhead to be absorbed}}{\text{No. of units produced}}$$

Or

$$\text{Overhead Rate} = \frac{\text{Overhead expenses}}{\text{Budgeted production}}$$

It is most suitable to the industries of mining, brick manufacturing, and foundries for calculating the overhead rate. It is mostly adopted in the organisations where only one product is being manufactured; otherwise it is not much meaningful technique to study the overhead rate.

Example: From the budgeted figures of Gwalior Soap Factory:

(i) Prepare Normal Overhead Application Rates using the:

- (a) Direct Labour Rate Method
- (b) Direct Labour Cost Method, and
- (c) Machine Hours Rate Method.

Budgeted figures for the year:

Estimated factory overheads	₹ 58,000
Estimated direct labour hours	1,34,600
Estimated direct labour cost	₹ 97,800
Estimated Machine-hours	50,500

(ii) Prepare a comparative statement of cost showing the result of the application of each of the above rates of Batch No. 488 from the data given below:

Direct materials consumed	₹ 42
Direct labour	₹ 45
Direct labour hours	30
Machine hours	20

Solution:

(i) Computation of Normal Overhead Application Rates from the following methods:

(a) Direct Labour Hour Rate Method:

Estimated Factory Overheads	₹ 58,000
Estimated Direct Labour Hours	1,34,600
Overhead Application Rate	$= \frac{58,000}{1,34,600} = ₹ 0.431$

(b) Direct Labour Cost Method:

Estimated Factory Overheads	₹ 58,000
Estimated Labour Cost	₹ 97,800
Overhead Application Rate	$= \frac{58,000}{97,800} \times 100 = 59.3\%$

(c) Machine Hour Rate Method:

Estimated Factory Overheads	₹ 58,000
Estimated Machine Hours	50,500
Overhead Application Rate	$= \frac{58,000}{50,500} = ₹ 1.149$

(ii) Comparative Statement of Cost of Batch No. 488

Particulars	Direct Labour Rate Method	Direct Labour Cost Method	Machine Hour Rate Method
Direct Materials Consumed	42	42	42
Direct Labour	45	45	45
Prime Cost	87	87	87
Factory Overhead	12.93	26.68	22.98
	99.93	113.68	109.98

Example: The following annual expenses are incurred in respect of a machine where annual labour is almost zero and where the work is done by means of five machines of exactly similar type and specifications.

- Rent and rates (Proportioned to the floor space occupied for the shop) 4,830
- Depreciation on each machine 500
- Repairs and maintenance for five machines 1,000
- Power (as per metre) @ ₹ 1 per 16 units consumed for the shop 3,750
- Electric charges for light in the shop 540
- Attendant: There are two attendants for the five machines and they are each paid ₹ 60 per month
- Supervision: There is one supervisor for the five machines whose salary is ₹ 250 per month
- Sundry supplies, such as lubricants, jute and cotton waste, etc., for the shop 494
- Hire-purchase installment payable for the machines (including ₹ 300 as interest)
- The machine uses 10 units of power per hour 1,200

From the given information, calculate machine hour rate.

Solution:

Computation of Machine Hour Rate

Particulars	Amount (₹)
(A) Standing Charges:	
Rent and Rates per machine (₹ 4,830 ÷ 5 machines)	961
Lighting charges in shop per machine (₹ 540 ÷ 5)	108
Attendants salary per machine (₹ 60 × 2 × 12 ÷ 5)	288
Supervision per machine (₹ 250 × 12 ÷ 5)	600
Sundry supplies per machine (494 ÷ 5)	99
Hire-purchase interest per machine (₹ 300 ÷ 5)	60
Total Standing Charges	2,116
Hourly Rate for Standing Charges (₹ 2,116 ÷ 1,200 hours) = 1.76	1.76
(B) Hourly Machine Expenses:	
Depreciation (₹ 500 ÷ 1,200 hours)	0.42
Repairs and Maintenance (₹ 200 ÷ 1,200 hours)	0.17
Power (₹ 750 ÷ 1,200 hours)	0.62
Machine Hour Rate	2.97

Note: It is objected to include higher-purchase installment and interest in computing machine-hour rate, as these are matters of financial nature. Thus, excluding ₹ 60 towards hire-purchase, the machine-hour rate would be ₹ 1.92.

Working notes:

(a) Working hours of the machine have been calculated as under:

₹ 1 is incurred for consuming 16 units of power.

₹ 3,750 will have to incur for consuming (₹ 3,750 ÷ 16 units) 60,000 units.

But, these 60,000 units are for all the five machines.

Power consumption per machine = 60,000 units ÷ 5 = 12,000 units

Since, machine consumes 10 units per hour

The number of machine-hours worked during the year

= 12,000 units ÷ 10 units per hour

= 1,200 hours.

(b) Hourly rate of power consumption is calculated as follows:

Power consumption per machine during the year

= ₹ 3,750 ÷ 5 = ₹ 750.

Hourly power consumption by the machine during the year

= ₹ 750 ÷ 12,000 hours = ₹ 0.62

Example: A machine costing ₹ 10,000 is expected to run for 100 years at the end of which period, its scrap value is likely to be ₹ 900. Repairs during the whole life of the machine are expected to be ₹ 1,800 and the machine is expected to run 4,380 per hours per year on an average. Its electricity consumption is 15 units per hour, the rate per unit being 5 paise. The machine occupies one-fourth of the area of the department, and has two points out of a total of 10 for lighting. The foreman has to devote about one-third of his time to the machine. The monthly rent of the department is ₹ 300 and the lighting charges amount of ₹ 80 per month. The foreman is paid a monthly salary of ₹ 480.

Compute the Machine Hour Rate assuming insurance at 1% per annum and the expenses on oil etc. are ₹ 9 per month.

Solution:

Computation of Machine Hour Rate

Particulars	Amount (₹)
(A) Standing Charges (Annual):	
Rent (₹ 300 × 12 months × 1/4 th area occupied)	900
Lighting (₹ 80 × 12 months × 2/10 th light points)	192
Foreman's Salary (₹ 480 × 12 months × 1/3 time occupied)	1,920
Insurance (10% on ₹ 10,000)	1000
Expenses on Oil, etc. (₹ 9 × 12 months)	108
Total Standing Charges	3,220

Contd

Hourly Rate for Standing Charges	
(` 3,220 ÷ 4,380 hours) = 0.73	0.73
(B) Variable Charges:	
Depreciation	0.21 ⁽¹⁾
Repairs and Maintenance	0.04 ⁽²⁾
Electricity (15 units per hour @ ` 0.05)	0.75
Machine Hour Rate	1.73

Working notes:

$$\begin{aligned}
 (1) \text{ Hourly Rate of Dep.} &= \frac{\text{Cost of Machine} - \text{Scrap value}}{\text{Total life} \times \text{Yearly no. of working hours}} \\
 &= \frac{` 10,000 - ` 900}{10 \times 4,380} = ` 0.21
 \end{aligned}$$

(2) Hourly Rate of Repair and Maintenance:

$$\begin{aligned}
 &= \frac{\text{Cost of repairs during the working life}}{\text{Hours of working life}} \\
 &= \frac{` 1,800}{10 \times 4,380} = ` 0.04
 \end{aligned}$$

Example: Compute a machine hour rate from the following particulars:

- (i) Cost of machine: ` 10,000; Estimated life: 10 years; Estimated Scrap value: ` 1,000; Estimated working hours: 50 weeks of 44 hours per year of which maintenance is expected to take up 200 hours. No other loss of working time is expected. The setting up time is estimated at 5% of the total productive time. No power is necessary for maintenance and setting up.
- (ii) The machine uses 10 units of power per hour at 10 paise per unit.
- (iii) The machine requires a chemical solution which is replaced at the end of each week at a cost of ` 20.
- (iv) The estimated cost of maintenance is ` 1,200 per annum.
- (v) Two operators control the machine together with 5 other identical machines in the shop, each getting wages of ` 60 per week.
- (vi) Insurance of the machine is 1% per annum.
- (vii) The rent of the machine shop is ` 1,200 per annum.
- (viii) Departmental overhead apportioned to this machine amount to ` 1,250 per annum.
- (ix) Repairs of the machine are estimated at 50% of depreciation.

Solution:

Computation of Machine Hour Rate

Particulars	Amount (₹)
(A) Standing Charges (Annual):	
Insurance of (1% of ₹ 10,000)	100
Rent of machine shop (₹ 1,200 ÷ 6 machines)	200
Department overhead	1,250
Operator's wages (₹ 60 × 2 × 50 weeks ÷ 6 machines)	1,000
Chemical solution (₹ 20 × 50 weeks)	1,000
Total Standing Charges	3,550
Hourly Rate for Standing Charges (₹ 3,550 ÷ 1,900 hours) = 1.87	1.84
(B) Machine Expenses:	
Depreciation — $\frac{₹ 10,000}{10 \text{ years} \times 1,900 \text{ hours}}$	0.47
Power @ 10 units per hour @ ₹ 0.10 per hour	1.00
Maintenance (₹ 1,200 ÷ 1,900 hours)	0.63
Repairs (50% of Depreciation i.e. ½ of ₹ 0.47)	0.23
Machine Hour Rate	4.17

Working note:

Estimated working hours are calculated as follows:

50 week of 44 hours per year = 2,200 Hours

Less: Maintenance hours lost = 200 Hours

Normal Productive hours = 2,000 Hours

Less: Setting up time:

(@ 5% of 200 hours) = 100 Hours

Productive or Effective working time = 1,900 Hours

Example: Compute the comprehensive Machine Hour Rate from the following data:

Total machine cost to be depreciated ₹ 2,30,000

Life of the machine 10 years

Depreciation on straight line

Departmental annual overheads

(a) Rent ₹ 50,000

(b) Heating and lighting ₹ 20,000

(c) Supervision ₹ 1,30,000

Departmental area 70,000 sq. ft.

Machine area 2,500 sq. ft.

26 machines in the department

Annual cost of reserve equipment for the machine ₹ 1,500

Hours run on production 1,800

Hours for setting and adjusting 200

Power cost ₹ 0.50 per hour of running time

Labour:

(a) When setting and adjusting Full time attention

(b) When machine is producing One man looks after 3 machines

Labour Rate ₹ 600 per hour

Solution:

Computation of Comprehensive Machine Hour Rate

Particulars	Annual (₹)	Per Hours (₹)
(A) Standing Charges:		
Depreciation (2,30,000 ÷ Scrap nil) ÷ 10 years	23,000.00	
Rent (₹ 50,000 × 20,500 sq. ft. / 70,000 sq. ft.)	1,785.71	
Heating and Lighting (₹ 20,000 × 2,500 sq. ft. / 70,000 sq. ft.)	714.28	
Supervision (₹ 1,30,000 ÷ 26 machines)	5,000.00	
Reserve Equipment (₹ 1,500 ÷ 26 machines)	57.69	
Labour cost: Setting & Adjusting time (200 hours @ ₹ 6)	1,200.00	
Total Standing Charges for the Year	31,757.68	
Hours Rate of Standing Charges: (₹ 31,757.68 ÷ 1,800 hours)		17.64
(B) Variable Charges:		
Power (₹ 50 per hour for running time)	900	
Labour cost: Running time (1,800 hours × ₹ 6 ÷ 3 machines)	3,600	
Total Variable Charges	4,500	
Hourly Rate for Variable Charges (4,500 ÷ 1,800 hours)		2.50
Machine Hour Rate (composite or comprehensive)		20.14

6.10.7 Sales Price Method

Under this method of absorption of overhead, we calculate the rate of overhead on the basis of sales of units and budgeted overhead cost. Same rate is used for absorption.

Overhead Rate = Budgeted Overhead Expenses / Sales of Units of Production

This method is useful for absorbing sales, distribution, research, development, promotion and advertising expenses.

6.11 OVERHEAD COST CONTROL

The overhead cost control is exercised through the implementation of overhead cost control account in the cost ledger. This account is debited by the respective expenses brought under each category. In the case of manufacturing overhead, the following

expense accounts are debited viz. indirect material, indirect labour and indirect expenses through passing the following journal entry:

Manufacturing Overhead Control	A/c	Dr.
To Stores Ledger Control	A/c	
To Wages Control	A/c	
To General Ledger Adjustment	A/c	

The debit side of the journal entry illustrates the amount of the total manufacturing overheads incurred during the particular span by the organisation.

The recovery of such overheads is carried out by the following entries

Work in process control A/c	Dr.
To Manufacturing Overhead Control A/c	

The balance of manufacturing overhead control A/c represents two different kinds of absorption viz. over absorption and under absorption.

Check Your Progress

Fill in the blanks:

- Salaries of foremen, supervisors and works manager are examples of _____.
- Production or Manufacturing Overhead is also known as _____.
- The fixed overheads are also known as _____.
- _____ overhead rates are those which are established well in advance before commencement of production.
- Where labour is the most predominant cost factor, adoption of _____ method is suitable for absorbing manufacturing overheads to production centre.
- _____ method may be adopted where a standard article is produced requiring a constant quantity of materials and labour cost.
- Machine hour rate is most suitable where work is performed predominantly on _____.

6.12 LET US SUM UP

- Overhead has been defined by the Institute of Cost and Work Accountants, London as, 'The aggregate of indirect material cost, indirect wages and indirect expenses'. The word indirect means one which cannot be allocated, but which can be apportioned to or absorbed by cost centre or cost unit.
- Due to rapid industrialization and mechanization, the growth in the volume of overheads surmounted due. Due to cut throat competition, every firm desires to price their products most effectively. For which, specific overhead accounting and control is required to not only allocate the overheads but also the overheads of the service departments are apportioned to production departments. Immediately after the primary distribution, if the earlier is taking place in between production departments and service departments is known as re-apportionment of overheads. The next stage in the process of overheads accounting is absorption of overheads which has got its own methods. The popular methods of absorption of overheads

are: Direct Labour Method, Prime Cost Method, Labour Hours Method and Machine Hours Method. These methods are used to recover the overheads through the charge from the cost centres or cost units. The next important stage is to control the overheads through overheads control account which could be classified into many viz Manufacturing overhead control account and Administrative overhead control account to determine the over and under absorption of overheads of the respective departments.

- The overhead classification depends upon the type and size of the business, nature of product, services of the product and various policies of the management regarding product or output. The important bases of classification of overheads are Nature-wise Classification, Function-wise Classification, Variability-wise Classification, Controllability-wise Classification and Normality-wise Classification.
- Under a normal costing approach, actual overhead costs are never assigned to jobs. Overhead is applied to each individual job using a predetermined overhead rate. Overhead costs flow into Work-in-process inventory via the predetermined rate. Since direct labour hours are used to assign overhead into production, the time tickets serve as the source documents for assigning overhead to individual jobs and to the controlling work-in-process inventory account.
- Allocation of overhead cost refers to the allotment of whole items of overhead costs to cost centre or cost unit. Apportionment refers to the distribution of overheads among different departments or cost centre on suitable basis. It involves charging a share of the total overhead cost to a number of cost centres.
- The basis of apportionment of factory overheads is Floor Area of Departmental Buildings, Number of Employees in Each Department, Percentage or Proportion of Buildings and Plants, Departmental Production Hours and Technical Basis.
- There are several methods in use for determining overhead rates. Fixing of overhead rates is necessary for absorption of overheads to cost units on a logical and equitable basis. The total overheads divided by the quantity or the value of the base selected determines the overhead rate. The following are the overhead rates i.e. Actual overhead rate, Predetermined overhead rate and Standard rate.
- The different methods of overhead absorption are: Direct Material Cost Method, Direct Wage Method, Direct Labour Hour Method, Prime Cost Method, Machine Hour Rate Method and Production Unit Method.

6.13 UNIT END ACTIVITY

Critically examine how the over/under absorption of overheads is being determined?

6.14 KEYWORDS

Overhead: The composition of indirect cost components of the product or service.

Allocation: Charging the overhead without division but wholly to the respective functional departments.

Production Overhead: The production overhead is the indirect cost which includes indirect material, indirect labour and indirect factory expenses.

Office and Administration Overheads: It is the indirect expenditure incurred in formulating the policy, directing the organisation and controlling the operations of an undertaking which is not related directly to research and development or production and selling activities.

Distribution Overheads: The expenses pertaining to delivery of goods to the customers fall under this distribution overhead.

Development Cost: The development cost is the cost of the process which begins with the implementation of the decision to produce a new or improved method and ends with the commencement of formal production of the product.

Fixed Overheads: Fixed overhead is one which tends to be unaffected by variation in volume of output.

Apportionment: Dividing the overhead to the various departments on certain basis.

Re-apportionment: Further dividing of earlier apportioned overheads of the service departments to the production departments.

Absorption: Recovery of overheads.

Absorption of Overheads: It means charging of overheads of a cost centre to the cost units in such a way that the cost of each unit of production of the cost centre includes an equitable share of the total overhead of that cost centre.

Overhead Absorption Rate: The rate at which overheads are to be absorbed in cost units is referred to as overhead absorption rate.

Predetermined Overhead Rate: Predetermined overhead rates are those which are established well in advance before commencement of production.

Machine Hour Rate Method: Under this method, overhead absorption rate is determined by dividing the actual or predetermined overhead cost to be absorbed by the number of hours for which the machine or machines are operated or expected to be operated.

Production Unit Method: Under this method, overheads of the department are divided by the units produced by the respective department and thus a rate per unit is ascertained.

6.15 QUESTIONS FOR DISCUSSION

1. What are overheads? How are they classified? Discuss in detail with a chart.
2. Describe the advantages of classification of factory overheads.
3. Define fixed, variable and semi-variable expenses giving examples of each.
4. Classify the Overheads according to Nature, Functions and Variability-wise and explain in detail.
5. Explain the system and basis of apportionment of factory overheads on machines.
6. What is the difference between allocation of overheads and apportionment of overheads?
7. Discuss the accounting treatment of actual overhead costs.
8. Classify the overhead according to controllability and normality-wise.
9. What is meant by re-apportionment of overheads? What are the various methods available for reapportioning of overheads?
10. What is meant by Allocation of overheads?
11. What do you understand by Machine Hour Rate? How is it calculated? Give the circumstances under which it may be suitably used in cost accounting.

12. The following figures relate to a manufacturing concern. All jobs pass through two departments:

	Production Dept.	Finishing Dept.
Material used	₹ 6,000	₹ 500
Direct labour	₹ 3,000	₹ 1,500
Factory overheads	₹ 1,800	₹ 1,200
Labour hours	12,000	5,000
Machine hours	10,000	2,000

The following information relates to Job No. 430:

	Production Dept.	Finishing Dept.
Direct material	₹ 240	₹ 20
Direct wages	₹ 130	₹ 50
Labour hours	530	140
Machine hours	510	50

You are required to prepare a statement showing the different cost results of Job No. 430 by using five different method of absorption of factory overheads.

13. Calculate Machine Hour Rate for Machine No. 5 which is one of the five machines in operation in a department of a factory.

You are furnished with the following information:

- (a) Cost of Machine No. 5, ₹ 1,000
- (b) Estimated Scrap Value at finish of working life (10 years) ₹ 100
- (c) Normal running hours per annum, 1,800
- (d) Machine No. 5 occupies one-fifth of the floor space of the department, the rent, rates, lighting, etc. of which amount to ₹ 350 per annum.
- (e) Charges for Electric Power supplied to Machine No. 5, ₹ 200 per annum.
- (f) Charges for oil, waste, etc. supplied to Machine No. 5, ₹ 30 per annum.
- (g) Repairs and Maintenance throughout working life of machine estimated at ₹ 360.
- (h) Cost of supervision and other expenses applicable to Machine No. 5 estimated at ₹ 150 per annum.
- (i) Labour cost of operating the machine is to be ignored in making your calculations.

14. From the following particulars, compute Machine-hour Rate:

Cost of Machine	₹ 90,000
Establishment Charges, etc.	₹ 10,000
Life of the Machine	10 years
Working Hours per year	2,000 hours
Repairs:	50% of depreciation
Consumption of Electric Power 10 unit p. h. @ 25 paise per unit	
Lubricating Oil per day ₹ 4 for 8 hours	
Consumable Stores ₹ 10 per day for 8 hours	
Wages of Operator ₹ 12 per day for 8 hours	

15. From the following information, compute Machine Hour Rate:

Cost of Machine	₹ 12,000
Scrap Value	₹ 500
Working Life	16,000 hours
Time taken for maintenance	250 hours
Time for Settings	5%
Power 20 units @ 10 paise per unit	
Cost of Repairs	₹ 1,600 p.a.
Workers engaged on two machines	2
Wages per man	₹ 200 p.m.
Requirement of Chemical	₹ 25 p.m.
Overhead Chargeable to this machine	₹ 225 p.m.
Insurance Premium 1% p.a.	
Productive Working Hours	2,200 hours p.a.

16. From the under mentioned data, calculate the Machine-hour Rate:

Cost of Machine	₹ 30,500
Scrap Value	₹ 2,500
Estimated life of the Machine	12 years
Working days per year	200 days of 8 hours; 100 days of 6 hours
Maintenance and Repairs	7.5% of the cost of machine
Stores Issued	₹ 1,000
Power Consumption	₹ 2 per operative hour
Insurance Premium	1% of cost of the machine
Supervision Expenses per year	₹ 7,500
Idle Time estimate	10%

Check Your Progress: Model Answer

1. Indirect Labour
2. Factory Overhead
3. Period Costs
4. Predetermined
5. Direct labour hour
6. Prime cost
7. Machines

6.16 REFERENCES/SUGGESTED READINGS

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UNIT 7

CONTRACT COSTING

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- 7.0 Aims and Objectives
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7.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Understand the meaning and features of contract costing
- Distinguish between contract and job costing
- Describe the contract costing procedure
- Understand the contract ledger
- Preparation of contract account
- Explain the important points in contract costing

7.1 INTRODUCTION

In principle, contract costing is similar to job costing as it follows the principles of job costing. Contract costing is, therefore, a type of job costing and the entire contract, instead of job, constitutes cost unit. This method of costing which is also known as Terminal Costing is applied in industries engaged in the construction of buildings, roads, dams, bridges, banks, parks, etc. In this method, a separate number is allotted for every contract and all related costs are accumulated for each contract. The person who undertakes the work to complete is known as Contractor and the person who gets the work done through contractor is known as Contractee.

In this lesson, we will study the concept of contract costing and distinguish between contract and job costing, the contract costing procedure and the contract ledger. We will also study the preparation of contract account and the important points in contract costing.

7.2 CONCEPT OF CONTRACT COSTING

This section will help you understand the meaning and features of contract costing and distinction between contract costing and job costing.

7.2.1 Meaning of Contract Costing

Contract costing is the method or technique of ascertaining cost of a contract. The ICMA, London defines contract costing as, *"that form of specific order costing which applies where work is undertaken to customer's special requirements and each order is of long duration or period."* In other words, *"contract costing is the technique of ascertaining cost of a contract"*.

From the above definitions, it is clear that contract costing is a type of specific order costing under which there is an attribution of costs to individual contracts. The important objectives of contract costing are to:

- determine the total cost of the contract,
- determine the profit or loss for each or every contract, and
- facilitate control of cost of each contract.

7.2.2 Features of Contract Costing

The main features of contract costing are as follows:

- A contract generally takes more than one year to complete,
- Work is generally carried out at a site other than the contractor's own premises,
- Each contract undertaken is treated as a cost unit,
- Contract is done for a specific consideration which is known as contract price,
- Separate contract account is prepared for each contract in the books of contractor to ascertain profit or loss on each contract,
- Most of the raw materials are specially purchased for each contract,
- The contractor is paid in installments which is done after the work completed has been certified,
- Most expenses, such as insurance, telephone, electricity, etc. are also direct,
- Plant, machinery and equipment may be purchased for the contract or may be hired for the duration of the contract,
- In case of large contracts, the contractor may employ sub-contractors for a part of the contract work,
- Penalties may be incurred by the contractor for failing to complete the work within the contract period,
- Contract costing is concerned with the costing of construction work on repair work and not with the costing of any goods,
- There is no heavy investments on assets initially in the case of contract costing,
- Nearly all labour is direct, and
- Each contract or work involved in contract costing is executed or done as per the specifications given by the contractee.

7.2.3 Distinction between Contract Costing and Job Costing

The main points of distinction between contract costing and job costing are as follows:

- Contract is big in size whereas a job is small in size.
- Contract work is done at site whereas jobs are usually carried out in factory premises.
- A contract takes more time to complete whereas a job usually takes less time to complete.
- In contract costing, most of the costs are chargeable direct to contract accounts, whereas under job costing, direct allocation to such an extent is not possible.
- In contract costing, there is no heavy investment on assets whereas job costing involves heavy investment on assets initially.
- Under contract costing, the price is paid in various installments depending upon the progress of work. In job costing, the selling price of a job is paid after completing the job in full.
- Contract costing pertains to construction while the job costing is confined to production.
- In contract costing, the cost computation is simple while in the job costing it is complex because of the overheads.
- Contract costing is adopted in long-term contracts whereas the job costing is confined to finished goods for a small duration of time.
- In contract costing, the profit and loss can be ascertained in either completed or uncompleted stages while in the job costing it is done only on the stage of completion.

7.3 CONTRACT COSTING PROCEDURE

The procedure for costing of contracts is as follows:

1. **Contract Account:** Every contract is allotted a separate number and a separate account is opened for each contract.
2. **Direct Costs:** Most of the costs of a contract can be allocated direct to the contract. All such direct costs are debited to the contract account. Direct costs for contracts include:
 - (a) Cost of direct materials,
 - (b) Cost of direct labour,
 - (c) Cost of direct expenses,
 - (d) Cost of supervision,
 - (e) Depreciation of plant and machinery, and
 - (f) Sub-contract costs.
3. **Indirect Costs:** Contract account is also debited with overheads which tend to be small in relation to direct costs. Indirect costs are often absorbed on some arbitrary basis as a percentage on prime cost or materials or wages, etc. Overheads are normally restricted to head office and storage costs.
4. **Transfer of Materials or Plant:** When materials, plant, etc. are transferred from the contract, the contract account is credited by that amount.
5. **Contract Price:** The contract account is also credited with the contract price. However, when a contract is not completed at the end of financial year, the

6. **Profit or Loss Account:** The balance of contract account represents profit or loss which is transferred to profit and loss account. However, when contract is not completed within the financial period, only the part of the profit arrived is taken into account and the remaining profit (balance profit) is kept as reserve to meet any contingent loss on the complete portion of the contract.

A contract ledger book is kept in which a separate account for each contract is opened. A contract is known by the number allotted to it, as for instance, Contract No. 401, Contract No. 402 and so on. This number and the terms and conditions of the contract pertaining to it are recorded in the contract ledger. A specimen of the contract ledger is given below:

[illegible]

Figure 7.1: Contract Ledger

In contract ledger, a separate contract account is prepared for each individual contract, so that for a specific contract all costs can be accumulated at one particular place. All the expenses likely to be incurred on contract, such as direct materials, direct labour, direct expenses, indirect expenses, cost of specific plant, outstanding expenses, sub-contract cost and the depreciation of the common plant being used at the same time on other contract etc., are debited.

In the credit side of the contract account, the cost of raw material returned to supplier, to store, transferred to other contracts, material sold, material damaged, material in hand, material stolen, plant returned to store, plant sold, plant transferred to other contracts, plant at site are shown. The plant or company, in which theft has occurred, is considered as loss affected company and hence cost is transferred to profit and loss account.

In addition to above items, if the contract is completed then contract account is credited by the contract price. If at the end of the financial year the contract remains incomplete then contract account is credited by cost of work-in-progress amount. In work-in-progress contract, the costs of certified work and uncertified work are included. At the end, the profit or loss on contract is determined as per rules stated ahead in respect to contract account.

A specimen of the contract account is presented showing the debit and credit items:

The Kartik Housing Construction Limited			
Contract No.		Date Started	
Terms of Contract		Date Completed	
Contract Price		Place of Work	
Terms of Payment		Escalation Clause, if any	
Dr.		Contract Account No.	Cr.
Particulars	Amount (₹)	Particulars	Amount (₹)
To Materials:		By Materials:	
• Direct material purchased		• Returned to suppliers	
• Issued from stores		• Returned to stores	
• Transferred from other contract		• Transferred to other contract	
To Wages		• Material sold	
Add. Outstanding wages		• Material at site/in hand	
To Direct Expenses		By Plant:	
To Indirect Expenses		• Returned to stores	
To Plant:		• Transferred to other contract	
• Cost of specific plant if used in the contract		• Plant sold	
• Depreciation of plant if used in other contracts		• Plant at site/in hand (the depreciated value of plant, if used in the contract)	
• To Profit and loss account (profit on sale of plant or material)		By Profit and Loss Account:	
To Costs of sub-contract		• Material lost, stolen or destroyed	
To Cost of extra work done		• Plant lost, stolen or destroyed	
To Profit and Loss account (if the contract is complete balancing figure)		• Loss on sale of plant/material	
Or		• By Contractee account (contract price in case of completed contract + extra work price)	
To WIP account (if work certified is less than 1/4 th of contract price (balancing figure)		Or	
Or		By WIP account:	
To Balance w/d (if work certified is more than 1/4 th of contract price)		• Value of work certified	
		• Cost of work uncertified (in case of an incomplete contract)	
		By Balance b/d	
To Profit and loss account (profit and loss credited at the end of the year)			
To WIP account (profit kept as reserve)			

7.6 IMPORTANT POINTS IN CONTRACT COSTING

The preparation of contract account is the essence of contract costing. The contract account is prepared by the contractor in his books. In addition to this account, the contractor also prepares contractee's account. The purpose of preparing a contract account is to know the profit or loss on each contract executed. Some of the important points in contract costing are now discussed in detail.

- (i) **Materials Cost:** Materials required for the execution of contract in most of the cases are ordered specifically and then used on the contract. The following entries are passed to record the materials cost:

- *When materials are specifically purchased for the contract.*

Materials a/c Dr.

To Cash or supplier's a/c

(Note: Usually the materials bought are sent to the store room of the contractor.)

- *When materials are sent to site by the contractor.*

Contract a/c Dr.

To Materials a/c

- *When any materials are sold at work site.*

Cash a/c Dr.

To Contract a/c

- *When materials are transferred from one contract to another.*

Transferee contract a/c Dr.

To Transferor contract a/c

- *When materials are sent to stores.*

Stores control a/c Dr.

To contract

- *For recording materials remaining at site at the end of the year.*

(a) At the end of the current year:

Materials at site a/c Dr.

To Contract a/c

(b) At the beginning of the next year:

Contract a/c Dr.

To Materials on site a/c

- *For recording accidental loss of materials.*

Insurance company a/c Dr. (with the admitted claim)

Profit and loss a/c Dr. (with the residue)

To Contract a/c

When materials are supplied by the contractee, the value of such materials should not be charged to the contract account. Instead, a separate record for such materials should be kept because the unused materials will have to be returned back to the contractee.

- (ii) **Labour Cost:** All wages of workers engaged on a particular contract are charged direct to the contract account. When several contracts are running at different areas, payroll is normally categorized so as to have separate payroll for every contract. Difficulties in costing may be encountered when some workers may have to move from one site to another when a number of small contracts are undertaken.

In such situations, it becomes necessary to provide time sheets from which allocation can be made. In order to control labour utilisation and prevent fraud in the payment of wages, surprise visits by head office personnel will be necessary. If there is any outstanding wages, it is also charged to contract account and in balance sheet as a liability, if it is required.

- (iii) **Direct Expenses:** The expenses incurred exclusively for a particular contract are treated as direct expenses and are chargeable to that contract for which it incurred. For example, a plant hired for a special contract will be charged by the hire charges or fees paid to expert for consulting him as regard to a specific contract would be treated as direct expense.

- (iv) **Indirect Expenses:** When a contractor undertakes more than one contract simultaneously, he will set up a common office and engage common supervisory staff. The administration expenses incurred and the supervisor's salary is apportioned among the contracts on some suitable basis.

- (v) **Plant and Machinery:** Some of the assets that are to be depreciated while on use on a contract are bulldozers, cement mixer, mobile crane, tractors, lorries and tiles-polishing machines. There are two ways of dealing with the plant and machineries used on a contract.

Where a plant or machinery is specially purchased for a particular contract to be used for longer duration, the contract account is debited with the value of plant. At the end of the accounting period, the depreciated value of the plant or machinery is credited to the contract account.

When the plant or machinery is used relatively for a shorter duration on a contract, the contract account is charged with the depreciation of the plant or machinery.

- (vi) **Sub-contract Cost:** Work of specialised character, for which facilities are not internally available, is offered to a sub-contractor. For example, steel work, glass work, electric fittings, doors and furniture fittings, painting, etc., are usually carried out by the sub-contractors who are accountable to the main contractor. The cost of such work is charged to the contract account.

- (vii) **Cost of Extra Work:** Sometimes the contractor is required to do some extra work like additions or alterations in the work originally done as per contract or agreement. The contractor will charge extra money for such extra work. The cost of such extra work or job is debited to the contract account and extra price realised is credited to the contract account.

- (viii) **Retention Money:** Usually the contractee stipulates in the contract deed that he would withhold a part of the contract price to be paid at a later stage after completion of the contract. This is to make sure that the contractor has performed all work relating to contract on the most satisfactory manner and that no repair work arises within a prescribed time limit. The amount so withheld by the contractee is known as retention money. It safeguards the interest of the contractee against the contractor, who may at times perform sub-standard work and gain there from.

- (ix) **Cost of Maintenance Periods:** Sometimes contractors are required to maintain the work during a specified period after completion, the cost of maintenance is also debited to the contract account.
- (x) **Progress Payment:** In large contract, which takes longer duration to complete, the contractee pays to the contractor a certain amount from time depending upon the stage of satisfactory completion of work. The progress of work from time to time will be certified by the architect or civil engineer of the contractee. Thus, every installment of money paid by the contractee to the contractor depending upon the progress of work is known as progress payment.
- (xi) **Escalation Clause:** This clause is often provided in contracts to cover any likely changes in the price of materials, labour, etc. Thus, a contractor is entitled to suitable enhance the contract price if the cost rises beyond a given percentage. The objective of this clause is to safeguard the interest of contractor against unfavourable changes in cost. The escalation clause is of particular importance where prices of materials and labour are anticipated to increase or where quantity of materials and labour time cannot be accurately estimated.

Just as an escalation clause safeguards the interest of the contractor by upward revision of the contract price or contract value, a de-escalation clause may be inserted to look after the interest of the contractee by providing for downward revision of the contract price or contract value in the event of cost going down beyond an agreed level.

- (xii) **Cost-plus Contract:** This is a modified method of contract costing. Cost-plus contract method of costing is resorted to when it is not possible to determine the cost of the contract in advance with a reasonable degree of accuracy. Under such circumstance, the contractee agrees to pay to the contractor, the actual cost incurred together with an agreed amount of profit which the contractor earns in the usual course of business. This type of contract is mostly followed during the period of urgency when certain types of products are to be manufactured and supplied as in the case of defence products, component parts and so on.

Advantages: Cost-plus contracts offer the following advantages:

To the Contractor:

- ❖ There is no risk of loss on such contract.
- ❖ There is bargain in the contract price in future under this type of contract.
- ❖ It simplifies the work of preparing tenders or quotation.
- ❖ Procurement of the services of the experts.
- ❖ It protects him from the risk of fluctuations in market prices of materials, labour, etc.
- ❖ Earliest completion of the work.

To the Contractee:

- ❖ Since the contract price is governed by the contract, the contractees will also not suffer from risk of loss.
- ❖ Under this method, the contractor can know in advance the profit that can be expected on successfully completion of the contract.
- ❖ In the case of cost-plus contracts, generally, the quality of the work does not suffer.

- ❖ By giving to the contractee the right to inspect the accounting records of the contractor, a cost-plus contract ensures a fair price to the contractee.

Disadvantages. The disadvantages of cost-plus contracts are given below:

To the Contractor:

- ❖ The contractor has to suffer for his own efficiency. This is because profit is usually based on a percentage of cost and efficient working resulting lower cost also leads to lower profits.
- ❖ The contractor is deprived of the advantages which would have accrued due to favourable market prices.

To the Contractee:

- ❖ Misuse of materials and labour by the contractor.
- ❖ The price a contractee has to pay is unknown until after the completion of work.
- ❖ Generally, the contract price is widely increased.

The contractee has to pay more for the efficiency of the contractor as the contractor has no incentive to reduce costs.

- (xiii) **Work Certified and Work Uncertified:** Work certified represents that portion of the contract that has been duly approved by the architect of the contractee. This is denoted in terms of money value in contract account and appears on the credit side of the contract account.

Work uncertified refers to that portion of work completed by the contractor and disapproved by the architect on the ground that it has not reached a stipulated stage. The value of work uncertified also appears on the credit side of the contract account.

- (xiv) **Work-in-Progress:** The work-in-progress represents the value of work which is in progress as a contract and requires further completion. The value of WIP appears on the asset side of the balance sheet and is ascertained as under:

Amount of work certified	
Amount of work uncertified

Less: Profit transferred to WIP	
Less: Cash received	Rs.
	-----	-----
Amount of Work in-Progress	

- (xv) **Contractee's Account:** The contractee's account is prepared by the contractor in his books. When the various installments of contract price are received from the contractee, the following entry is passed:

Cash a/c Dr.
 To Contractee's a/c

When the contract is fully completed the following entry is passed:

Contractee's a/c Dr.
 To Contract a/c

Thus, it is clear that the contractee's account will show a debit balance indicating the amount due from him to the contractor till it is paid fully.

- (xvi) **Loss of Completed Contract and Incomplete Contract:** Every loss on contract, whether completed or incomplete, should be transferred to profit and loss account in full. This treatment is justified on the basis of prudence concept. While accounting the loss on contract, stage of completion of contract work is not considered. In case of incomplete contract, if it is expected that in future also contract is subject to losses, it is advisable to make a provision for contingencies.
- (xvii) **Notional Profit:** Notional profit is the difference between the value of work-in-progress certified and the cost of work-in-progress certified. It is computed as follows:

Particulars	Amount (₹)
Value of certified work	10,00,000
Add: Cost of work not yet certified	1,00,000
	11,00,000
Less: Cost of work to date	9,00,000
Notional Profit	2,00,000

If in any year, cost of work done exceeds the value of certified work and uncertified, the result will be a notional loss.

- (xviii) **Profit on Incomplete Contract:** Profit can be accurately calculated only when contract is complete. If a contract extends two, three or more years, the contractor will have to wait for calculation of profit till the contract is completed. This is not desirable; hence, profit has to be calculated on the contract even if the contract is not completed. But profit on incomplete contract should be calculated after providing adequate sums for meeting unknown contingencies. For calculating profit on incomplete contract abundant caution and conservative approach are required so as to cover risk and uncertainty during the balance of period of execution of the contract.

There are no hard and fast rules regarding the calculation of profit of incomplete contract. However, profit should be taken only in respect of certified work and uncertified work should be valued at cost. When profit is based on the basis of certified work, it is known as *profit earned*. Following rules may be followed for calculating profit to be taken to profit and loss account:

- (a) If the work certified is less than $1/4^{\text{th}}$ of the contract, no profit should be transferred to profit and loss account. It means that entire notional profit should be treated as reserve for future contingencies.
- (b) If the work certified is $1/4^{\text{th}}$ of contract price or more but less than $1/2^{\text{nd}}$ of the contract price, the profit transferred to profit and loss account should be $1/3^{\text{rd}}$ of the notional profit:

$$\text{Profit} = \text{Notional profit} \times 1/3$$

If it is desired to transfer the realised profit to profit and loss account it will be calculated as under:

$$\text{Profit} = 1/3 \times \text{Notional profit} \times (\text{Cash received}/\text{Work certified})$$

- (c) If the work certified is $1/2$ or more than of the contract price, the profit transferred to profit and loss account would be $2/3^{\text{rd}}$ of the notional profit:

$$\text{Profit} = \text{Notional profit} \times 2/3^{\text{rd}}$$

If it is desired to transfer the realised profit to profit and loss account, it will be calculated as under:

$$\text{Profit} = \frac{2}{3} \times \text{Notional profit} \times (\text{Cash received} / \text{Work certified})$$

- (d) Sometimes a contract is about to complete, say, its physical progress is more than 90% and the contractor is in a position to estimate the future costs with high degree of accuracy. In such a case, it would be desirable to calculate the profit with reference to total estimated profit. Total estimated profit is excess of contract price over total estimated cost. The profit to be transferred to profit and loss account will be calculated as under:

$$\text{Profit} = \text{Estimated profit} \times (\text{Work certified} / \text{Contract price})$$

If it is desired to transfer the realised profit to profit and loss account, it will be calculated as under:

$$\text{Profit} = \text{Estimated profit} \times (\text{Work certified} / \text{Contract price}) \times (\text{Cash received} / \text{Work certified})$$

Where,

$$\text{Estimated Profit} = \text{Contract price} - \text{Total estimated cost}$$

$$\text{Total Estimated Cost} = \text{Costs incurred up to date} + \text{Estimated costs for completion of contract.}$$

[**Note:** If nothing is given in the problem, students are advised to use the concept of realized profit.]

- (xix) **Balance Sheet:** At the time of preparation of balance sheet, the contractee's account deserves a special mention. The contractee's account is not to be shown as a debtor for the full contract price unless the work has been completed. Likewise the sum received from the contractee under various installments should not be shown as a liability on the balance sheet. On completion of contract, if the contractee still owes the amount to the contractor, his account is shown as a debtor for the amount due from him. When the contractee pays full amount, his account is closed and his account will not appear in the balance sheet.

- (xx) **Target Costing:** This is a variation of cost-plus contract. Under target costing method, the contractee agrees to pay the profit as per the agreement or contract on the total contract price. In addition to the profit, sometimes, it is agreed upon by the contractor to complete the contract within a target price.

In case if he completes the contract within the target price, he is entitled to receive a bonus which is in proportion to the savings made, saving being difference between original contract price and target price.

Example: Show how you would deal with plant in Uday Contract Account with the following information:

Plant issued to contract on 1st June, 2008 costing ₹ 2,00,000, Plant costing ₹ 16,000 was transferred to Vikas Contract on 30.11.2008. Plant costing ₹ 6,000 was stolen and another costing ₹ 5,000 was destroyed by fire. The plant was insured against fire to the full value. Plant costing ₹ 20,000 was sold for ₹ 19,000. Plant at the end of the year was valued by charging depreciation @20% per annum on 31st March, 2009.

Solution:

Contract Account

Particulars		Particulars	
To Plant account	2,00,000	By Vikas Contract Account	
		Plant transferred	
		Cost	16,000
		Less: Dep. @20% for 6 months	1,600
			14,400
		By Profit & loss account (Plant stolen)	6,000
		By Fire insurance company (Plant destroyed by fire)	5,000
		By Sale of plant	19,000
		By Profit and loss account (Loss on plant sold)	
		Cost	20,000
		Less: Sold	19,000
			1,000
		By Plant at site	
		Cost	1,53,000
		(2,00,000 @47,000)	
		Less: Dep. @20% for 10 months	25,500
			1,27,500

Example: The contract price of a contract undertaken by Kartik Limited on 1st July, 2008 was ₹ 3,00,000. Following expenses were incurred on the contract:

Materials consumed	₹ 72,500
Materials in hand on 31 st March, 2009	₹ 30,000
Direct wages	₹ 40,000
Direct expenses	₹ 42,000
Plant purchased	₹ 50,000

The contract was completed on 31st March, 2009 and the contract price was duly received. Provide depreciation on plant @10% per year and charge indirect expenses @20% on direct wages. Prepare Contract Account and Contractee's Account in the books of Kartik Limited.

Solution:

**Contract Account
In the Books of Kartik Limited**

Date	Particulars		Date	Particulars	
2008, 1 st July	To Plant purchased	50,000	2009, 31 st March	By Material in hand	30,000
	To Materials issued			By Plant in hand	
	Materials consumed	72,500		Cost	50,000
	Add: Material in hand	30,000		Less: Dep	3,750 ⁽¹⁾
		1,02,500		By Contractee's account	46,250
	To Direct wages	40,000			3,00,000
	To Direct expenses	42,000			
	To Indirect expenses (20% of direct wages)	8,000			
	To Profit and loss account	1,33,750			
2009, 31 st March		3,76,250			3,76,250

Working note:

1. Calculating of depreciation on plant:

$$\text{Depreciation} = \left(50,000 \times \frac{10}{100} \times \frac{9}{12} \right) = ₹ 3,750.$$

Contractee's Account

Date	Particulars	₹	Date	Particulars	₹
2009, 31 st March	To Contract account	3,00,000	2009, 31 st March	By Cash account	3,00,000
		3,00,000			3,00,000

Example: The following expenses relate to a contract:

Materials issued to contract	₹ 85,349
Labour engaged	₹ 74,375
Plant at cost	₹ 15,000
Direct expenses	₹ 3,169
Establishment charges	₹ 4,126
Materials returned to stores	₹ 549
Work certified	₹ 1,95,000
Cost of work uncertified	₹ 4,500
Materials in hand on 31 st December, 2012	₹ 1,883
Wages accrued due at 31 st December, 2012	₹ 2,400
Direct expenses accrued due at 31 st December, 2012	₹ 240
Value of plant at 31 st December, 2012	₹ 11,000

The contract price has been agreed at ₹ 2,50,000. Cash received from the contractee was ₹ 1,80,000. The accounting year closes on 31st December, 2012. Prepare Contract Account and Contractee's Account for the year 2012.

Solution:

Contract Account

Particulars	₹	Particulars	₹
To Material	85,349	By Materials returned	549
To Labour	74,375	By Materials in hand	1,883
To Plant	15,000	By Plant at site	11,000
To Direct expenses	3,169	By Work-in-progress:	
To Establishment charges	4,126	Work certified	1,95,000
To Wages accrued	2,400	Work uncertified	4,500
To Direct expenses accrued	240		
To Profit c/d	28,273		
	2,12,932		2,12,932
To Profit & loss account	17,399 ⁽¹⁾	By Profit b/d	28,273
To Work-in-progress	10,874		
	28,273		28,273

Contractee's Account

Particulars		Particulars	
To Balance c/d	1,80,000	By Bank	1,80,000
	1,80,000		1,80,000

Working note: (1) Profit to profit and loss account

$$= 28,273 \times \frac{2}{3} \times \frac{1,80,000}{1,95,000} = 17,399$$

Example: Mr. Saxena undertook a contract for ₹ 1,35,000 which took 13 weeks in its completion. From the following details, prepare Contract Account and Contractee's Account assuming the amount due from the contractee to be received:

The values of loose tools and stores returned at the end of the period were ₹ 300 and ₹ 4,500 respectively. The plant returned at the value of ₹ 24,000 after charging depreciation at 20%. The value of tractor was ₹ 30,000 on which depreciation @15% per annum was to be charged. The administration and office expenses are to be provided at 20% on works cost.

Solution:

Contract Account

Particulars		Particulars	
To Direct materials	30,375	By Store returned	4,500
To Direct wages	23,250	By Loose tools returned	300
To Stores issued	15,750	By Plant returned	30,000
To Loose tools	3,600	Less: Dep. @20%	6,000
To Tractor expenses:		By Tractor returned	30,000
Fuel, etc.	3,450	Less: Dep. @15%	
Driver's wages	4,500	p.a. for 13 weeks	1,125
Other expenses	3,975	By Works cost c/d (Balancing figure)	87,225
	11,925		
To Plant issued $24,000 \times \frac{100}{80}$	30,000 ⁽¹⁾		
To Cost of tractor	30,000		
	1,44,900		1,44,900
To Works cost b/d	87,225	By Contractee's account (work finished)	1,35,000
To Administration exp. 20% of works cost	17,445		
To Profit & loss account	30,330		
	1,35,000		1,35,000

Working note: (1) Plant depreciated at 20% and not @20% per annum. So, original cost of plant would be $24,000 \times (100/80) = ₹ 30,000$.

Contractee's Account

Particulars		Particulars	
To Contract account	1,35,000	By Bank account	1,35,000
	1,35,000		1,35,000

Example: From the following data relating to a contract extracted from the books of a company, prepare Contract Account as on 31st March, 2013:

Materials issued	₹ 1,35,000	Small plant used	₹ 5,275
Wages	₹ 75,000	Contract price	₹ 3,50,000

Office expenses 20% of works cost

You are further informed that: (a) Work commenced on 1st October, 2012; (b) Wages of workers for one week and salary of the supervisory staff for one month were due at the end of the period; (c) Depreciation to be charged @10% per annum on plant; (d) Materials at site on 31st March, 2013 was of ₹ 6,300.

Solution:

Contract Account
For the Year Ended 31st March, 2013

Particulars		Particulars	
To Materials issued	1,35,000	By Material at site	6,300
To Wages	75,000	By Plant at site	1,12,500
To Wages accrued	3,000 ⁽¹⁾	Less: Dep.	
To Plant issued	1,12,500	@10% p.a. for six months	5,625
To Supervisor's salary	8,250	By Contractee's account	3,50,000
Add: Accrued for one month	1,650 ⁽²⁾		
	9,900		
To Cost of extra work done	2,500 ⁽⁴⁾		
To Sub-contract cost	10,000		
To Small plant used	5,275		
To Office expenses (20% of ₹ 2,40,000 ⁽³⁾)	48,000		
To Profit & loss account	62,000		
	4,63,175		4,63,175

Working notes:

1. Wages accrued: Wages paid for 25 weeks ₹ 75,000. Hence, wages for one week = $\frac{75,000}{25} = ₹ 3,000$.
2. Salary accrued: Salary for 5 months ₹ 8,250. Hence, salary for 1 month = $\frac{8,250}{5} = ₹ 1,650$.
3. Office expenses are 20% of works cost being $[1,35,000 + 75,000 + 3,000 + 1,12,500 + 9,900 + 2,500 + 10,000 + 5,275] \div [6,300 + 1,06,875] = ₹ 2,40,000$.
4. Cost of extra work done is ₹ 2,500 considered as the cost of original contract because it is very low amount in this case.

Check Your Progress

Fill in the blanks:

1. Contract costing is a basic method of _____.
2. Work Certified is valued at _____.
3. Cash received on contract is credited to _____.
4. Materials returned under material return note credited to _____.
5. Escalation Clause in a contract to perfect the interest of _____.
6. The degree of completion of work is determined by comparing the work certified with _____.

7.7 LET US SUM UP

- In principle, contract costing is similar to job costing as it follows the principles of job costing. Contract costing is, therefore, a type of job costing and the entire contract, instead of job, constitutes cost unit. This method of costing which is also known as Terminal Costing is applied in industries engaged in the construction of buildings, roads, dams, bridges, banks, parks, etc. In this method, a separate number is allotted for every contract and all related costs are accumulated for each contract.
- A contract generally takes more than one year to complete. Work is generally carried out at a site other than the contractor's own premises and each contract undertaken is treated as a cost unit. Contract is done for a specific consideration which is known as contract price and separate contract account is prepared for each contract in the books of contractor to ascertain profit or loss on each contract. Most of the raw materials are specially purchased for each contract.
- Under contract costing, the price is paid in various installments depending upon the progress of work. In job costing, the selling price of a job is paid after completing the job in full. The preparation of contract account is the essence of contract costing. The contract account is prepared by the contractor in his books. In addition to this account, the contractor also prepares contractee's account. The purpose of preparing a contract account is to know the profit or loss on each contract executed.
- All wages of workers engaged on a particular contract are charged direct to the contract account. When several contracts are running at different areas, payroll is normally sectionalised so as to have separate payroll for every contract. When a contractor undertakes more than one contract simultaneously, he will set up a common office and engage common supervisory staff. The administration expenses incurred and the supervisor's salary are apportioned among the contracts on some suitable basis.
- Target Costing is a variation of cost-plus contract. Under target costing method, the contractee agrees to pay the profit as per the agreement or contract on the total contract price. In addition to the profit, sometimes, it is agreed upon by the contractor to complete the contract within a target price.

Particulars	SUMO 160 GB	BRAYON 320 GB
Materials	54,600	2,17,360
Labour	31,200	1,25,840

Works overhead is charged at 80% on labour and office overhead is taken at 15% on works cost. The selling price of both hard disk drives amounted to ₹ 2,000. 156 SUMO 160 GB and 572 BRAYON 320 GB hard disks were sold.

9. From the following information, prepare the balance sheet from the cost records of Aditya Chemicals Ltd. for 1993.

Particulars	
Finished goods on 1-1-1993	50,000
Raw material on 1-1-1993	10,000
Work in progress 1-1-1993	14,000
Direct labour	1,60,000
Purchase of raw material	98,000
Indirect labour	40,000
Heat, light and power	20,000
Factory, Insurance and Taxes	5,000
Repairs to plant	3,000
Factory supplies	5,000
Depreciation of factory building	6,000
Depreciation of plant	10,000
Factory cost of goods produced in 1993	2,80,000
Raw material consumed in 1993	95,000
Cost of goods sold in 1993	1,60,000

No office and administration expenses were incurred during the year 1993. Prepare a statement of cost for the year ending 1993 giving maximum possible information and its break up.

10. Discuss analytically, direct and indirect costing.
11. What is Tender or Quotation sheet?
12. Explain on what basis tender sheet is prepared.
13. Write a short note on manufacturing account.
14. Following are the particulars for the production of 2000 sewing machines of ABC Co Ltd. for the year 2007:

Cost of materials ₹ 1,80,000; Wages ₹ 3,40,000; Manufacturing expenses ₹ 1,20,000; Salaries ₹ 1,00,000; Rent, Rates and Insurance ₹ 40,000; Selling expenses ₹ 40,000; General expenses ₹ 30,000 and Sales ₹ 9,00,000.

Prepare cost sheet at a profit of 10% of selling price.

15. The accounts of Pleasant Company Ltd. show details for the year 2004:

Materials	₹ 550000
Labour	₹ 300000
Factory overhead	₹ 70000
Administration overhead	₹ 59080

What price should the company quote for a refrigerator? It is estimated that ₹ 2000 in materials and ₹ 900 in labour will be required for one refrigerator. Absorb factory overhead on the basis of labour and administration overheads on the basis of works cost. A profit of 10.5% on selling price is required.

Check Your Progress: Model Answer

1. Indirect costs
2. Factory cost or works cost
3. Cost of production
4. Cost of sales
5. Raw materials
6. Finished goods
7. Indirect expenses

5.13 REFERENCES/SUGGESTED READINGS

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UNIT 8

JOB COSTING

CONTENTS

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- 8.1 Introduction
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 - 8.2.2 Objectives of Job Costing
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- 8.3 Procedure of Job Costing
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8.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Understand the meaning and features of job costing
- Explain the objectives, advantages and disadvantages of job costing
- Describe the procedure of job costing
- Preparation of job cost sheet

8.1 INTRODUCTION

Job costing is a method of costing applied in industries where production is measured in terms of completed jobs. Industries where job costing is generally applied are printing press, ship building, repair workshops, foundry, automobile garage and other similar manufacturing units which manufacture to customer's specific requirements. Under batch costing, the cost of a batch or group of products is ascertained. The unit of cost is a batch or group of identical products, instead of a single job, order or contract. The method is applicable to general engineering industries which produce components in convenient economical batches for subsequent assembly or manufacture on mass scale, comparatively small items of products. Except for the difference that in batch costing, a batch instead of a job constitutes the cost unit for

which costs are compiled, the procedure for batch costing is similar to that of job costing. Separate job cost sheets are maintained for each batch of components manufactured and for the assembly of finished products. When products are stocked for sale, a greater degree of control is required.

In this lesson, we will study the concept of job costing, the procedure of job costing and the preparation of job cost sheet.

8.2 MEANING AND DEFINITIONS OF JOB COSTING

CIMA terminology defines job costing as *"a form of specific order costing which applies where work is undertaken to customer's special requirement. As distinct from contract costing, each job is a comparatively short duration"*. It implies that under job costing, production is always against the customer's special requirement.

Kohler in his *Dictionary for Accounts* defines job costing as *"a method of cost accounting whereby cost is compiled for a specific quantity of product, equipment, repair on other service that moves through the production process as a continuously identifiable unit, applicable material, direct labour, direct expense and usually a calculated portion of the overhead being charged to a job order"*.

From the above definition, it is clear that job costing is a method of costing under which the cost of each job is ascertained separately. It is that form of specific order costing which applies where work is undertaken to customer's special requirements.

8.2.1 Features of Job Costing

The main features of job costing are as under:

1. The production is generally against customer's order and not for stocks.
2. Under job costing method, production is intermittent and not continuous.
3. Each job has its own characteristics and needs special treatment.
4. Each job is treated as a cost unit under this method of costing.
5. The work-in-progress differs from period to period according to the number of jobs in hand.
6. There is no uniformity in the flow of production from department to department.
7. The emphasis is on division the direct and indirect expenses are laid upon.
8. Job costing is adopted by manufacturing organisations as well as non-manufacturing organisations.
9. Under this method, the profit and loss can be ascertained in respect of each job.
10. Each job is distinctively identified by a production order throughout the production stage.

8.2.2 Objectives of Job Costing

The following are the main objectives of job costing:

1. The important objective of job costing is to ascertain the cost as well as the profit or loss for each job.
2. It provides a basis for determining the cost of similar jobs undertaken in future. It, thus, helps in future production planning.
3. Job costing is to find out those jobs which are more profitable, not profitable or less profitable.

4. It helps the management in controlling costs by comparing the actual costs with the budgeted costs.

8.2.3 Advantages of Job Costing

The various advantages of job costing are as follows:

1. Job costing is useful in quoting cost plus contract.
2. Job costing facilitates identification and control of spoilages and defectives.
3. Job costing facilitates estimation of cost of similar jobs.
4. It helps the management to know about the profitability of the jobs.
5. Job costing is helpful to ascertain the cost as well as the profit or loss for each job separately.
6. The data of the job costing are quite helpful for the future planning.
7. Job costing helps in making detailed analysis of cost of materials, labour, direct expenses and overheads.

8.2.4 Disadvantages of Job Costing

The disadvantages or weaknesses of job costing are as follows:

1. It is expensive to operate as it requires considerable detailed official or clerical work.
2. With the increase in the official or clerical works the chances of errors or mistakes are increased.
3. Job costing does not facilitate control of cost unless it is used with standard or budgetary costing.
4. Job costing cannot be efficiently operated without highly developed production control system. The job costing method requires intricate factory organisation system.
5. To get accurate results, job costing requires some prerequisites. In its absence job costing will not give accurate results.
6. It is expensive as cost is accumulated and ascertained for each job separately.
7. When drastic economic changes take place cost comparison becomes difficult.

8.3 PROCEDURE OF JOB COSTING

The procedure that is commonly applicable to a normal sale transaction equally applies in case of job costing. The procedure for job costing involves the following:

1. **Receiving an Enquiry:** First of all a customer seeks an enquiry about the price, quality and other terms and conditions of the job before placing an order.
2. **Estimation of the Price of the Job:** The cost accountant estimates the cost of job after considering the various elements of cost and keeping in mind the specification of customer. This is based on the cost of execution of similar job in the yester years and considering the possible changes in the various elements of the cost. Estimated costs are also compared with the actual costs to find out the variation in the actual profit.
3. **Receiving of Order:** The customer will then place the order if he is satisfied with the quotation price, other terms and conditions of executing the job.

4. **Job Order Number:** When an order is received from the customer, it is allotted a certain number. Every job order is known by its number throughout its production process.
5. **Production Order:** When a job is accepted, the production planning department prepares a production order or job order. Production order or job order is a written order issued to the manufacturing department to proceed with the job. A specimen of production order is given below:

Serial No. :		Description of Job :	
Name of Customer :		Quantity Ordered :	
Customer's Reference No. :		Operation Nos. :	
Date :		Materials Requisition No. :	
Date of Commencement :		Date of Completion :	

Clock Time	Operation No.	Dept. No.	Operation		Quantity	
			No.	Details	Produced	Rejected

Ordered by:	Checked by:	Approved by:
-------------------	-------------------	--------------------

Figure 8.1: Production Order

Production order contains all the information regarding production. Several copies of production order are prepared. These copies are generally in different colours so as to distinguish them more easily. Copies of production order are sent to production department, stores department, cost department, etc.

6. **Recording of Costs:** Cost is ascertained for each job separately. Costs are collected and recorded for each job. The costing department collects the costs and records them in the job cost sheet. The sources of collection of various costs may be as under:
 - (a) **Material Cost.** Materials are classified into direct and indirect on the basis of traceability of materials to the job. Materials may have to be purchased or requisitioned from the stores. The documents necessary for collection of costs are the bills of materials, suppliers' invoices, goods received notes, material requisition notes, material returned back, material transfer notes, etc.
 - (b) **Direct Labour Cost:** Direct labour costs are collected from operation schedule, job card or labour/wages analysis sheet, etc.
 - (c) **Direct Expenses.** Direct expenses are collected from various expenses vouchers and other records of job.
 - (d) **Overheads.** Overheads or indirect expenses are apportioned to the job in the usual manner.
7. **Completion of the Job:** On completion of a job, the production department sends a completion report of job to the costing department. On the basis of the report, the costing department completes the job cost sheet and calculates profit or loss on each job. Actual cost recorded in the job cost sheet is compared with the budgeted cost so as to reveal the efficiency or inefficiency of operations.
8. **Dispatch of Goods:** The finished products are then packed and delivered to the customer as per the delivery schedule. Payment is settled as per the agreed mode of payment.

8.4 PREPARATION OF JOB COST SHEET

A separate job cost sheet is prepared for every job undertaken. This is to facilitate the calculation of cost of the job separately. The main idea of preparing job cost sheet is to show in detail the cost components or elements of the total cost of executing a job. Job cost sheet is used to record direct materials, direct wages and overheads applicable to the job.

A job cost sheet facilitates the determination of profit or loss on every job. Estimated costs are also recorded on the job cost sheet which facilitates comparison of actual costs with the estimated cost and variation in the cost is known.

A specimen form of job cost sheet is given below:

ABC Company Limited											
Job Cost Sheet											
Job No.		:		Quantity		:					
Job Description		:		Date of Completion		:					
Name of the Customer		:		Date of Commencement		:					
Particulars of Job		:		Production Order No.		:					
Material Cost				Labour Cost				Overheads			
Date	Dept.	MR No.	Amt. (₹)	Date	Dept.	Time Ticket No.	Amt. (₹)	Date	Dept.	Rate (₹)	Amt. (₹)
Total											
Summary of Cost											
	Estimated Cost (₹)		Actual Cost (₹)		Variance (₹) (+)/(-)						
Material cost											
Labour cost											
Overheads											
Total											
Explanation of Variance :											
Prepared by :											
Remarks :											
Checked by :											

Figure 8.2: Job Cost Sheet

Example: The following information is extracted from the job ledger of Neelam Enterprises in respect of Job Number 510:

Materials ₹ 7,000

Wages 100 hours @ ₹ 7

Variable overheads incurred for all jobs ₹ 15,000 for 5,000 labour hours.

Find the profit if the job is billed for ₹ 9,000.

Solution

Job Cost Sheet for Job No. 510

Particulars	Amount (₹)
Materials	7,000
Wages 100 hours @ ₹ 7	700
Variable overheads : 100 hours @ ₹ 3 ⁽¹⁾	300
Total Cost	8,000
Profit	1,000
Billed Amount	9,000

Working note: (1) Rate of variable overheads per hour = $15,000/5,000 = ₹ 3$

Example: The following information has been obtained from the costing records of Kartik Metal in respect of Job No. 264:

Materials ₹ 5,200

Wages:

Department X 180 hours @ ₹ 3 per hour

Department Y 120 hours @ ₹ 5 per hour

Department Z 60 hours @ ₹ 2 per hour

Variable Overheads:

Department X ₹ 10,000 for 5,000 direct labour hours

Department Y ₹ 9,000 for 3,000 direct labour hours

Department Z ₹ 4,000 for 2,000 direct labour hours

Fixed Overheads:

Estimated ₹ 30,000 for 10,000 normal working hours

Calculate the cost of Job No. 264 and also find the price to be charged so as to earn a profit of 25% on selling price.

Solution

Job Cost Sheet for Job No. 264

Particulars	Amount (₹)
Materials	5,200
Wages :	
Department X 180 hrs. × ₹ 3	540
Department Y 120 hrs. × ₹ 5	600
Department Z 60 hrs. × ₹ 2	120
Prime Cost	6,460
Overheads :	
Variable :	
Department X 180 hrs. @ ₹ 2	360
Department Y 120 hrs. @ ₹ 3	360
Department Z 60 hrs. @ ₹ 2	120
Fixed :	360 hours @ ₹ 3 ⁽²⁾ per hr.
Total Cost	8,380
Profit (25% on selling price or $33\frac{1}{3}\%$ on Cost Price)	2,793
Selling Price	11,173

Working notes:

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1. Calculation of variable overheads:

Department X $\frac{\text{Total Overheads}}{\text{Total Direct Labour Hours}}$

$$= \frac{10,000}{5,000 \text{ hrs.}} = ₹ 2 \text{ per hour}$$

Department Y $\frac{9,000}{3,000 \text{ hrs.}} = ₹ 3 \text{ per hour}$

Department Z $\frac{4,000}{2,000 \text{ hrs.}} = ₹ 2 \text{ per hour}$

2. Calculation of fixed overheads = $\frac{\text{Total Fixed Overheads}}{\text{Total Direct Hours}}$
 $= \frac{30,000}{10,000} = ₹ 3 \text{ per hour}$

Example: The information given below has been taken from the cost records of Holani Engineering Works in respect of the job number 224:

Materials ₹ 3,200

Wages:

Department A 60 hours @ ₹ 2 per hour

Department B 40 hours @ ₹ 5 per hour

Department C 20 hours @ ₹ 3 per hour

The overhead expenses are as follows:

Variable:

Department A ₹ 10,000 for 5,000 hours

Department B ₹ 4,500 for 1,500 hours

Department C ₹ 1,500 for 500 hours

Fixed expenses: ₹ 30,000 for 10,000 working hours

Calculate the cost of the Job No. 224 and the price from the job to give a profit of 25% on the selling price.

Solution

Job Cost Sheet for Job No. 224

Particulars			Amount (₹)
Materials			3,200
Wages :			
Department A	60 × 2	120	
Department B	40 × 5	200	
Department C	20 × 3	60	380
Prime Cost			3,580
Overheads expenses : Fixed			360 ⁽¹⁾
Variable :			
Department A	60 hrs. @ ₹ 2	120	
Department B	40 hrs. @ ₹ 3	120	
Department C	20 hrs. @ ₹ 3	60	300
Total Cost of the Job			4,240
Profit (25% on selling price)			1,413
Selling Price			5,653

Working notes:

1. Variable overhead rates have been arrived at as follows:

$$\text{Department A} = \frac{\text{Overheads for department A}}{\text{Direct labour hours}} = \frac{10,000}{5,000} = ₹ 2$$

$$\text{Department B} = \frac{\text{Overheads for department B}}{\text{Direct labour hours}} = \frac{4,500}{1,500} = ₹ 3$$

$$\text{Department C} = \frac{\text{Overheads for department C}}{\text{Direct labour hours}} = \frac{1,500}{500} = ₹ 3$$

$$\begin{aligned} 2. \text{ Fixed overhead rate has been ascertained as } &= \frac{\text{Fixed expenses}}{\text{Working hours}} \\ &= \frac{30,000}{10,000} = ₹ 3 \end{aligned}$$

$$\text{Fixed overhead for the job would be } ₹ 3 \times 120 (60 + 40 + 20) = ₹ 360$$

3. Profit on sale = 1/4 = Profit on cost = 1/3

Example: A factory uses a job costing system. The following cost data are available from the books for the year ended 31st March, 2008:

Direct materials	90,000
Direct wages	75,000
Profit	60,900
Selling and distribution overhead	52,500
Administrative overhead	42,000
Factory overhead	45,000

Required:

1. Prepare a cost sheet indicating the prime cost, works cost, production cost, cost of sales and sales value.
2. In 2008-09, the factory has received an order for a number of jobs. It is estimated that the direct materials would be ₹ 10,00,000 and direct labour would cost ₹ 6,00,000. What would be the price for these jobs if the factory intends to earn the same rate of profit on sales, assuming that the selling and distribution overhead has gone up by 15%. The factory recovers factory overhead as a percentage of direct wages and administration and selling and distribution overheads as percentage of works cost based on the cost rates prevalent in the previous year.

Job Cost Sheet for the Year Ending 31st March, 2008

Particulars	Amount (₹)
Direct materials	90,000
Direct wages	75,000
Prime Cost	1,65,000
Factory overhead	45,000
Works or Factory Cost	2,10,000
Administration overhead	42,000
Cost of Production	2,52,000
Selling and Distribution overhead	52,500
Cost of Sales	3,04,500
Profit	60,900
Sales	3,65,400

Working notes:

Overhead recovery rates have been ascertained as under:

1. Percentage of factory overhead on direct wages = $\frac{45,000}{75,000} \times 100 = 60\%$
2. Percentage of administrative overhead on works cost = $\frac{42,000}{2,10,000} \times 100 = 20\%$
3. Percentage of selling and distribution overhead on works cost = $\frac{52,500}{2,10,000} \times 100$
 $= 25\%$
4. Percentage of profit on sales = $\frac{60,900}{3,65,400} \times 100 = 16\frac{2}{3}\%$

Job Cost Sheet for the Year 2008-09

Particulars	Amount (₹)
Direct material	10,00,000
Direct labour	6,00,000
Prime Cost	16,00,000
Factory overhead (60% on direct wages)	3,60,000
Factory or Works Cost	19,60,000
Administration overheads (20% on works cost)	3,92,000
Cost of Production	23,52,000
Selling and Distribution overhead (25% on works cost + 15% of 4,90,000)	5,63,500
Cost of Sales	29,15,500
Profit (20% of cost on sales or 16 2/3% of sales value)	5,83,100
Sales	34,98,600

Example: In respect of a factory, the following figures have been obtained for the year 2008:

Cost of materials ₹ 1,00,000; Direct labour ₹ 90,000; Factory overhead ₹ 50,000; Administrative overhead ₹ 77,200; Selling expenses ₹ 54,800; Distribution charges ₹ 38,000; Profit ₹ 84,000.

A work order has been executed in 2009 and the following expenses have been incurred; Materials ₹ 40,000 and Labour ₹ 25,000. Assuming that in 2009 the rate of Factory charges has increased by 20%; Distribution charges have gone down by 10% and Selling and Administration charges have each gone up by 12½ %; at what price should the product be sold so as earn the same rate of profit on the selling price as in 2008?

Factory overhead is based on direct wages, while all other overheads are based on factory cost.

Solution

Statement of Cost for the Year 2008

Particulars	Amount (₹)
Cost of materials	1,00,000
Direct labour	90,000
Prime Cost	1,90,000
Factory overhead	50,000
Works Cost	2,40,000
Administrative overhead	77,200
Cost of Production	3,17,200
Selling and Distribution overheads:	
Selling expenses	54,800
Distribution charges	38,000
	92,800
	4,10,000
Profit (20% on cost)	84,000
Selling Price	4,94,000

Statement of Cost of a Work Order for the Year 2009

Particulars	Amount (₹)
Materials	40,000
Labour	25,000
Prime Cost	65,000
Factory overhead (55.55% of wages + 20%, thereof i.e. 66.66 on labour)	16,665
Works Cost	81,665
Administrative overhead (32.17% of factory cost + 12½%, thereof i.e. 36.19% on factory cost)	29,555
Cost of Production	1,11,220
Selling expenses (22.83% of factory cost + 12½%, thereof i.e. 25.69% on factory cost)	20,980
Distribution charges (15.83% of factory cost + 10%, thereof i.e. 14.25% on factory cost)	11,637
Total Cost	1,43,837
Profit (20% on cost)	28,767
Selling Price	1,72,604

Check Your Progress

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Job Costing

Fill in the blanks:

1. _____ helps the management to know about the profitability of the jobs.
2. Under job costing each job is treated as a _____.
3. The cost accountant estimates the cost of job after considering the various elements of cost and the specification of _____.
4. _____ are classified into direct and indirect on the basis of traceability of materials to the job.

8.5 LET US SUM UP

- Job costing is usually adopted by the concerns where a specific job is done for a stipulated price. CIMA terminology defines job costing as a form of specific order costing which applies where work is undertaken to customer's special requirement. As distinct from contract costing, each job is a comparatively short duration. It implies that under job costing, production is always against the customer's special requirement.
- Job costing is useful in quoting cost plus contract; it facilitates identification and control of spoilages and defectives, estimation of cost of similar jobs. It helps the management to know about the profitability of the jobs and is helpful to ascertain the cost as well as the profit or loss for each job separately. The data of the job costing are quite helpful for the future planning, and helps in making detailed analysis of cost of materials, labour, direct expenses and overheads. Job costing cannot be efficiently operated without highly developed production control system. The job costing method requires intricate factory organisation system.
- A job cost sheet facilitates the determination of profit or loss on every job. Estimated costs are also recorded on the job cost sheet which facilitates comparison of actual costs with the estimated cost and variation in the cost is known.

8.6 UNIT END ACTIVITY

The following information was obtained from the books of Kartik Company in respect of Job No. 222:

Materials ₹ 10,000

Wages:

Dept. X: 81 hours @ ₹ 4 per hour

Dept. Y: 54 hours @ ₹ 3 per hour

Dept. Z: 27 hours @ ₹ 3 per hour

Variable overheads:

Dept. X: 5,400 man hours ÷ 10,800

Dept. Y: 2,000 man hours ÷ 4,000

Dept. Z: 1,000 man hours ÷ 1,000

Fixed overheads: ÷ 6,000 for 12,000 man hours worked normally.

Calculate cost of Job No. 222 and also its selling price if profit is assumed to be 10% on selling price.

8.7 KEYWORDS

Job Costing: Job costing is a method of cost accounting whereby cost is compiled for a specific quantity of product, equipment, repair or other service that moves through the production process as a continuously identifiable unit, applicable material, direct labour, direct expense and usually a calculated portion of the overhead being charged to a job order.

Job Order Number: When an order is received from the customer, it is allotted a certain number. Every job order is known by its number throughout its production process.

Production Order: Production order or job order is a written order issued to the manufacturing department to proceed with the job.

Job Cost Sheet: A job cost sheet facilitates the determination of profit or loss on every job. Estimated costs are also recorded on the job cost sheet which facilitates comparison of actual costs with the estimated cost and variation in the cost is known.

8.8 QUESTIONS FOR DISCUSSION

1. Define job costing.
2. What are the main features of job costing? Give a proforma of cost sheet under such a system.
3. What is the concept of job costing? Discuss its advantages and limitations.
4. What is a job cost sheet? What kind of data does generally appear on job cost sheet?
5. What is contract costing? How does it differ from job costing? Explain.
6. What is job costing? How does it differ from contract costing? Explain.
7. Write an explanatory note on job cost sheet by providing a proforma cost sheet.
8. Briefly explain the purpose of job costing and the procedure for ascertaining the job costs.

Check Your Progress: Model Answers

1. Job costing
2. Cost
3. Customer
4. Materials

8.9 REFERENCES/SUGGESTED READINGS

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UNIT 9

OPERATING COSTING

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9.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Understand the meaning of operating costing, its features and objectives
- Discuss classification of services under operating costing
- Describe the selection of cost under operating costing
- Explain the preparation of cost sheet under operating costing
- Understand the concept of transport costing

9.1 INTRODUCTION

Operation costing is not a new method but it is the technique to use the method of job costing, batch costing and process costing for calculating the cost of those business products whose production is operating day and night. So, all expenses in operation costing are recurring in nature. Operation costing is also useful where units of products are same and one or two types of products are being produced.

9.2 MEANING OF OPERATING OR SERVICE COSTING

Cost Accounting has been traditionally associated with manufacturing companies. However in the modern competitive market, cost accounting has been increasingly applied in service industries like banks, insurance companies, transportation organisations, electricity generating companies, hospitals, passenger transport and railways, hotels, road maintenance, educational institutions, road lighting, canteens, port trusts and several other service organisations. The costing method applied in these industries is known as Operating Costing.

Operating costing is an extension and refined form of process costing. It is also more or less very similar to single or output costing. The operating costing gives more emphasis on providing services rather than the cost of manufacturing an article. The services provided may be for sale to the general public or they may be provided within an organisation.

The operating costing is also called as service costing, period costing or terminal costing. Service costing is concerned to rendering service to the public or to an organisation for which cost is accumulated and calculated. Period costing means the costs data collected and calculated for a specific period. Terminal costing means a bus or truck of a transport undertaking chartered for a specific trip.

According to CIMA [London] operating costing is, "that form of operating costing which applies where standardized services are provided either by an undertaking or by a service cost center within an undertaking".

Operation costing is a mix of job costing and process costing, and is used in either of the following situations:

- A product initially uses different raw materials, and is then finished using a common process that is the same for a group of products; or
- A product initially has identical processing for a group of products, and is then finished using more product-specific procedures.

In both cases, you use a mix of job costing and process costing to compile the cost of a product; this mixed costing environment is called operation costing. The job costing element is based on the concept that you can assign costs to specific products, which is the case when something is produced in units of one or in very small quantities. The process costing element is based on the concept that the cost of producing a large group of products is allocated equally to all the products in that group, since they are manufactured in an identical manner.

In short, operation costing is most applicable to the more complex manufacturing environments that require a mix of different types of production processes in order to create goods.

For example, a company manufactures watches in lots of 1,000. The watch casings and workings for all 1,000 units are identical, so the company simply adds up the cost of the production run and divides by 1,000 units to arrive at the per-unit cost. In addition, watch bands are custom-made for the wrist size of the customer, and use a

variety of unique materials. These costs are compiled for each individual watch. Thus, we have process costing for one portion of the production process (the watch casings and workings) and job costing for another portion (the watch bands). When combined, this is operational costing.

An example of the reverse situation is when a product initially has unique raw materials, but is then finished using a common process. For example, a company builds unique, custom-designed race cars. It uses job costing to compile the cost of each car. However, all cars are then run through a paint shop, which is essentially a fixed cost. The cost of the paint booth is allocated equally to all of the cars run through it, which is process costing. Thus, we use job costing for the first part of the production process and process costing for the second part. Again, this is an example of operation costing.

It is a method of ascertaining costs of providing or operating a service. This method of costing is applied by those undertakings which provide services rather than production of commodities. The emphasis under operating costing is on the ascertainment of cost of services rather than on the cost of manufacturing a product. This costing method is usually made use of by transport companies, gas and water works departments, electricity supply companies, canteens, hospitals, theatres, schools, etc.

For computing the operating cost, it is necessary to decide first, about the unit for which the cost is to be computed, this may often require the study of some technical and operating data, for finding out the factors which have a bearing on cost. The cost units usually used in the following service undertakings are as below:

Transport service	Passenger km., quintal km., or tonne km.
Supply service	Kw hr., Cubic metre, per kg., per litre.
Hospital	Patient per day, room per day or per bed, per operation etc.
Canteen	Per item, per meal etc.
Cinema	Per ticket.

9.2.1 Features of Operating Costing

The basic features of operating costing are presented below:

1. Uniform service is provided to all the customers.
2. The costs are classified into fixed and variable.
3. The fixed and variable cost classification is necessary to ascertain the cost of service and the unit cost of service.
4. There is no physical stock of article if an undertaking renders a service.
5. If a cost centre is operating for an undertaking, there is no sale of service but render the service. In other words, if a cost centre is operating for public it sells its service to the public.
6. The cost unit may be simple in certain cases or composite or compound in other cases like transport undertakings.
7. Total costs are averaged over the total amount of service rendered.
8. The costs are collected from the authentic documents like daily log sheet, operating cost sheet, boiler house cost sheet, canteen cost sheets, etc.
9. Operating cost is the cost of rendering service.

10. Operating costing is the method of ascertaining costs.
11. The productive enterprises can quote prices by ascertaining cost data.

9.2.2 Application of Operating Costing

Operating costing is applied by an organisation, which provides service to the public as a whole instead of manufacturing an article, and sells the same, for example, transport undertakings, electricity, theatre, hospitals, schools and the like. Similarly, the same type of organisation or cost centre renders service to production departments, for example, electricity, powerhouse, canteen, etc.

The service cost in operating cost should be find out to understand whether an organisation or cost centre renders services to others or sells the services to the general public. If the services are sold, the operating expenses and the extent of services rendered are taken into consideration to find out the service cost. On the other hand, if the services are sold, the service expenses should be apportioned to the production department on a suitable basis.

Generally, the basis may be the extent of service availed by the production departments. It may also become necessary to compare the cost of such a service with the cost of an outside service for deciding whether it is profitable to buy a service from outside rather than make the same available from within an organisation.

9.2.3 Classification of Services under Operating Costing

The services may be classified into two categories under operating costing, namely:

- Internal service
- External service

Internal service refers to rendering service to the production departments within an organisation. External service refers to providing services to the general public uniformly. The object of both internal service and external service is the same.

9.2.4 Nature of Operating Costing

The main objective of operating costing is to compute the cost of the services offered by the organisation. For doing this, it is necessary to decide the unit of cost in such cases. The cost units vary from industry to industry. For example, in goods transport industry, cost per ton kilometer is to be ascertained while in case of passenger transport, cost per passenger kilometer is to be computed.

One of the important features of operating costing is that mostly such costs are fixed in nature. For example, in case of passenger transport organisation, most of the costs are fixed while few costs like diesel and oil are variable and dependent on the kilometers run. Because of the diverse nature of activities carried out in service undertakings, the cost system used is obviously different from that of manufacturing concern.

9.3 SELECTION OF COST UNDER OPERATING COSTING

Cost is expressed in terms of the unit of service rendered. Though, operating cost is relating to units of costing the cost unit is not as tangible as a job or a contract. Any person cannot easily select a cost unit. Thus, the selection of cost unit requires more skill, technical and statistical talent on the part of the cost accountant.

The cost unit may be simple cost unit or composite cost unit. There is only one variable in the simple cost unit. For example, per bed in case of hospitals, a cup of tea

or coffee in case of canteen, per room or per bed in case of lodge and the like. Two or more variables have a close relationship in the composite cost unit. Costs are collected in terms of composite cost units. For example, per ton km in case of transport (truck), per man show in case of cinema theatres, per passenger km in case of transport (passenger) and the like. Hence, the selection of suitable cost unit depends upon the nature of service.

The following table gives a clear picture on the cost unit along with the nature of service of the undertaking.

Nature of Service Undertaking	Cost Unit
Goods Transport service (Lorry, goods train, air transport of goods, trucks etc.)	Per ton km
Passenger Transport service (Bus, Mini Bus, Train, Boat, Passenger train, air transport etc.)	Per Passenger km.
Hospitals	Per bed, per patient, per day
Electricity Supply	Kwh. Horse power
Canteen Service	Man-men/cup of tea or coffee
Boiler House	Cubic centimeters
Road Maintenance	Per Km
Private Transport (private car, private aeroplane etc.)	Running Hour, Trip Km
Hotel	Per room, per bed
Street lighting	Per point, per lamp
Gas	Cubic meters, Kg
Water Supply	Gallons, Litres
Cinema theatres	Per man show

In case rail transport, more number of cost centres are functioning since the rail transport has more number of complicated activities, for example, repairs and maintenance, routes, stations, godowns, yards, wagons, engines and the like. There is no method of costing except operating costing applicable to rail transport.

9.4 OBJECTIVES OF OPERATING COSTING

The objectives of operating costing are to:

1. Supply the information through which the efficiency in rendering service is improved.
2. Provide a basis for fixing accurate quotation and fare.
3. Ensure that the services are provided in proper time.
4. Control the fuel consumption and its expenses.
5. Ensure that a lot of service equipment are properly maintained.
6. Provide cost comparison between own service and alternative service i.e. hiring.
7. Compare the cost of one service centre with another.
8. Determine the apportionment cost if the services are provided within an organisation.
9. Decide the price that can be charged for use of vehicle.
10. Control the cost of maintenance and repairs.
11. Select efficient and suitable routing of vehicles to reduce the costs to production departments that use the service.

12. Avoid the underutilization of capacity and idle time of the work force.
13. Absorb the fixed costs proportionately and systematically that is allocated to the units of services.

9.5 PREPARATION OF COST SHEET UNDER OPERATING COSTING

For preparing a cost sheet under operating cost, costs are usually accumulated for a specified period *viz.* a month, a quarter, or a year, etc.

All of the accumulated costs should be classified under the following three heads:

1. Fixed costs or standing charges,
2. Variable costs or running charges, (Fuel, Driver's Wages, Depreciation, oil etc.)
3. Semi-variable costs or maintenance costs. (Supervision salary, Repairs and Maintenance)

Note: In the absence of information about semi-variable costs, the costs may be shown under two heads only, *i.e.*, fixed and variable.

Under operating costing, per unit cost of service may be calculated by dividing the total cost for the period by the total units of service in the period.

	Particulars	Total Cost	Cost per km
A	Standing Charges:- License Fees Insurance Premium Road Tax Garage Rent Driver's Wages Attendant-cum-cleaner's wages Salaries and wages of other staff		
	TOTAL		
B	Running charges:- Repairs and maintenance Cost of fuel (diesel, petrol etc.) Lubricants, grease and oil Cost of tires, tubes and other Spare Parts Depreciation		
	TOTAL		
C	TOTAL CHARGES [(A) + (B)]		

9.5.1 Calculation of Cost Units

A proper calculation of total cost unit is very important so as to correctly ascertain the cost per unit of transport service provided. The cost unit for passenger transport is passenger kilometre and for goods transport is tonne kilometre.

The following example will help in better understanding of the calculation of total cost units in transport costing.

Example: A transport company runs four buses between two towns which are 100 km apart. The seating capacity of each bus is 50 passengers. Actual passengers are 75% of the seating capacity.

All the four buses run on 25 days in a month and each bus makes two round trips per day. Calculate total passenger km.

Solution:

Total passenger km = No. of buses × Distance per round trip × No. of round trips per day × No. of days × capacity of the bus × actual capacity utilised

$$= 4 \times (100 \times 2) \times 2 \times 25 \times 50 \times 75\%$$

$$= 15,00,000 \text{ passenger km.}$$

9.5.2 Absolute and Commercial Tonne Km

Composite units *i.e.* tonnes kms., quintal kms., etc. may be computed in two ways:

- (i) Absolute (weighted average) tonnes-kms., quintal kms., etc.
- (ii) Commercial (simple average) tonnes-kms., quintal kms., etc.
- (i) **Absolute (weighted average) tonnes-kms.:** Absolute tonnes-kms. are the sum total of tonnes-kms., arrived at by multiplying various distances by respective load quantities carried.

$$\text{Absolute Tonne Km} = \text{Dist 1} \times \text{Qty1} + \text{Dist 2} \times \text{Qty 2}$$

- (ii) **Commercial (simple average) tonnes-kms.:** Commercial tonnes-kms. are arrived at by multiplying total distance kms. by average load quantity.

$$\text{Commercial Tonne Km} = \text{Total Dist} \times \text{Average Qty}$$

Note: To understand the concept of absolute tonnes-kms., and commercial tonnes-kms., students should refer to the following example.

Example: Computation of absolute tonnes-kms and commercial tonnes-kms.

A lorry starts with a load of 20 tonnes of goods from station A. It unloads 8 tonnes at station B and rest of goods at station C. It reaches back directly to station A after getting reloaded with 16 tonnes of goods at station C. The distance between A to B, B to C and then from C to A are 80 kms., 120 kms., and 160 kms., respectively. Compute 'Absolute tonnes-kms.' and 'Commercial tonnes-kms.'

Solution:

$$\text{Absolute tonnes-kms.} = 20 \text{ tonnes} \times 80 \text{ kms} + 12 \text{ tonnes} \times 120 \text{ kms} + 16 \text{ tonnes} \times 160 \text{ kms.}$$

$$= 5600 \text{ tonnes-kms.}$$

$$\text{Commercial tonnes-kms.} = \text{Average load} \times \text{total kilometres travelled}$$

$$= (20 + 12 + 16 / 3) \text{ tonnes} \times 360 \text{ kms.} = 5,760 \text{ tonnes-kms.}$$

Example: A truck starts with a load of 10 tonnes of goods from station P. It unloads 4 tonnes at station Q and rest of the goods at station R. It reaches at back directly to station P after getting reloaded with 8 tonnes of goods at station R. The distances between P to Q, Q to R and then from R to P are 40 km, 60 km and 80 km respectively. Compute 'Absolute tonne km' and 'Commercial tonne km'.

Solution:

$$\text{Absolute tonne km} = 10 \text{ tonnes} \times 40 \text{ km} + 6 \text{ tonnes} \times 60 \text{ km} + 8 \text{ tonnes} \times 80 \text{ km}$$

$$= 1400 \text{ tonnes km}$$

$$\text{Commercial tonne km} = \text{Average Load} \times \text{total km travelled}$$

$$= (10 + 6 + 8 / 3) \text{ tonnes} \times 180 \text{ km}$$

$$= 1440 \text{ tonnes km.}$$

Notes: Treatment of some special items

- Depreciation - Depreciation if related to effluxion of time may be treated as fixed. If it is related to the activity level, it may be treated as variable.
- Interest - If information about interest is explicitly given, it may be treated as fixed cost.

Example: The Union Transport Company has been given a twenty kilometre long route to ply a bus. The bus costs the company ₹ 1,00,000. It has been insured at 3% per annum. The annual road tax amounts to ₹ 2,000. Garage rent is ₹ 400 per month. Annual repair is estimated to cost ₹ 2,360 and the bus is likely to last for five years. The salaries of the driver and the conductor are ₹ 600 and ₹ 200 per month respectively in addition to 10% of the takings as commission to be shared equally by them. The manager's salary is ₹ 1,400 per month and stationery will cost ₹ 100 per month. Petrol and oil will cost ₹ 50 per 100 kilometres. The bus will make three round trips per day carrying on an average 40 passengers in each trip. Assuming 15% profit on takings and that the bus will ply on an average 25 days in a month, prepare operating cost statement on a full year basis and also calculate the bus fare to be charged from each passenger per kilometre.

9.6 TRANSPORT COSTING

Transport costing is a form of service costing employed for the purpose of cost ascertainment by the undertakings providing transport services. The transport service may be passenger transport or goods transport. It may include all modes of transport i.e., road, air or sea. The cost so determined provides a good basis for determination of price to be charged from the users. It also helps in the decision-making.

Costing in a transport industry consists of determining the operating cost of each vehicle and applying this cost to find out the cost per unit of service rendered by a vehicle. The cost unit is selected with proper care keeping in view the needs of each concern, the weight, bulk, volume and type of goods carried and distance covered in each trip. Transport undertakings include goods transport organisations as well as passenger transport organisations. The cost unit is either tonne kilometre or passenger kilometre. The meaning is cost of carrying one tonne over a distance of one kilometre or cost of carrying one passenger for a distance of one kilometre.

9.6.1 Objectives of Transport Costing

The objectives of Transport Costing are to:

- ascertain the operating cost of running a vehicle per kilometre.
- fix the rates of carriage of goods or passengers on the basis of operating costs.
- fix the higher charges where vehicles are given on hire.
- compare the cost of using own vehicles with that of using alternative mode of transport.
- determine what should be charged to departments which use internal transport facilities.

Notes: The more kilometres you travel with your own vehicle, the cheaper it becomes. The cost per kilometre, (if one travels in his own vehicle) will decline when he travels more kilometres. This is because the majority of costs for running and maintaining

vehicles are of fixed nature and the component of fixed cost per kilometre goes on decreasing with an increase in kilometre travel. Hence, the given statement is true.

9.6.2 Transport Costing Procedure

Transport Costing Procedure includes the following steps:

Data Collection

A log sheet is maintained for each vehicle to record the details of trips, running time, capacity, distance covered, cost of petrol/diesel, lubricants, loading and unloading time, etc. made by the vehicle on daily basis.

A log sheet enables the management:

- To ascertain the operating cost.
- To avoid idleness of vehicle.
- To prevent wastage of capacity.
- To exercise other controls.

A specimen Proforma of Daily Log Sheet

Vehicle No.					Date				
Driver's No. and Name					Time Garages out				
Route No.					Time Garages in				
Licence No.									
Registration No.									
TRIP PARTICULARS									
Trip No.	Place/ Station From	Place/ Station To	Tone of Packages		Kilometres	Time		Remarks	
			Out	Collected on Route		Out	in		
Supplies			Time of workers			Analysis of lost time			
Vehicle No.			Driver			Accident			
Oil			Mechanic			Traffic			
Grease			Cleaner			Delay			
			Conductor			Loading/Unloading			
						Others			

Cost Collection

A log book is maintained for each vehicle to record details of trips made by the vehicle during a specified period of time. Log book is maintained usually on a daily basis. The details shown in the log book enable the management to make suitable allocation of vehicles, to avoid the duplicate trips or to avoid idle running capacity. The log book also provides the information relating to the fuel consumed, distance travelled, no. of hours travelled, chargeable kilometres. The log book provides the data for proper allocation of cost and in this respect, these may be compared with the production details available in a manufacturing concern.

Classification and Preparation of Operating Cost Sheet

All costs incurred during a particular period are collected from various documents and classified into two broad categories i.e., (i) Standing Charges or Fixed Charges, (ii) Maintenance charges and (iii) Running and charges.

- Standing Charges (Fixed Charges):** These are incurred whether a vehicle is operating or not. These expenses do not change with the distance run. The

examples of these charges are garage rent, insurance, road tax, license fee, interest on capital, share of establishment cost, time wages of drivers, conductors and cleaners, etc. Total standing or fixed charges divided by number of transport service units to get the cost per service unit of standing charges.

- (b) **Maintenance Charges:** These costs are of semi-variable nature which includes expenditure on maintenance, repairs, tyres, tubes and other charges.
- (c) **Operating and Running costs:** These costs are variable in nature, include fuel, lubricating oil, wages of drivers/cleaners (if paid on per trip/kilometre). These costs can be easily identifiable with each of the vehicle.

9.6.3 Significance of Operating or Running Costs

The significances of operating or running costs are given below:

- Control of operating and running cost and avoidance of waste of fuel and other consumable material.
- Cost of running own vehicles may be low as compared with the hired or other forms of transport.
- It facilitates quotation of hiring rates to outside parties who ask for the transport service.
- If transport service is treated as a separate department or service cost centre, the costs to be charged to the requesting department may be easily determined.
- Suitable information is obtained for efficient routing of vehicles.
- Cost of idle vehicles and lost running time is easily obtained.

Example: There are two warehouses for storing finished goods produced in a factory. Warehouse A is at a distance of 10 kms. and Warehouse B is at a distance of 15 kms from the factory. A fleet of 5 tonne lorry is engaged in transporting the finished goods from the factory. The records show that the lorries' average speed is 30 kms. per hour when running and regularly take 40 minutes to load at the factory. At warehouse A unloading takes 30 minutes per load while at warehouse B it takes 20 minutes per load. Drivers' Wages, depreciation, insurance and taxes amount to ₹18 per hour operated. Fuel oil, tyres, repairs and maintenance cost ₹2.40 per kilometre. You are required to draw up a statement showing the cost per tonne kilometre of carrying the finished goods to the two warehouses.

Solution:

Statement showing computation of total cost and cost per tonne kilometre of carrying finished goods to warehouses:

Particulars	A	B
Time for travelling	40 Min	60 Min
Time for loading	40 Min	40 Min
Time for unloading	30 Min	20 Min
	110 Min	120 Min
Cost of Insurance, wages, tax, etc. [(110/60) × 18] [(120/60) × 18]	33.00	36.00
Fuel & oil etc. (20 × 2.4) (30 × 2.4)	48.00	72.00
Total Cost	81.00	108.00
Tonne Kilometres (5 × 10) (5 × 15)	50.00	75.00
Cost per tonne KM	1.62	1.44

Example: A transport service company is running 4 buses between two towns which are 50 miles apart. Seating capacity of each bus is 40 passengers. The following particulars were obtained from their books for April, 2015.

Wages of Drivers, Conductors and Cleaners	₹ 2,400
Salaries of Office and Supervisory Staff	₹ 1,000
Diesel and oil and other oil	₹ 4,000
Repairs and Maintenance	₹ 800
Taxation, Insurance, etc.	₹ 1,600
Depreciation	₹ 2,600
Interest and Other Charges	₹ 2,000
	<u>₹ 14,400</u>

Actual passengers carried were 75% of the seating capacity. All the four buses ran on all days of the month. Each bus made one round trip per day. Find out the cost per passenger mile.

Solution:

Computation of Cost per Passenger Mile:

$$\begin{aligned}
 \text{Passenger miles} &= \text{No. of buses} \times \text{Distance} \times \text{Round trip} \times \text{No. of Passengers} \times \text{No. of days in month} \times \text{Capacity} \\
 &= 4 \times 50 \times 2 \times 40 \times 30 \times 75\% \\
 &= 3,60,000 \text{ miles}
 \end{aligned}$$

$$\begin{aligned}
 \text{Cost per passenger mile} &= 14,400 / 3,60,000 \\
 &= ₹ 0.04
 \end{aligned}$$

Example: Mr. Sohan Singh has started transport business with a fleet of 10 taxis. The various expenses incurred by him are given below:

- (i) Cost of each taxi ₹ 75,000
- (ii) Salary of office Staff ₹ 1,500 p.m.
- (iii) Salary of Garage Supervisor ₹ 2,000 p.m.
- (iv) Rent of Garage ₹ 1,000 p.m.
- (v) Driver's Salary (per taxi) ₹ 400 p.m.
- (vi) Road Tax and Repairs per taxi ₹ 2,160 p.a.
- (vii) Insurance premium @ 4% of cost p.a.

The life of a taxi is 3,00,000 km. and at the end of which it is estimated to be sold at ₹ 15,000. A taxi runs on an average 4,000 Km. per month of which 20% it runs empty, petrol consumption 9 Km. per litre of petrol costing ₹ 6.30 per litre. Oil and other sundry expenses are of amount to ₹ 10 per 100 Km.

Calculate the effective cost of running a taxi per kilometre. If the hire charge is ₹ 1.80 per Kilometre, find out the profit that Mr. Sohan may expect to make in the first year of operation.

Solution:

Statement Showing Computation of Effective Cost and Profit for the Year

Particulars	Amount (₹)	Amount (₹)
Fixed expenses:		
Salary of staff	1,500	
Salary of garage supervisor	2,000	
Rent of garage	1,000	
Driver Salary (10 × 400)	4,000	
Road tax and repairs (2,160 × 10/12)	1,800	
Insurance premium (75,000 × 4 % × 10/12)	2,500	12,800
Fixed cost of 10 taxis per month:		
Cost per taxi = 12,800/10 =	1,280	
Cost per km = 1280/4,000 =	0.32	
Running Costs:		
Depreciation [(75,000 - 15,000)/3,00,000]		0.20
Petrol (6.3/9)		0.70
Oil & sundry expenses (10/100)		0.10
		1.32
Effective cost per Km = 1.32 × (100/80)		1.65

$$\begin{aligned}\text{Profit for year} &= (1.80 - 1.65) \times 10 \times 3,200 \times 12 \\ &= ₹ 57,600\end{aligned}$$

Example: Janata Transport Co. has been given a route 20 km. long for running buses. The company has a fleet of 10 buses each costing ₹ 50,000 and having a life of 5 years without any scrap value. From the following estimated expenditure and other details calculate the bus fare to be charged from each passenger.

- (i) Insurance charges 3% p.a.
- (ii) Annual tax for each bus ₹ 1,000
- (iii) Total garage charges ₹ 1,000
- (iv) Drivers' salary for each bus 150 p.m.
- (v) Conductors' salary for each bus ₹ 100 p.m.
- (vi) Annual repairing to each bus ₹ 1,000
- (vii) Commission to be shared by the driver and conductor equally: 10% of the takings
- (viii) Cost of stationery ₹ 500 p.m.
- (ix) Manager's salary ₹ 2,000 p.m.
- (x) Accountant's salary ₹ 1,500 p.m.
- (xi) Petrol and oil ₹ 25 per 100 km.

Each bus will make 3 round trips carrying on an average 40 passengers on each trip. The bus will run on an average for 25 days in a month. Assuming 15% profit on takings, calculate the bus fare to be charged from each passenger.

Solution:

Particulars	Amount (₹)
Insurance $(50,000 \times 3\% \times 10/12)$	1,250
Tax $(1,000 \times 10/12)$	833.33
Garage charges	1,000
Drivers' salary (150×10)	1,500
Conductors' salary (100×10)	1,000
Repairs $(1,000 \times 10/12)$	833.33
Cost of stationery	500
Manager's salary	2,000
Accountant's salary	1,500
Depreciation $(50,000 \times 10/5 \times 1/12)$	833.33
Petrol * $(30,000/100) \times 25$	7,500
Commission of conductor & driver $35,000 \times (10/100)$	3,500
	29,750
(+) Profit @ 15% on takings $(35,000 \times 15/100)$	5,250
	35,000

$$* 10 \times 20 \times 3 \times 2 \times 25 = 30,000$$

$$\text{Let } X \text{ be the takings } X = 26,250 + (10/100 X) + (15/100 X) 100 X$$

$$= 26,250 + 25 X$$

$$\Rightarrow X = 35,000$$

$$\text{Fare per passenger Km} = 35,000 / (30,000 \times 40)$$

$$= 0.0292 = ₹ 0.03$$

Example: Union Transport Company supplies the following details in respect of a truck of 5 tonne capacity.

Cost of truck ₹ 90,000

Estimated life 10 years

Diesel, oil, grease ₹ 15 per trip each way

Repairs and maintenance ₹ 500 p.m.

Driver's wages ₹ 500 p.m.

Cleaner's wages ₹ 250 p.m.

Insurance ₹ 4,800 per year

Tax ₹ 2,400 per year

General supervision charges ₹ 4,800 per year

The truck carries goods to and from the city covering a distance of 50 kms. each way.

On outward trip freight is available to the extent of full capacity and on return 20% of capacity.

Assuming that the truck runs on an average 25 days a month, work out:

(a) Operating cost tonne-km.

- (b) Rate for tonne per trip that the company should charge if a profit of 50% on freight is to be earned.

Solution:

Particulars	Amount (₹)
Repairs & Maintenance	500
Driver's wages	500
Cleaner's wages	250
Insurance	400
Tax	200
Supervision charge	400
Depreciation $\{(10,000/10) \times (1/12)\}$	750
Diesel, oil, grease $(15 \times 2 \times 25)$	750
	3,750
(+) 50% profit on freight (100% on cost)	3,750
	7,500

$$\text{Tonne Kms} = 25 \{ (50 \times 5) + (20/100 \times 50 \times 5) \}$$

$$= 7,500$$

$$\text{Cost per tonne km} = 3,750 / 7,500 = 0.50$$

$$\begin{array}{rcl} (+) \text{ Profit @ 50\% on freight} & & = 0.50 \\ & & \hline & & 1.00 \end{array}$$

Check Your Progress

Fill in the blanks:

- _____ costing means a bus or truck of a transport undertaking chartered for a specific trip.
- There is only _____ variable in the simple cost unit.
- The cost unit for goods transport is _____.
- A _____ is maintained for each vehicle to record details of trips made by the vehicle during a specified period of time.
- Total standing or fixed charges divided by number of transport service units to get the _____ unit of standing charges.
- The main objective of operating costing is to compute the cost of the services offered by the _____.

9.7 LET US SUM UP

- Operating costing is an extension and refined form of process costing. It is also more or less very similar to single or output costing. The operating costing gives more emphasis on providing services rather than the cost of manufacturing an article.
- For computing the operating cost, it is necessary to decide first, about the unit for which the cost is to be computed, this may often require the study of some technical and operating data, for finding out the factors which have a bearing on cost.

- The service cost in operating cost should be found out to understand whether an organisation or cost centre render services to others or sell the services to the general public.
- The main objective of operating costing is to compute the cost of the services offered by the organisation. For doing this, it is necessary to decide the unit of cost in such cases.
- Cost is expressed in terms of the unit of service rendered. Though, operating cost is relating to units of costing the cost unit is not as tangible as a job or a contract.
- A proper calculation of total cost unit is very important so as to correctly ascertain the cost per unit of transport service provided. The cost unit for passenger transport is passenger kilometre and for goods transport is tonne kilometre.
- Costing in a transport industry consists of determining the operating cost of each vehicle and applying this cost to find out the cost per unit of service rendered by a vehicle.

9.8 UNIT END ACTIVITY

Manar lodging home is being run at a small hill station with 50 single rooms. The home offers concessional rates during six off-season months in a year. During this period, half of the full room rent is charged. The management's profit margin is targeted at 20% of the room rent.

The following are the cost estimates and other details for the year ending on 31st March 2016. [Assume a month to be of 30 days].

- Occupancy during the season is 80% while in the off- season it is 40% only.
- Expenses:
 - Staff salary [Excluding room attendants] ₹ 2,75,000
 - Repairs to building ₹ 1,30,500
 - Laundry and linen ₹ 40,000
 - Interior and tapestry ₹ 87,500
 - Sundry expenses ₹ 95,400
- Annual depreciation is to be provided for buildings @ 5% and on furniture and equipment @ 15% on straight-line basis.
- Room attendants are paid ₹ 5 per room a day on the basis of occupancy of the rooms in a month.
- Monthly lighting charges are ₹ 120 per room, except in four months in winter when it is ₹ 30 per room and this cost is on the basis of full occupancy for a month.
- Total investment in the home is ₹ 100 lakhs of which ₹ 80 lakhs relate to buildings and balance for furniture and equipment.

You are required to work out the room rent chargeable per day both during the season and the off-season months on the basis of the foregoing information.

9.9 KEYWORDS

Operating costing: The method of costing used in service rendering undertakings is known as operating costing.

Internal service: It refers to rendering service to the production departments within an organisation.

External service: It refers to providing services to the general public uniformly.

Absolute (weighted average) tonnes-kms: Absolute tonnes-kms are the sum total of tonnes-kms, arrived at by multiplying various distances by respective load quantities carried.

Commercial (simple average) tonnes-kms: Commercial tonnes-kms are arrived at by multiplying total distance kms by average load quantity.

Transport costing: It is a form of service costing employed for the purpose of cost ascertainment by the undertakings providing transport services.

Standing charges (fixed charges): These are incurred whether a vehicle is operating or not. These expenses do not change with the distance run.

9.10 QUESTIONS FOR DISCUSSION

1. Define operating costing with the help of an example.
2. What are the basic features of operating costing?
3. Distinguish between:
 - (a) Internal service and External service
 - (b) Absolute and commercial tonne km
4. Highlight nature of service undertaking along with its cost unit.
5. What are the objectives of operating costing?
6. Discuss the objectives of transport costing.
7. Write short notes on the following:
 - (a) Standing Charges or Fixed Charges
 - (b) Maintenance Charges
 - (c) Running and Charges

Check Your Progress: Model Answer

1. Terminal
2. One
3. Tonne kilometre
4. Log book
5. Cost per service
6. Organisation

9.11 REFERENCES/SUGGESTED READINGS

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UNIT IV

UNIT 10

PROCESS COSTING

CONTENTS

- 10.0 Aims and Objectives
- 10.1 Introduction
- 10.2 Meaning and Definitions of Process Costing
 - 10.2.1 Characteristics of Process Costing
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- 10.6 Oil Refinery Processes
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10.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Understand the meaning of process costing
- Describe accounting procedure of costing
- Explain normal wastage, abnormal loss and gain
- Explain oil refinery process and joint products and By-products

10.1 INTRODUCTION

Industries which are engaged in the manufacture of products which involve continuous operation or process are known as process industries. These industries have their special features. The costing system should be designed bearing in mind the salient features. Process costing is also one important method of costing. It refers to costing of operation(s) or process (es) involved in converting raw materials into finished goods or products. Its main objective is to provide an average cost of product.

10.2 MEANING AND DEFINITIONS OF PROCESS COSTING

Process costing represents a type of cost procedure for continuous production industries. In such industries, output consists of like units, each unit being processed in the same manner. Therefore, it is assumed that the same amount of raw materials, labour and overhead is chargeable to each unit processed. The cost of unit at the end of any manufacturing process can be easily determined and provided costs are accumulated on a process basis and record of units produced is available.

According to **CIMA**, "*The costing method is applicable where products or services result from a sequence of continuous operations or processes. Costs are arranged over the units produced during the period*".

According to **Köhler**, "*A method of accounting whereby costs are charged to processes or operations and averaged over units produced; it is employed principally where a finished product is the result of a more or less continuous operation, as in paper mills, refineries, canneries and chemical plants; distinguished from job costing, where costs are assigned to specific orders, lots or units*".

10.2.1 Characteristics of Process Costing

The main characteristics of process costing are:

1. The products or goods are processed in one or more processes,
2. The products are distinguishable in processing stage,
3. The products or goods are standardized, and
4. When a product is produced through various processes, the output of each process is transferred to the next process and that of last process is transferred to the finished goods or finished stocks.

10.2.2 Application of Process Costing

Process costing may be used in a wide number of industries. The following types of industries may be used in process costing:

- (a) Production or manufacturing industries, such as cement, rubber, glass, textiles, paper, iron, steel, aluminum, milk-dairy, biscuits, soap-making, flour mills industries, etc.
- (b) Public utility services, such as water supply, generation of electricity, health services, etc.
- (c) Mining industries, such as coal, steam, gas, oil, coking industries, etc.
- (d) Chemical and distilleries industries, etc.

10.2.3 Differences between Process Costing and Job Costing

The main differences between process costing and job costing are as follows:

Table 10.1: Differences between Process Costing and Job Costing

Sl. No.	Process Costing	Job Costing
(i)	In process costing, production is a continuous flow and the products are standardized.	In job costing, production is carried on by specific order.
(ii)	Processes are related to each other. Products also lose their individual entities.	Various jobs are separate and independent.
(iii)	In process costing, costs are calculated at the end of period under each process.	In job costing, costs are calculated when a job is completed or finished.
(iv)	In process costing, transfer from one process to another is a usual feature.	In job costing, there is normally no transfer from one job to another. It will be only when there is surplus or excess production.
(v)	Costs are compiled on time basis: for production, for a given accounting period, for each process.	Costs are determined by jobs or batches of products.
(vi)	In process costing, production is homogeneous, stable and controllable.	In job costing, each product unit is different and therefore more managerial attention is needed for proper control.
(vii)	The unit cost of a process, which is computed by dividing the total cost for the period into the output of the process during that period, is an average cost for the period.	In job costing, unit cost of a job is calculated by dividing the total cost by units produced in the lot or batch in the period.
(viii)	Production in process costing is continuous and hence there is normally work-in-progress at beginning and closing.	In job costing, there may not be opening or closing work-in-progress in an accounting period.

10.3 ACCOUNTING PROCEDURE OF COSTING

If the products are produced by different processes, cost of previous process is transferred to the next process, so that total and unit cost of products are accumulated. In short, cost of products will comprise all costs incurred in all the processes up to finished stage. There is no departure from the principles regarding direct and indirect expenditures. The costs of processing will include:

1. Materials,
2. Labour,
3. Direct Expenses, and
4. Indirect Overheads.

Materials issued for a particular process are debited direct to it and so also labour engaged only on that process. If two or more processes are carried on in the same department, the department expenses will be apportioned among the processes carried on there.

Apart from direct expenses, some indirect overheads, common to all process, are bound to be incurred. The salary of the works manager, for example, will have to be allocated to all the process. The normal practice is to do that on the base of direct wages or labour but that naturally would depend on the circumstances of each case. It is quite possible that a complicated process should absorb more indirect overheads.

The total of each process account less any work in progress is transferred to the next process account. The balance in the final or last process is transferred to the finished stock account.

Example: A product passes through three processes, Process A, Process B and Process C to completion. During the month of March, 2007, 1,000 units were produced and the following were the expenses:

	Process A (₹)	Process B (₹)	Process C (₹)
Materials	2,000	3,000	2,000
Labour	5,000	4,000	3,000
Direct expenses	800	900	1,000

Indirect expenses amounted at all to 6,000. These are to be allocated on the basis of direct wages. Raw materials worth ₹ 6,000 were issued to Process A. Prepare process cost accounts showing cost per article produced.

Solution:

Process Account A (Output: 1,000 units)

Particulars	Cost per unit (₹)	Total (₹)	Particulars	Cost per unit (₹)	Total (₹)
To Raw materials	6.00	6,000	By Transfer to Process B a/c	16.30	16,300
To Materials	2.00	2,000			
To Direct wages	5.00	5,000			
To Direct expenses	0.80	800			
To Indirect expenses	2.50	2,500			
	16.30	16,300		16.30	16,300

Process Account B

Particular	Cost per unit (₹)	Total (₹)	Particulars	Cost per unit (₹)	Total (₹)
To Transfer from Process A a/c	16.30	16,300	By Transfer to Process B a/c	26.20	26,200
To Materials	3.00	3,000			
To Direct wages	4.00	4,000			
To Direct expenses	0.90	900			
To Indirect expenses	2.00	2,000			
	26.20	26,200		26.20	26,200

Process Account C

Particulars	Cost per unit (₹)	Total (₹)	Particulars	Cost per unit (₹)	Total (₹)
To Transfer from Process B a/c	26.20	26,200	By Transfer to Finished stock a/c	33.70	33,700
To Materials	2.00	2,000			
To Direct wages	3.00	3,000			
To Direct expenses	1.00	1,000			
To Indirect expenses	1.50	1,500			
	33.70	33,700		33.70	33,700

Example: Product A requires three distinct processes and after the third process, the product is transferred to finished stock. You are required to prepare related process accounts from the following informations:

	Total (₹)	X ₁ (₹)	X ₂ (₹)	X ₃ (₹)
Direct material	5,000	4,000	500	500
Direct labour	4,000	1,500	1,600	900
Direct expense	800	400	400	--
Production overheads	6,000	--	--	--

Production overhead is to be allocated to different processes on the basis of 150% of direct wages. Production during the period was 200 units. Assume there is no opening and closing stock.

Solution:

Process Account X₁ (Output: 200 units)

Particulars	Cost per unit (₹)	Total (₹)	Particulars	Cost per unit (₹)	Total (₹)
To Direct materials	20.00	4,000	By Output transferred to Process X ₂	40.75	8,150
To Direct labour	7.50	1,500			
To Direct expenses	2.00	400			
To Production overheads	11.25	2,250			
	40.75	8,150		40.75	8,150

Process Account X₂

Particulars	Cost per unit (₹)	Total (₹)	Particulars	Cost per unit (₹)	Total (₹)
To Output transferred from process X ₁	40.75	8,150	By Output transferred to process X ₃	65.25	13,050
To Direct materials	2.50	500			
To Direct labour	8.00	1,600			
To Direct expenses	2.00	400			
To Production overheads	12.00	2,400			
	65.25	13,050		65.25	13,050

Process Account X₃

Particulars	Cost per unit (₹)	Total (₹)	Particulars	Cost per unit (₹)	Total (₹)
To Output transferred from process X ₂	65.25	13,050	By Output transferred to finished stock a/c	79.00	15,800
To Direct materials	2.50	500			
To Direct wages	4.50	900			
To Production overheads	6.75	1,350			
	79.00	15,800		79.00	15,800

10.4 WASTAGE, SCRAP, DEFECTIVES AND SPOILAGE

Wastage represents the portion of a basic raw material lost in processing, having no recovery value. Wastage may be visible, e.g. remnants of basic raw materials, or invisible, e.g. disappearance of basic raw material through evaporation, smoke, etc. In process type of industry, wastage may have lower reusable value.

Normally, in each process, there is a residue left after transfer of the partially completed product to the next process. For example, in case of crushing of oil seeds, oil produced will be passed on to the refining process and oil cakes will be left. This is not wastage as it can be sold in the market. But the quantity of oil produced plus the quantity of cake left will not equal the quantity of oil seeds. It will be slightly less. The quantity not accounted for is a loss and effort should be to keep it as low as possible. The residue, if it can be sold in the market and if it can be used as a material for another finished product, is known as a by-product. In the process of converting coal into coke, useful by-products such as coal tar, sulphate of ammonia are obtained.

Normal wastage is absorbed in the cost of net output while abnormal wastage is written-off to costing profit and loss account. When, however, wastage has any reusable value, the process account should be credited with the quantity and value of normal wastage.

Scrap as discarded material which has some recovery value and which is usually either disposed of without further treatment, or reintroduced into the production process in place of raw material. Where value of scrap is negligible, it may be excluded from costs. In other words, the cost of scrap is borne by good units and the income from scrap, if any, is treated as other income. The net value of scrap, net of selling and distribution cost, if any, is deducted from overheads to reduce the overhead rate.

Defectives products are not up to the standard or they do not meet dimensional specifications, they are known as defectives. Defective work may be the result of various causes, such as sub-standard materials, bad workmanship, incompetent supervision, carelessness in planning, etc. Accounting for defectives is concerned with accounting for rework costs or costs of rectification. When defectives are usual for the products and it is not paying to try to identify them job-wise, the related methods are generally in use. Where defectives are easily identifiable with specific jobs, the rework costs are debited to the job.

Spoilage results when materials are damaged in manufacturing operations in such a way that they cannot be rectified or reused economically and hence taken out of the process to be disposed of in same manner without further processing. The main difference between defectives and spoiled work is that spoiled material cannot be repaired or reconditioned as is done in the case of defectives.

Normal spoilage costs are included in costs either by charging the loss due to spoilage to the production order or charging it to production overheads, so that it is spread over all products. Any value realized from spoilage is credited to the production order or production overheads account, as the case may be. The cost of abnormal spoilage is charged to costing profit and loss account.

Example: A product passes through three distinct processes to completion. These processes are numbered A, B and C respectively. During the week ended January 2008, 500 items were produced. The following information is obtained:

	Process A (₹)	Process B (₹)	Process C (₹)
Materials	3,000	1,500	1,000
Labour	2,500	2,000	2,500
Direct expenses	500	100	500

The indirect expenses for the period were ₹ 1,400 apportioned to the process on the basis of wages. You are required to prepare process accounts.

Solution:

Process Account A

Particulars	Amount (₹)	Particulars	Amount (₹)
To Materials	3,000	By Output transferred to Process B Account	6,500
To Labour	2,500		
To Direct expense	500		
To Indirect expenses	500		
	6,500		6,500

Process Account B

Particulars	Amount (₹)	Particulars	Amount (₹)
To Process A a/c	6,500	By Output transferred to Process C Account	10,500
To Materials	1,500		
To Labour	2,000		
To Direct expense	100		
To Indirect expenses	400		
	10,500		10,500

Process Account C

Particulars	Amount (₹)	Particulars	Amount (₹)
To Process B a/c	10,500	By Output transferred to Finished Stock Account	15,000
To Materials	1,000		
To Labour	2,500		
To Direct expense	500		
To Indirect expenses	500		
	15,000		15,000

Example: An article passes through three processes of manufacture. During the week ended 15th March 2005, 600 bottles are produced. The cost books show the following information:

	Process I	Process II	Process III
Raw materials	5,000	3,000	2,000
Direct labour	3,000	2,500	2,300
Direct expenses	600	200	500
Cost of bottles	Nil	2,030	Nil
Cost of corks	Nil	Nil	325

The indirect expenses for the period were ₹ 1,600. The by-products were sold for ₹ 240 in Process-II. The residue sold for ₹ 125 in Process-III.

Prepare the account in respect of each of the process showing its cost and cost of production of the finished product per bottles.

Solution:

Process Account I
(Output: 600 Bottles)

Particulars	Cost per bottle (₹)	Total (₹)	Particulars	Cost per bottle (₹)	Total (₹)
To Raw materials	8.333	5,000	By Transfer to Process II	15.358	9,215
To Direct labour	5.000	3,000			
To Direct expenses	1.000	600			
To Indirect expenses	1.025	615			
	15.358	9,215		15.358	9,215

Process Account II

Particulars	Cost per bottle (₹)	Total (₹)	Particulars	Cost per bottle (₹)	Total (₹)
To Transferred from Process I	15.358	9,215	By Sale of By-products	0.400	240
To Raw materials	5.000	3,000	By Transfer to process III	28.695	17,218
To Direct labour	4.166	2,500			
To Direct expenses	0.333	200			
To Indirect expenses	0.855	513			
To Cost of bottles	3.383	2,030			
	29.095	17,458		29.095	17,458

Process Account III

Particulars	Cost per bottle (₹)	Total (₹)	Particulars	Cost per bottle (₹)	Total (₹)
To Transfer from Process II	28.695	17,218	By Sale of residue	0.208	125
To Raw materials	3.333	2,000	By Finished stock account	37.814	22,690
To Direct labour	3.833	2,300			
To Direct expenses	0.833	500			
To Indirect expenses	0.786	472			
To Cost of corks	0.542	325			
	38.022	22,815		38.022	22,815

Example: The product of a manufacturing company passes through two processes A and B, and then to finished stock. It is ascertained that in each process 5% of the total weight put in is lost and 10% is scrap which from processes A and B realises ₹ 80 per tonne and ₹ 200 per tonne respectively. The process figures are as follows:

	Process A (₹)	Process B (₹)
Materials consumed in tonnes	1,000	70
Cost per ton	125	200
Wages	18,000	12,000
Manufacturing expenses	6,000	5,000

Prepare process cost accounts showing the cost of the output of each process and the cost per tonne.

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Process Costing

Solution:

Process Account A

Particulars	Tonnes	Amount ()	Particulars	Tonnes	Amount ()
To Material consumed	1,000	1,25,000	By Loss in weight 5%	50	
To Wages		18,000	By Sale of scrap (10%)	100	8,000
To Manufacturing expenses		6,000	By Process B (cost 165.88 per tonne)	850	1,41,000
	1,000	1,49,000		1,000	1,49,000

Process Account B

Particulars	Tonnes	Amount ()	Particulars	Tonnes	Amount ()
To Process A acc	850	1,41,000	By Loss in weight 5%	46	
To Material consumed	70	14,000	By Sale of Scrap 10%	92	18,400
To Wages		12,000	By Finished stock (cost 196.42 per tonne)	782	1,53,600
To Manufacturing expenses		5,000			
	920	1,72,000		920	1,72,000

Example: The information given below is extracted from the cost accounts of an industry which produces commodities. In production, three processes are involved. Prepare cost accounts showing the cost of the output and the cost per unit at each stage of manufacture:

- The operations in each separate process are completed daily.
- The value at which units are to be charged to process B and C is the cost per unit of process A and A plus B respectively.

	Process		
	A ()	B ()	C ()
Direct wages	640	1,200	2,925
Manufacturing expenses	360	300	360
Factory on cost	200	225	240
Raw materials consumed	2,400	--	--
Production (Gross)	37,000 Units	--	
Wastage	1,000 Units	1,500 Units	500 Units
Stock 1 st July, 2006	--	4,000 Units	16,500 Units
Stock 31 st July, 2006	--	1,000 Units	5,500 Units

Solution:

Process Account A

Particulars	Units (')	Amount (')	Particulars	Units (')	Amount (')
To Materials	37,000	2,400	By Transfer to Process B (Cost per unit = 0.10)	36,000	3,600
To Wages		640	By Wastage	1,000	
To Manufacturing expenses		360			
To Factory on cost		200			
	37,000	3,600		37,000	3,600

Process Account B

Particulars	Units (')	Amount (')	Particulars	Units (')	Amount (')
To Stock	4,000		By Process C a/c (transfer at = 0.15 per unit)	37,500	5,625
To Process A a/c	36,000		By Wastage	1,500	
	40,000				
Less: Closing stock	1,000				
	39,000	3,900			
To Wages		1,200			
To Manufacturing expenses		300			
To Factory on cost		225			
	39,000	5,625		39,000	5,625

Process Account C

Particulars	Units (')	Amount (')	Particulars	Units (')	Amount (')
To Stock	16,500		By Cost of finished goods (cost of per unit = 0.21)	48,000	10,800
To Process B a/c	37,500		By Wastage	500	
	54,000				
Less: Closing stock	5,500				
	48,500	7,275			
To Wages		2,925			
To Manufacturing expenses		360			
To Factory on cost		240			
	48,500	10,800		48,500	10,800

Example: The finished goods of an industry pass through three processes known as M, N and O. The production of each process is being passed on the next process. From the following figures show the cost of each process.

	Process M (')	Process N (')	Process O (')
Materials	10,000	30,000	50,000
Direct wages	9,200	16,000	27,750
Works on cost	16,000	15,000	18,000
General on cost	9,800	10,750	12,000

Contd...

Production for the month of June	36,000 Units	37,500 Units	48,000 Units
Stock at beginning (1 st June)	Nil	4,000 Units	16,500 Units
Stock at close (30 th June)	Nil	1,000 Units	5,500 Units

Solution:

Process Account M

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Materials	36,000	10,000	By Transfer to Process N Account (per unit ₹ 1.25)	36,000	45,000
To Direct wages		9,200			
To Works on cost		16,000			
To General on cost		9,800			
	36,000	45,000		36,000	45,000

Process Account N

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Stock (1st June @ ₹ 1.25 per unit)	4,000	5,000	By Stock (30 th June @ ₹ 1.25 unit)	1,000	1,250
To Transferred from Process M Account	36,000	45,000	By Wastage	1,500	Nil
To Materials		30,000	By Transfer to Process O Account (Cost per unit ₹ 3.21)	37,500	1,20,500
To Direct wages		16,000			
To Works on cost		15,000			
To General on cost		10,750			
	40,000	1,21,750		40,000	1,21,750

Process Account O

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Stock (1st June @ ₹ 3.21 per unit)	16,500	52,965	By Stock (30 th June @ ₹ 3.21 per unit)	5,500	17,655
To Transferred from Process N Account	37,500	1,20,500	By Wastage	500	Nil
To Materials		50,000	By Finished stock (Cost per unit ₹ 5.59)	48,000	2,68,560
To Direct wages		27,750			
To Works on cost		18,000			
To General on cost		17,000			
	54,000	2,86,215		54,000	2,86,215

Working note: Opening and closing units of Process N have been valued at cost per unit of output of Process M. Similarly opening and closing units of Process O have been valued at cost per unit of output of Process N.

Example: A product passes through three processes A, B and C. The following details are obtained for its manufacture:

	A	B	C
Raw materials introduced tonnes	250	152	145
Cost of per tonnes (₹)	120	80	50
Direct wages (₹)	85,800	20,250	10,560
Direct expenses (₹)	13,800	13,870	2,250

Contd.

Loss of Tonnage due to processing	4%	5%	2 ½%
Output transferred to next processes	20%	50%	—
Transferred to warehouse	80%	50%	100%

Prepare necessary process accounts.

Solution:

Process Account A

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Materials	250	30,000	By Wastage (4%)	10	
To Direct wages		85,800	By Process B (20%)	48	25,920
To Direct Expenses		13,800	By Warehouse (80%)	192	1,03,680
	250	1,29,600		250	1,29,600

Process Account B

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Process A a/c	48	25,920	By Wastage (5%)	10	
To Raw materials	152	12,160	By Process C (50%)	95	36,100
To Direct wages		20,250	By Warehouse (50%)	95	36,100
To Direct expenses		13,870			
	200	72,200		200	72,200

Process Account C

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Process B A/c	95	36,100	By Wastage (2.5%)	6	
To Raw materials	145	7,250	By Warehouse (100%)	234	56,160
To Direct wages		10,560			
To Direct expenses		2,250			
	240	56,160		240	56,160

Example: During production a manufacturing concern passes through two processes A and B, and then to finished stock. It is ascertained that in each process 2% of the total weight put in is lost and 5% scrap which from Process A and B realises ₹ 100 per tonne and ₹ 200 per tonne respectively. The Process figures are as follows:

	Process A	Process B
Materials consumed (Tonnes)	1,000	70
Cost of materials per tonne	₹ 200	₹ 300
Manufacturing wages	₹ 20,000	₹ 15,000
Manufacturing expenses	₹ 6,000	₹ 4,000

Prepare process cost accounts, showing the cost of the output of each process and the cost per tonne.

Solution:

Process Account A

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Materials @ ₹ 200/-	1,000	2,00,000	By Loss in weight (2% of 1,000 tons)	20	
To Manufacturing wages		20,000			
To Manufacturing expenses		6,000	By Sale of Scrap (5% of 1,000 tons and sold @ ₹ 100 a tonne)	50	5,000

Contd...

			By Transfer to Process B (Cost per tonne = 237.63)	930	2,21,000
	1,000	2,26,000		1,000	2,26,000

Process Account B

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Transferred from Process A	930	2,21,000	By Loss in weight (2% of 1,000 tons)	20	—
To Materials (@ ₹ 300/-)	70	21,000	By Sale of scrap (5% of 1,000 tons and sold @ ₹ 200 a ton)	50	10,000
To Manufacturing wages		15,000	By Transfer to Finished stock (Cost per tonne = 269.89)	930	2,51,000
To Manufacturing expenses		4,000			
	1,000	2,61,000		1,000	2,61,000

Example: A company manufactures and sells three chemicals produced by consecutive process. In each case, 2 per cent of the total weight put in is lost and 10% is scrap which from process A and B realises ₹ 100 a tonne and from process C ₹ 20 a ton. The products of three processes are as follows:

	Process A	Process B	Process C
Sent to warehouse for sale	25%	50%	—
Passed on to next process	75%	50%	—

The following particulars relate to the month of August, 2007:

	Process A (₹)	Process B (₹)	Process C (₹)
Raw materials used (Tonnes)	1,000	140	1,348
Cost per tonne	120	200	80
Direct wages and expenses	30,800	25,760	18,100

Prepare an account for each process, showing the cost per tonne of each product.

Solution:

Process Account A

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Raw materials	1,000	1,20,000	By Loss in weight 2%	20	—
To Direct wages and expenses		30,800	By Scrap (100 × 100)	100	10,000
			By Warehouse (25%)	220	35,200
			By Process B (cost ₹ 160 per tonne)	660	1,05,600
	1,000	1,50,800		1,000	1,50,800

Process Account B

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Transferred from Process A	660	1,05,600	By Loss in weight 2%	16	
			By Scrap (80 × 100)	80	8,000
To Materials used	140	28,000	By Warehouse (50%)	352	75,680
To Direct wages and expenses		25,760	By Process C (cost ₹ 215 per tonne)	352	75,680
	800	1,59,360		800	1,59,360

Process Account C

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Transferred from Process B	352	75,680	By Loss in weight (2%)	34	
			By Scrap (170 × 20)	170	3,400
To Materials used	1,348	1,07,840	By Warehouse (cost ₹ 132.50 per tonne)	1,496	1,98,220
To Direct wages and expenses		18,100			
	1,700	2,01,620		1,700	2,01,620

Example: Rajendra Limited manufactures and sells fertilizers in three processes. Details of costs and production during July, 2007 were as follows:

	Process A	Process B	Process C
Raw materials used (Tonnes)	200	71	164
Cost per tonne	₹ 100	₹ 300	₹ 50
Direct wages	₹ 10,000	₹ 5,000	₹ 3,000
Overheads	₹ 3,000	₹ 2,500	₹ 4,000
Finished Product:			
Sent to warehouse for sale	25%	50%	100%
Sent to next process	75%	50%	—
Sale of scrap per tonne	₹ 80	₹ 60	₹ 120

In each process, 6% of total weight is lost and 8% is scrap. All fertilizers are sold at a profit of 25% at cost but are transferred to next process are made at cost. You are instructed to prepare process cost sheet for July, 2007 of fertilizers for each process and determine the selling prices.

Solution:

Process Cost Sheet for the period of July, 2007

Particulars	Quantity (tonnes)	Amount (₹)	Cost of per tonne (₹)
Process A:			
Raw materials used @ ₹ 100	200	2,000	
Direct wages		10,000	
Overheads		3,000	
	200	33,000	
Less: Weight lost	12	—	
	188	33,000	
Less: Sale of scrap	16	1,280	
Cost of process A	172	31,720	
Less: Sent to warehouse for sale	43	7,930	

Contd...

Passed on to process B	129	23,790	184.4
Process B:			
Raw materials used (@ ₹ 300/-)	71	21,300	
Direct wages		5,000	
Overheads		2,500	
	200	52,590	
Less: Weight lost	12	-	
	188	52,590	
Less: Sale of scrap	16	966	
Cost of process B	172	51,630	
Less: Sent to warehouse for sale	86	25,815	
Passed on to process C	86	25,815	300.2
Process C:			
Raw materials used (@ ₹ 50/-)	164	8,200	
Direct wages		3,000	
Overheads		4,000	
	250	41,015	
Less: Weight lost	15	-	
	235	41,015	
Less: Sale of scrap	20	2,400	
Total Cost	215	38,615	179.6

Statement of Selling Prices

Particulars	Process A (₹)	Process B (₹)	Process C (₹)
Cost per ton	184.4	300.20	179.6
Add: Profit @25% on cost	46.1	75.05	44.9
Selling price per ton	230.5	375.25	224.5

Example: An article is passed through three processes of manufacture. From the following figures, show the cost of each of the three processes and the cost per article produced during the month of March, 2007:

	Process A	Process B	Process C
Materials used	₹ 30,000	₹ 10,000	₹ 4,000
Direct labour	₹ 16,000	₹ 40,000	₹ 12,000
Direct expenses	₹ 5,200	₹ 14,400	₹ 5,000

The indirect expenses amounted to ₹ 17,000 and may be apportioned on the basis of direct wages. No account need be taken of stocks in hand and work in progress at the beginning and the end of the month. The number of articles produced during the month was 480.

Solution:

Process Account A

Particulars	Cost per article (₹)	Total (₹)	Particulars	Cost per article (₹)	Total (₹)
To Materials	62.50	30,000	By Transfer to Process B	115.00	55,200
To Direct labour	33.34	16,000			
To Direct exp.	10.83	5,200			
To Indirect exp.	8.33	4,000			
	115.00	55,200		115.00	55,200

Process Account B

Particulars	Cost per article (₹)	Total (₹)	Particulars	Cost per article (₹)	Total (₹)
To Transferred from Process A	115.00	55,200	By Transfer to Process C	227.00	1,29,600
To Materials	20.83	10,000			
To Direct labour	83.33	40,000			
To Direct exp.	30.00	14,400			
To Indirect exp.	20.84	10,000			
	270.00	1,29,600		227.00	1,29,600

Process Account C

Particulars	Cost per article (₹)	Total (₹)	Particulars	Cost per article (₹)	Total (₹)
To Transferred from Process B	270.00	1,29,600	By Finished goods a/c	320.00	1,53,600
To Materials	8.33	4,000			
To Direct labour	25.00	12,000			
To Direct exp.	10.42	5,000			
To Indirect exp.	6.25	3,000			
	320.00	1,53,600		320.00	1,53,600

10.5 NORMAL WASTAGE, ABNORMAL LOSS AND ABNORMAL GAIN

10.5.1 Normal Wastage

This is the amount of loss which is unavoidable because of the nature of raw materials or the production technique and is inherent in the normal course of production e.g., loss of weight because of evaporation or melting, etc. Such wastage may also take place while stamping product components out of a big metal sheet. This wastage is normally expressed as a percentage of the quantity of output. This percentage of normal wastage of a particular process is determined on the basis of the experience of previous years.

In the case of normal wastage, all production expenses incurred are charged to the good units of output. Thus, normal wastage becomes the part of cost of production and increases the cost of output. If the normal wastage takes place at the beginning of the process or during it, it is supposed that the lost units were never introduced in the process and thus normal wastage is charged to the units completed as well as to the work in process.

10.5.2 Abnormal Loss

Sometimes the percentage of wastage or loss may exceed the determined standard percentage of normal wastage. Any wastage exceeding the normal percentage is termed abnormal loss or wastage. Such loss or wastage is not a part of production. It is credited out of the concerned process account as a loss to the costing profit and loss account. The value of abnormal wastage is calculated with the help of the following formula:

$$\text{Abnormal Loss} = \frac{\text{Normal cost}}{\text{Normal output}} \times \text{Units of abnormal loss}$$

10.5.3 Abnormal Gain or Abnormal Effectives

If the quantum of wastage is less than the predetermined percentage of normal wastage, the difference is called as abnormal gain or effectives. This does not affect the cost of production. The value of the abnormal effectives is debited to the concerned process account and credited to the abnormal effectives account. This value is calculated at the rate at which the effective output would have been valued if normal wastage had taken place according to expectation. This formula for calculation of the value of abnormal gain or effectives is:

$$= \frac{\text{Normal cost of normal production}}{\text{Units of normal production}} \times \text{Units of abnormal effectives}$$

At the end of the accounting year, the abnormal effectives account is transferred to the credit side of profit and loss account.

Example: The XYZ manufacturing company's product passes through two distinct processes I and II and then to finished stock. It is known from past experience that wastage occurs in the processes as under:

In process I 5% of the units entering the process.

In process II 10% of the units entering the process.

The scrap value of the wastage in process I is ₹ 8 per 100 units and process II is ₹ 10 per 100 units.

The process figures are:

	Process I (₹)	Process II (₹)
Materials consumed	3,000	1,500
Wages	3,500	2,000
Manufacturing expenses	1,000	1,000

5000 units were brought into process I costing ₹ 2,500. The outputs were:

Process I 4,700 Units

Process II 4,150 Units

Prepare process cost accounts showing the cost of the output.

Solution:

Process Account I

Particulars	Units (₹)	Amount (₹)	Particulars	Units (₹)	Amount (₹)
To Units brought in	5,000	2,500	By Normal wastage	250	20
To Materials consumed		3,000	By Abnormal wastage	50	105
To Wages		3,500	[(9,980/4,750) × 50]		
To Manufacturing expenses		1,000	By Transfer to process II	4,700	9,875
	5,000	10,000		5,000	10,000

Process Account II

Particulars	Units (₹)	Amount (₹)	Particulars	Units (₹)	Amount (₹)
To Transferred from Process I	4,700	9,875	By Normal wastage	470	47
To Materials consumed		1,500	By Abnormal wastage	80	271
			[(14,328/4,230) × 80]		

Contd.

To Wages		2,000	By Finished stock	4,150	14,057
To Manufacturing expenses		1,000			
	4,700	14,375		4,700	14,375

Example: The product of Ajay Company is passed through three distinct processes called I, II and III respectively. From past experience, it is ascertained that wastage is incurred in each process as under:

Process I	2%
Process II	5%
Process III	10%

In each case, the percentage of wastage is computed on the number of units entering the process concerned. The wastage of each process possesses a scrap value. The wastage of process I and II is sold at ₹ 5 per 100 units and that of process III at ₹ 20 per 100 units. The following information is obtained for the month March, 2008:

20,000 units of crude material were introduced in process I at the cost of ₹ 8,000.

	Process I	Process II	Process III
Materials consumed	4,000	1,500	1,000
Direct labour	6,000	4,000	3,000
Expenses	1,000	500	1,500
Output (in unit)	10,500	10,250	15,000

Prepare process accounts.

Solution:

Process Account I

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Materials	20,000	8,000	By Normal wastage	400	20
To Introduced materials		4,000	By Abnormal wastage	100	97
To Direct labour		6,000	By Output transferred to process II @ ₹ 0.97 per unit	19,500	18,883
To Expenses		1,000			
	20,000	19,000		20,000	19,000

Process Account II

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process I a/c	19,500	18,883	By Normal wastage	975	48
To Materials		1,500	By Output transferred to process III @ ₹ 1.34 per unit	19,250	25,807
To Direct labour		4,000			
To Expenses		500			
To Abnormal gain	725	972			
	20,225	25,855		20,225	25,855

Process Account III

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process II a/c	19,250	25,807	By Normal wastage	1,925	385
To Materials		1,000	By Abnormal wastage	1,425	2,543
To Direct labour		3,000	By Output transferred to Finished stock Account (at ₹ 1.78 per unit)	15,900	28,379
To Expenses		1,500			
	19,250	31,307		19,250	31,307

Example: The product of a factory is passed through three processes of manufacture. The output of each process is transferred to the next process at cost on completion. The stocks which consist of raw materials are to be valued at cost per unit of the preceding process

From the following particulars, prepare process cost account showing the cost of the output and the cost per unit at each stage of production.

	Processes		
	I (₹)	II (₹)	III (₹)
Direct wages	6,400	12,000	29,250
Machine expenses	3,600	3,000	3,600
Factory on cost	2,000	2,250	2,400
Raw materials consumed	24,000	--	--
Production (Gross) in units	37,000	--	--
Wastage in units	1,000	1,500	500
Stock 1 st June, 2007 (in units)	--	4,000	16,500
Stock 30 th June, 2007 (in units)	--	1,000	5,500

Solution:

Process Account I

Particulars	Units ()	Amount (₹)	Particulars	Units ()	Amount (₹)
To Raw materials	37,000	24,000	By Wastage	1,000	
To Direct wages		6,400	By Transfer to process II (cost ₹ 1 per unit)	36,000	36,000
To Machine expenses		3,600			
To Factory on cost		2,000			
	37,000	36,000		37,000	36,000

Process Account II

Particulars	Units ()	Amount (₹)	Particulars	Units ()	Amount (₹)
To Transferred from Process I	36,000	36,000	By Wastage	1,500	
To Stock 1 st June 2007	4,000	4,000	By Transfer to Process III (₹ 1.50 per unit)	37,500	56,250

Contd...

To Direct wages		12,000	By Stock on 30 June 2007 (@ ₹ 1 per unit)	1,000	1,000
To Machine expenses		3,000			
To Factory on cost		2,250			
	40,000	57,250		40,000	57,250

Process Account III

Particulars	Units (')	Amount (')	Particulars	Units (')	Amount (')
To Stock 1 st June 2007	16,500	24,750	By Wastage	500	
To Transferred from Process II	37,500	56,250	By Stock on 30 th June 2007 (@ ₹ 1.50 per unit)	5,500	8,250
To Direct wages		29,250	By Finished goods a/c (cost ₹ 2.25 per unit)	48,000	1,08,000
To Machine expenses		3,600			
To Factory on cost		2,400			
	54,000	1,16,250		54,000	1,16,250

Example: The Products Ltd. manufacture and sell their chemicals produced by consecutive process:

The products of the three processes are as under:

	Process I (%)	Process II (%)	Process III (%)
Transferred to next process	66 $\frac{2}{3}$ %	60%	0
Transferred to warehouse for sale	33 $\frac{1}{3}$ %	40%	100%

In each process, 4% of the total weight is lost and 6% is become scrap, which from process I realises ₹ 3 per tonne, from process II ₹ 5 per tonne and from process III ₹ 6 per tonne. The following particulars relate October, 2005:

Raw materials used.

Process I 1,400 tonnes @ ₹ 10 per tonne

Process II 160 tonnes @ ₹ 16 per tonne

Process III 1,260 tonnes @ ₹ 7 per tonne

Manufacturing wages and expenses:

Process I ₹ 5,152

Process II ₹ 3,140

Process III ₹ 2,895

Prepare process accounts showing the cost per tonne of each product.

Solution:

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Process Costing

Process Account I

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Materials	1,400	14,000	By Loss in weight	56	
To Wages		5,152	By Sale of scrap	84	252
			By Transfer to Warehouse	420	6,300
			By Process II (cost per tonne ₹ 15)	840	12,600
	1,400	19,152		1,400	19,152

Process Account II

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Transferred from process I a/c	840	12,600	By Loss in weight	40	
			By Sale of scrap	60	300
To Materials	160	2,560	By Transfer to Warehouse	360	7,200
To Wages		3,140	By Transfer to Process III (cost per tonne ₹ 20)	540	10,800
	1,000	18,300		1,000	18,300

Process Account III

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Transferred from process II a/c	540	10,800	By Loss in weight	72	
			By Sale of scrap	108	648
To Materials	1,260	8,820	By Cost of production transfer to warehouse (cost per tonne ₹ 13.19)	1,620	21,867
To Wages		2,895			
	1,800	22,515		1,800	22,515

Example: Pramod Limited produces patent materials used in building and in the manufacture of which three processes are involved. The material is produced in three consecutive grades, namely, soft, medium and hard. Figures relating to production for the first six months of 2007 are as follows:

	Process I	Process II	Process III
Raw materials used tonnes	1,000	--	--
Cost of per tonne	200	--	--
Manufacturing wages and expenses	72,500	40,800	10,710
Weight lost	5%	10%	20%
Scrap (sold at ₹ 50 per tonne)	50 tonnes	30 tonnes	51 tonnes

Two-third of process I and one-half of process II are passed to the next process and the balance are sent to the warehouse for sale.

You are required to prepare an account for each process, showing the cost per tonne of each process.

Solution:

Process Account I

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Raw materials	1,000	2,00,000	By Loss in weight (5%)	50	
To Manufacturing wages		72,500	By Sale of scrap	50	2,500
			By Process II (cost of per tonne ₹ 300)	600	1,80,000
			By Warehouse transfer	300	90,000
	1,000	2,72,500		1,000	2,72,500

Process Account II

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Process I a/c	600	1,80,000	By Loss in weight (10%)	60	
To Manufacturing wages		40,800	By Sale of scrap	30	1,500
			By Process III (cost of per tonne ₹ 430)	255	1,09,650
			By Warehouse transfer	255	1,09,650
	600	2,20,800		600	2,20,800

Process Account III

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Process II a/c	255	1,09,650	By Weight lost (20%)	51	
To Manufacturing wages		10,710	By Sale of scrap	51	2,550
			By Cost of Production (@ ₹ 770 per tonne)	153	1,17,810
			By Warehouse transfer	255	1,09,650
	255	1,20,360		255	1,20,360

10.6 OIL REFINERY PROCESSES

Oil refineries normally adopt three processes:

- Crushing Process,
 - Refining Process, and
 - Finishing Process.
- (a) **Crushing Process:** In crushing process raw material i.e. oil seeds or coconut or copra etc. are used. Other expenses of the process are debited. Sale of bags or sacks is credited. Oil cakes or oil residue are sold as a by-product. The output of

crude oil is transferred as input in the next process. There may be loss in weight in the process.

- (b) **Refining Process:** Crude oil from Crushing Process is debited. Other materials, wages and overheads of the process are debited. Loss-in-weight, if any in this process, is credited. The output of process is refined oil. Fats and residual oil may be obtained as by-products which are credited. The output being refined oil is transferred to the Finishing Process.
- (c) **Finishing Process:** Refined oil obtained from Refining Process is debited. Other materials, wages and overheads of the process are also debited. Sale of by-product and loss-in-weight are credited. The balance of this process is credited as cost of production of refined oil. Cost of drums or tins for storage of refined oil is also debited to find out cost of stored finished oil.

Example: The following details are extracted from the costing records of an oil mill for the year ended 31st March, 2007:

Purchases of 500 tonnes of copra ₹ 2,00,000

	Crushing (₹)	Refining (₹)	Finishing (₹)
Cost of labour	2,500	1,000	1,500
Electric power	600	360	240
Sundry materials	100	2,000	-
Repairs to machinery	280	330	140
Steam	600	450	450
Factory expenses	1,320	660	220

Cost of casks ₹ 7,500

300 tonnes of crude oil were produced

250 tonnes of oil were produced from the refining process

248 tonnes of refined oil was finished for delivery

Copra sacks sold ₹ 400

175 tonnes of copra residue sold ₹ 11,000

Loss-in-weight in crushing 25 tonnes

45 tonnes of by-products obtained from refining process ₹ 6,750

You are required to show the account in respect of each of the following stages of manufacture for the purpose of arriving at the cost per tonne of each process and the total cost per tonne of finished oil:

- (a) Copra crushing process,
 (b) Refining process, and
 (c) Finishing process including casking.

Solution:

Copra Crushing Process

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Copra used	500	2,00,000	By Sale of copra stocks		400
To Labour		2,500	By Sale of copra residue	175	11,000
To Electric power		600	By Loss in weight	25	
To Sundry materials		100	By Cost of crude oil (cost per tonne 646.66)	300	1,94,000
To Repairs to machinery		280			
To Steam		600			
To Factory expenses		1,320			
	500	2,05,400		500	2,05,400

Refining Process

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Crude oil	300	1,94,000	By By-products	45	6,750
To Labour		1,000	By Loss in weight	5	
To Electric power		360	By Cost refined oil products (cost per tonne 768.20)	250	1,92,050
To Sundry materials		2,000			
To Repairs to machinery		330			
To Steam		450			
To Factory expenses		660			
	300	1,98,800		300	1,98,800

Finishing Process

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Refined oil	250	1,92,050	By Loss in weight	2	
To Labour		1,500	By Cost of finished oil produced (cost per tonne 788.20)	248	1,94,600
To Electric power		240			
To Repairs to machinery		140			
To Steam		450			
To Factory expenses		220			
	250	1,94,600		250	1,94,600
To Finished Oil	248	1,94,600	By Cost of oil (Cost of per tonne 814.93)	248	2,02,100
To Cost of casks		7,500			
	248	2,02,100		248	2,02,100

Example: The following particulars are extracted from the books of the JK Oil Company for the week ending 7th March 2005:

Kernels consumed 100 tonnes ₹ 45,000.

	Crushing (₹)	Refining (₹)	Finishing (₹)
Wages	1,600	1,180	1,175
Power and steam	240	200	300
Repairs and stores	80	—	—
Rent and taxes	100	150	120
Sundry works expenses	40	50	70

Office expense	690
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Sundry materials for refining 380

Barrels for storing finished oil	4,205
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Cake sales 40 tonnes for ₹ 3,000, crude oil obtained 55 tonnes, sundry bags sold ₹ 180, residual oil and fats sold for 180 (4 tonnes), refined oil 50 tonnes, finished oil stored in barrels 48 tonnes, and 2 tonnes sundry sales realised ₹ 220. Office expenses are to be apportioned in ₹ 260, ₹ 280 and ₹ 150 to the three processes in order. You are asked to prepare a crushing account, refining account and finishing account.

Solution:

Crushing Process Account

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Cost of kernels	100	45,000	By Cake sales	40	3,000
To Wages		1,600	By Sundry sales		180
To Power and steam		240	By Loss in weight	5	
To Repairs and stores		80	By Transfer of crude oil to refining process	55	44,140
To Rent and taxes		100			
To Sundry works expenses		40			
To Office on cost		260			
	100	47,320		100	47,320

Refining Process Account

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Crushing process	55	44,100	By Sundry sales	4	180
To Sundry materials		380	By Loss in weight	1	
To Wages		1,180	By Cost of refined oil transferred to Finishing process	50	46,200
To Power and steam		200			
To Rent and taxes		150			
To Sundry works expenses		50			
To Office on cost		280			
	55	46,380		55	46,380

Finishing Process Account

Particulars	Tonnes	Amount (₹)	Particulars	Tonnes	Amount (₹)
To Refining process	50	46,200	By Sundry sales	2	220
To Wages		1,175	By Cost of Finishing	48	52,000
To Barrels		4,205			
To Power and steam		300			
To Rent and taxes		120			
To Sundry works expenses		70			
To Office on cost		150			
	50	52,220		50	52,220

10.7 JOINT PRODUCTS AND BY-PRODUCTS

According to Shukla, Grewal and Gupta, "Joint products represent two or more products separated in the course of the same processing operations, usually requiring further processing, and each product being in such proportion that no single product can be designated as a major product". By-products have been defined as "any saleable or usual value incidentally produced in addition to the main product". Thus the main difference between by-products and joint product is that in case of the former, generally no extra expense is to be incurred, whereas in the case of the latter additional expenditure will be necessary before the products can be sold.

10.7.1 Costing of Joint Products

Costing for joint products implies the assignment of a portion of the joint cost to each of the joint product. Unless the joint costs are properly and reasonably apportioned to different joint products produced, the cost of joint products will vary considerably and this will affect valuation of inventory, pricing of products and profit or loss on sale of different products. Therefore, the basic problem in respect of joint products is that of apportioning the joint cost. Various authors have suggested various methods of joint products.

The brief description of these methods is as follows:

- Average Unit Cost Method:** It is most simple method. The total costs are assessed, yielding an average unit cost with one net profit for the total operation. This method can be applied where processes are common and inseparable for the joint products and where the resultant products can be expressed in same common unit. This means that all joint products have the same unit cost and, therefore, if price fixing is based on cost of various products which may be of different grades or quality will be sold at the same unit price, resulting in a customer's price advantage in grades. Moreover, where the end products cannot be expressed in some common unit, this method breaks down.
- Physical Unit Method:** Under this method, a physical base such as raw materials weight, linear measure volume, etc., is applied in apportion pre-separation point costs to joint products. This method presupposes that each joint product is equally valuable, which is probably not the case in practice.
- Survey Method:** Under this method, all the important factors such as volume, selling price, technical aspects, marketing process, etc., affecting costs are ascertained by means of extensive survey. The values or percentages of point are

given to individual products according to their relative importance and costs are apportioned on the basis of total points. These ratios should be revised from time to time depending upon the factors affecting production and sales.

- (d) **Market Value Method:** This method of apportioning joint costs to products on the basis of relative value is the most popular and convenient method. The joint costs are split in the ratio of selling price of individual products.

10.7.2 Costing of By-products

By-products are relatively considered less important. For example, molasses obtained from production of sugar or ash available when boilers are run would be by-products.

Accounting Treatment when By-products have Market Value

If the by-products have relatively unimportant market value, it is neither feasible nor practicable to attempt to apportion to the by-products any part of the joint costs of production up to the point of split off. The possible treatments in this condition may be as follows:

- All income received from the sale of by-products may be considered as income and credited to the Profit and Loss Account. The major product bears the whole cost of production and its sales are considered while determining operating income.
- The sale proceeds of by-products may be credited to the account of main product and thus it can be deducted from the cost of production of main product.
- The income realised from the sale of by-products is reduced by the selling costs incurred on the sale and manufacturing costs applied to the by-products after they achieve a separate existence. The remaining amount is deducted from the cost of production of the major product.

10.7.3 Accounting Treatment When By-products Need Further Processing

In this case, obviously the by-product is of some importance and it would be necessary to determine the cost of by-product at the point it is separated from the main product. This cost should be determined on the basis of physical measurement or the market value at the separation point. After having ascertained the share of joint costs on the by-product, it will be necessary to have a separate account for it in which the expenses for further processing will be charged. The total of this account will be the cost of raw materials for the other products.

Example: A particular brand of cough syrup passed through three processes for production. During the month ended August, 2007, 600 gross of bottles were produced. The following information is obtained.

	Processes		
	I (₹)	II (₹)	III (₹)
Materials	4,000	2,000	1,500
Labour	3,000	2,500	2,500
Direct expenses	600	200	500
Cost of bottles	--	2,030	--
Cost of casks and spoons	--	--	325

The indirect expenses were ₹ 1,600 to be apportioned as ₹ 600 in I process, ₹ 500 in II process and ₹ 500 in III process. The by-products were sold for ₹ 240 in process II and the residue sold ₹ 125 in process III.

Prepare process accounts.

Solution:

Process Account I

Particulars	Qty.	Amount (₹)	Particulars	Qty.	Amount (₹)
To Materials	600	4,000	By Transfer to Process II (Cost of per bottle ₹ 13.67)	600	8,200
To Labour		3,000			
To Direct expenses		600			
To Indirect expenses		600			
	600	8,200		600	8,200

Process Account II

Particulars	Qty.	Amount (₹)	Particulars	Qty.	Amount (₹)
To Process I a/c	600	8,200	By By-product sold		240
To Material		2,000	By Transfer to Process III @ ₹ 25.32	600	15,190
To Labour		2,500			
To Direct expenses		200			
To Indirect expenses		500			
To Cost of bottles		2,030			
	600	15,430		600	15,430

Process Account III

Particulars	Qty.	Amount (₹)	Particulars	Qty.	Amount (₹)
To Process II a/c	600	15,190	By Residue sold		125
To Materials		1,500	By Finished goods a/c @ ₹ 33.98	600	20,390
To Labour		2,500			
To Direct expenses		500			
To Indirect expenses		500			
To Cost of casks and spoons		325			
	600	20,515		600	20,515

Example: From the following information, find out the cost of X and Y the latter being by the product on whose sale a profit of 20% on selling price is obtained usually.

	Joint Expenditure (₹)	Separate Expenditure	
		X (₹)	Y (₹)
Materials	9,000	2,000	1,000
Labour	4,000	800	300
Other expenses	2,000	1,000	400

Total amount realised by sale of Y is ₹ 1,100.

Solution:

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Process Costing

Joint Expenses Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Materials	9,000	By X's Production a/c	13,900
To Labour	4,000	By Y's Production a/c	1,100
To Other expenses	2,000		
	15,000		15,000

X's Production Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Joint expenses a/c	13,900	By Cost of production	17,700
To Materials	2,000		
To Labour	800		
To Other expenses	1,000		
	17,700		17,700

Y's Production Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Joint expenses a/c	1,100	By Cost of production	2,800
To Materials	1,000		
To Labour	300		
To Other expenses	400		
	2,800		2,800

Check Your Progress

Fill in the blanks:

- _____ costing represents a type of cost procedure for continuous production industries.
- Wastage may have _____ reusable value.
- Where value of scrap is negligible, it may be _____ from costs.
- The cost of abnormal spoilage is charged to costing _____ account.
- If the quantum of wastage is less than the predetermined percentage of normal wastage, the difference is called as _____.
- Refined oil obtained from Refining Process is _____.

10.8 LET US SUM UP

- Process costing is a type of operation costing which is used to ascertain the cost of a product at each process or stage of manufacture. CIMA defines process costing as "the costing method applicable where goods or services result from a sequence of continuous or repetitive operations or processes. Costs are averaged over the units produced during the period". Process costing is suitable for industries producing homogeneous products and where production is a continuous flow. A process can be referred to as the sub-unit of an organisation specifically defined for cost collection purpose.

- The basic principles of process costing are that the cost of material, wages and overheads expenses is collected for each process or operation in a period. Adequate records in respect of output and scrap of each process or operation during the period are kept, the cost per unit of each process is obtained by dividing the total cost incurred during a period by the number of units produced during that period after taking into consideration the losses and amount realized from sale of scrap and the finished product of one process is transferred as a raw material to the next process.
- If the products are produced by different processes, cost of previous process is transferred to the next process, so that total and unit cost of products are accumulated. In short, cost of products will comprise all costs incurred in all the processes up to finished stage. There is no departure from the principles regarding direct and indirect expenditures.
- Normal loss is the amount of loss which is unavoidable because of the nature of raw materials or the production technique and is inherent in the normal course of production e.g., loss of weight because of evaporation or melting, etc. Such wastage may also take place while stamping product components out of a big metal sheet. Any wastage exceeding the normal percentage is termed abnormal loss or wastage. Such loss or wastage is not a part of production. It is credited out of the concerned process account as a loss to the costing profit and loss account.
- Costing for joint products implies the assignment of a portion of the joint cost to each of the joint products. Unless the joint costs are properly and reasonably apportioned to different joint products produced, the cost of joint products will vary considerably and this will affect valuation of inventory, pricing of products and profit or loss on sale of different products. By-products are relatively considered less important. For example, molasses obtained from production of sugar or ash available when boilers are run would be by-products.

10.9 UNIT END ACTIVITY

Give illustration and explain process costing in detail.

10.10 KEYWORDS

Costing P&L A/c: It is an account normally records the loss or gain out of the manufacturing process.

Public Utility Service: A business that furnishes an everyday necessity to the public at large.

Manufacturing Industry: It is a branch of manufacture and trade based on the fabrication, processing or preparation of products from raw materials and commodities.

Scrap: One that is left over after the greater part has been used.

Process Costing: It refers to costing of operation(s) or process(es) involved in converting raw materials into finished goods or products. Its main objective is to provide an average cost of product.

Normal Loss/Wastage: This is the amount of loss which is unavoidable because of the nature of raw materials or the production technique and is inherent in the normal course of production.

Abnormal Gain: If the quantum of wastage is less than the predetermined percentage of normal wastage, the difference is called as abnormal gain or effective.

Joint Products: Joint products represent two or more products separated in the course of the same processing operations, usually requiring further processing, and each product being in such proportion that no single product can be designated as a major product.

By-products: By-products have been defined as Any saleable or usual value incidentally produced in addition to the main product.

10.11 QUESTIONS FOR DISCUSSION

1. Define process costing and explain its working procedure.
2. Write short notes on abnormal gain or abnormal effective in process costing.
3. Discuss the process costing and explain its objectives.
4. Explain the treatment of by-product in process costing.
5. Define joint products, by-products and give example of each.
6. What are the various methods of accounting for by-products? Briefly explain each of the methods.
7. What do you mean by inter-process profit? Discuss its procedure.
8. A product passes through Process A, Process B and Process C. From the under mentioned figures, prepare process accounts concerned indicating the cost of each process and the cost per article produced. The production was 480 units per month.

	Process A (₹)	Process B (₹)	Process C (₹)
Direct materials	30,000	10,000	4,000
Direct labour	16,000	40,000	12,000
Expenses	5,200	14,400	5,000

Indirect expenses amounted to ₹ 17,000, which should be apportioned on the basis of direct labour. Ignore stocks in hand and work-in-progress at beginning and end of the month.

9. An article has to undergo three different processes before it becomes ready for sale. From the following information, find out the cost of production of that article, if 200 articles were manufactured up to 31st July, 2007:

Expenses of 200 articles

	Manufacturing process (₹)	Refining Process (₹)	Finishing process (₹)
Direct materials	2,000	1,000	750
Direct wages	1,500	2,500	1,000
Direct expenses	400	200	300

The indirect expenses for the period amount to ₹ 6,000 in the factory out of which ₹ 2,000 is attributable to this product. There was no stock at the end in any process. The indirect expenses should be allocated to each process on the basis of direct wages.

10. Distinguish between process costing and job costing.
11. How would you account for wastage in the cost of production? Define normal wastage and abnormal effective and distinguish between them.

Check Your Progress: Model Answer

1. Process
2. Lower
3. Excluded
4. Profit and loss
5. Abnormal gain or effective
6. Debited

10.12 REFERENCES/SUGGESTED READINGS

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UNIT 11

RECONCILIATION OF COST AND FINANCIAL ACCOUNTS

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- 11.0 Aims and Objectives
- 11.1 Introduction
- 11.2 Need for Reconciliation
- 11.3 Reasons for Differences in Profit
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- 11.8 Questions for Discussion
- 11.9 Reference / Suggested Readings

11.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Understand the need for reconciliation
- State the reasons for differences in profits
- Describe the method or procedure of reconciliation
- Make reconciliation between two profits

11.1 INTRODUCTION

When cost accounts and financial accounts are separately maintained in two different sets of books, two profit and loss accounts will be prepared – one for costing books and second for financial books. The profit or losses shown by the cost accounts may not agree with the profit or loss shown by financial accounts or books. Therefore, it becomes necessary that profit or loss shown by the two sets of accounts is reconciled. According to Wheldon, "No system is complete unless it is linked up with the financial accounting, that results shown by both cost and financial accounting may be reconciled." In the words of Eric L. Kohler, "Reconciliation is the determination of the items necessary to bring the balances of two or more related accounts or statements, into agreement." It is important to note that the question of reconciliation of cost and financial accounts arises only under non-integral system. However, under the integral accounts, since cost accounts and financial accounts are integrated into

one set of books and only one profit and loss account is prepared, the problem of reconciliation does not arise.

In this lesson, we will study the need for reconciliation and reasons for difference in profits. At the end of the lesson, we will study the problems on preparation of reconciliation statements including memorandum reconciliation account.

11.2 NEED FOR RECONCILIATION

The need for reconciliation arises due to the following reasons:

- (i) To find out the reasons for the difference in the profit or loss in cost and financial accounts,
- (ii) To ensure the mathematical accuracy and reliability of cost accounts in order to have cost ascertainment, cost control and to have a check on the financial accounts,
- (iii) Reconciliation helps in formulation of various policies regarding overheads, depreciation and valuation of stock, and
- (iv) It promotes co-ordination and co-operation between departments of cost accounts and financial accounts.

11.3 REASONS FOR DIFFERENCES IN PROFIT

Differences in profit or loss between cost and financial accounts may arise due to the following reasons:

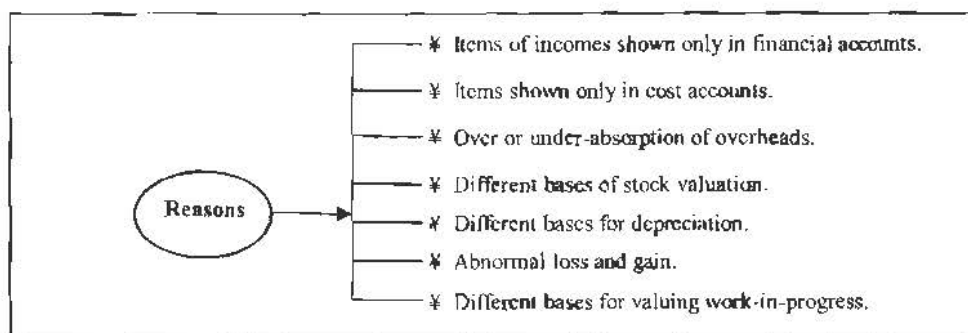


Figure 11.1: Reasons for Differences in Profit

1. **Items of Incomes Shown Only in Financial Accounts:** There are a number of items which are included in financial accounts but find no place in cost accounts. While reconciling any items under this category must be considered. Such items are classified into three categories as under:
 - (i) **Purely Financial Charges.** Under this category, the following charges or examples are considered:
 - (a) Loss on investments
 - (b) Discount on debentures and bonds
 - (c) Loss on the sale of capital assets
 - (d) Expenses of the company's share transfer office
 - (e) Interest on bank loan and mortgages
 - (f) Capital expenditure

- (g) Commission to partners and managing agents
 - (h) Damages payable at law
 - (i) Fines and penalties
 - (j) Goodwill written off, preliminary expenses
 - (k) Loss due to theft, fire, accident, etc.
 - (l) Debit balance of profit and loss account written off
 - (m) Excess provision for depreciation
 - (n) Commission on issue of shares and debentures
 - (o) Cash discount allowed
- (ii) *Purely Financial Incomes:* Under this category, the following items of income are included:
- (a) Rent receivable
 - (b) Transfer fees received
 - (c) Dividend and interest received on investments
 - (d) Profits on the sale of fixed assets
 - (e) Interest received on bank deposits
 - (f) Income tax refund
 - (g) Commission received
 - (h) Cash discount received
 - (i) Brokerage received
 - (j) Damages received
- (iii) *Appropriations of Profit:* Under this category, the following items are included:
- (a) Donations and charities
 - (b) Income tax
 - (c) Dividend paid
 - (d) Transfers to reserves and sinking funds
 - (e) Any other items which appear in profit and loss appropriation account
2. **Items Shown Only in Cost Accounts:** There are certain items which are included in cost accounts but not in financial accounts. Following are the examples of such items:
- (a) National depreciation on assets fully depreciated in the books
 - (b) National rent of the owned building and no rent is payable
 - (c) Interest on capital employed but not actually paid
 - (d) National salaries
3. **Over or Under-absorption of Overheads:** Overheads absorbed in cost accounts on the basis of estimation like percentage on direct materials, percentage on direct wages, etc. may be more or less than the actual amount incurred. If overheads are not fully absorbed, i.e. the amount in cost accounts is less than the actual amount,

the shortfall is called under-absorption. On the other hand, if overhead expenses in cost accounts are more than the actual, it is called over-absorption. Thus, under or over-absorption of overheads leads to difference in two accounts. Sometimes, selling and distribution expenses are ignored in cost accounts and as such costing profit will be higher and thus requires reconciliation.

4. **Different Bases of Stock Valuation:** In cost accounting, stocks are valued according to the method adopted in stores accounts *i.e.*, FIFO, LIFO, etc. On the other hand, valuation of stock in financial accounts is invariably based on the cost or market price, whichever is less. Different stock values result in some difference in profit or loss shown by the two sets of account books.
5. **Different Bases for Depreciation:** In cost accounts, the assets may be depreciated on the straight line method, whereas in financial accounts, a different method of depreciation such as reducing balance method or sinking policy method or a different method is followed. The difference in the method of depreciation followed in these systems of accounts results in a difference of profit.
6. **Abnormal Loss and Gain:** Abnormal losses and abnormal gains are completely kept separate from cost accounts or they are transferred to costing profit and loss account. If they are not included in cost accounts then the profit shown by these two sets of book will vary and adjustment for which has to be done. If these losses are transferred to costing profit and loss account then the profit will tally with the profit as shown by financial accounts. These losses are like theft, loss by fire, idle time loss, etc.
7. **Different Bases for Valuing Work-in-progress:** Work-in-progress is valued either at the stage of prime cost, works cost or cost of production. In cost accounts, the basis followed may be quite different than that followed in financial accounts. This difference in the method of valuing work-in-progress gives rise to preparation of reconciliation statement.

11.4 METHOD OR PROCEDURE OF RECONCILIATION

The cost and financial accounts are reconciled by preparing a Reconciliation Statement or a Memorandum Reconciliation Account.

11.4.1 Reconciliation Statement

Reconciliation statement is a popular and important method of cost accounts and financial accounts.

The following method or procedure is recommended for preparing a Reconciliation Statement:

- (i) Ascertain the reasons/points of difference between cost accounts and financial accounts.
- (ii) Start with the profit as shown by the cost accounts.
- (iii) (a) Regarding items of expenses and losses:

Add: Items over-charged in cost accounts.

Less: Items under-charged in cost accounts.

For example, depreciation in cost accounts is ₹ 3,000 and that in financial accounts is ₹ 3,400. This has the effect of increasing costing profit by ₹ 400 as compared to financial profit. Then in order to reconcile, ₹ 400 will be deducted from costing profit.

(b) Regarding items of income:

Add: Items under-recorded in cost accounts.

Less: Items over-recorded in cost accounts.

For example, interest on investments received amounting to ₹ 3,000 is not recorded in cost accounts. This will have the effect of reducing profit by ₹ 3,000, then in order to reconcile, this amount of ₹ 3,000 for interest should be added in the costing profit.

(c) Regarding stock valuation:

Opening stock

Add: Overvaluation in cost accounts.

Less: Undervaluation in cost accounts.

Closing stock

Add: Undervaluation in cost accounts.

Less: Overvaluation in cost accounts.

(iv) The above treatment of items will be reversed when the starting point in the reconciliation statement is the profit as per financial accounts or loss as per cost accounts.

(v) After making all the above additions and deductions in costing profit, the resulting figure shall be the profit as per financial books.

(vi) At some places, Memorandum Reconciliation Account is prepared in place of Reconciliation Statement.

(vii) The following formula for easy reconciliation (with cost profit):

(a) *For Expenses items:* Add the excess, deduct the shortage.

(b) *For Income items:* Add the shortage, deduct the excess

The following is the proforma of a reconciliation statement:

**Proforma of Reconciliation Statement
For the year ending**

Particulars	Amount (₹) (+)	Amount (₹) (-)
Profit as per Cost Accounts		..
Add : (i) Expenses over-charged in cost account	...	
(ii) Income not included in cost account	...	
(iii) Overvaluation of opening stock in cost account	...	
(iv) Undervaluation of closing stock in cost account	...	
(v) Expenses recorded in cost account but not charged in financial account	...	
(vi) Income recorded in financial books but not recorded in cost books	...	
(vii) Items credited in financial books but not recorded in cost books	...	
(viii) Depreciation over-charged in cost account	...	

Contd.

Less : (i) Expenses under-charged in cost account		
(ii) Expenses not charged in cost account	...	
(iii) Undervaluation of opening stock in cost account	...	
(iv) Overvaluation of closing stock in cost account	...	
(v) Expenses not recorded in cost books but recorded in financial books	...	
(vi) Items debited in financial books but not recorded in cost books
Profit as per Financial Accounts		...

11.4.2 Memorandum Reconciliation Account

This account is presented in debit and credit form but it is not a part of double entry system of book-keeping. So it is kept as a memorandum account only.

The procedure of its preparation is similar to that of reconciliation statement, the only difference is that items shown under Dr column are shown on the credit side and items shown under Cr column are shown on the debit side of the memorandum reconciliation account.

The following is the proforma of memorandum reconciliation account:

Memorandum Reconciliation Account

As on

Particulars	()	Particulars	()
To Expenses not recorded in cost accounts	...	By Profits as per cost accounts	..
To Overheads under-absorbed in cost accounts	...	By Incomes not recorded in cost accounts	...
To Undervaluation of opening stock in cost accounts	...	By Expenses not recorded in profit and loss account	...
To Overvaluation of closing stock in cost accounts	...	By Overheads over-absorbed in cost accounts	...
To Profits as per profit and loss accounts	...	By Overvaluation of opening stock in cost accounts	...
		By Undervaluation of closing stock in cost accounts	..

Example: The cost books of a company show a profit of ₹ 50,000 while the net profit as per financial books is ₹ 29,500. On the basis of the following information, prepare a statement reconciling the two profits for the year ended on 31st March, 2007.

Particulars	Cost Books (₹)	Financial Books (₹)
Factory expenses	20,000	22,000
Office expenses	12,000	10,000
Selling and distribution expenses	8,000	7,000
Dividend received	--	5,000
Loss on sale of furniture	--	1,500
Income-tax	--	10,000
Goodwill written-off	--	5,000
Interest on capital	--	10,000

Solution:

Reconciliation Statement
For the year ended on 31st March, 2007

Particulars	Amount (₹)
Profit as per cost account	50,000
Add : Office expenses over-charged in cost books	2,000
Selling and distribution expenses over-charged in cost books	1,000
Dividend received not recorded in cost books	5,000
	8,000
	58,000
Less : Factory expenses under-charged in cost accounts	2,000
Loss on sale of furniture not recorded in cost accounts	1,500
Income tax not charged in cost books	10,000
Goodwill written-off not charged in cost books	5,000
Interest on capital not charged in cost accounts	10,000
	28,500
Profit as per Financial Accounts	29,500

Example: Following is the trading and profit and loss account of Jain Traders for the year ended on 31st March, 2009:

Particulars		Particulars	
To Material consumed	12,000	By Sale (350 units)	70,000
To Wages	4,000	By Finished stock (50 units)	3,500
To Factory expenses	12,000	By Interest received	1,500
To Administrative expenses	12,000		
To Goodwill written-off	4,000		
To Discount of debentures written-off	3,000		
To Net profit	28,000		
	75,000		75,000

The company's cost records show that:

- Factory overheads have been recovered at 100% on prime cost.
- Administrative overheads have been recovered at 25% of factory cost.

Prepare:

- A statement of cost indicating net profit, and
- A statement reconciling the profit as disclosed by cost accounts and that shown in financial accounts.

Solution:

Statement of Cost and Profit

Particulars	Amount (₹)
Material consumed	12,000
Wages	4,000
Prime Cost	16,000
Factory overheads (100% of prime cost)	16,000
Factory Cost	32,000
Administrative overheads (25% of factory cost)	8,000

Contd...

Cost of Production	40,000
Less : Closing finished stock (40,000 x 50) ÷ 400 ⁽¹⁾	5,000 ⁽²⁾
Cost of Goods Sold	35,000
Profit (70,000 ÷ 35,000)	35,000
Sales	70,000

Reconciliation Statement
For the year ended on 31st March, 2009

Particulars	Amount (₹)	Amount (₹)
Profit as per cost accounts	35,000	..
Add : Over-absorption of factory overheads in cost accounts	4,000	..
Interest received excluded from cost accounts	1,500	..
Less : Administration overheads under-recovered in cost accounts	—	4,000
Goodwill written off excluded from cost accounts	..	4,000
Discount on debentures excluded from cost accounts	..	3,000
Finished stock over-valued in cost accounts	..	1,500
	40,500	12,500
Profit as per Financial Accounts	—	28,000 ⁽³⁾
	40,500	40,500

Working notes:

- Number of units produced = Number of units sold + Units of closing stock
= 350 + 50 = 400 units
- In cost accounts, closing stock is valued at cost of production, i.e. value of closing stock:

$$= \frac{\text{Cost of production}}{\text{Number of units produced}} \times \text{Units in closing stock}$$

$$= \frac{40,000}{50} \times 50 = ₹ 5,000$$

- Profit as per financial accounts = 40,500 ÷ 12,500 = 28,000

Example: The net profit of ABC Manufacturing Company for the year ended 31st March, 2007 was ₹ 5,15,020 as shown by financial books. The cost accounts disclosed a profit of ₹ 6,89,600 for the same period. The following details are discovered:

Loss due to depreciation in stock value charged in financial accounts only	₹ 27,000
Bank interest and dividend received	₹ 4,900
Works overhead under recovered in cost account	₹ 12,480
Depreciation charged in financial accounts	₹ 44,800
Depreciation recovered in cost accounts	₹ 50,000
Interest on investments	₹ 32,000
Obsolescence loss charged in financial accounts	₹ 22,800
Administrative overhead recovered in excess in cost accounts	₹ 6,800
Income tax paid	₹ 1,61,200

Prepare a statement reconciling the profits shown in both the books.

Solution:

**Reconciliation Statement
For the year ended on 31st March, 2007**

Particulars	Amount (₹)
Net profit as per cost accounts	6,89,600
Add: Interest on investments	32,000
Bank interest and dividend received	4,900
Depreciation over recovered in cost accounts (₹ 50,000 - ₹44,800)	5,200
Administrative overhead over recovered	6,800
	7,38,500
Less: Loss due to depreciation in stock value provided in financial accounts only	27,000
Works overhead under recovered	12,480
Obsolescence loss charged in financial accounts	22,800
Income tax provided in financial books	1,61,200
Net Profit as per Financial Accounts	5,15,020

Example: The net profit of Kartik Company Limited appeared at ₹ 60,652 as per financial records for the year ending 31st March, 2008. The cost books, however, showed a net profit of ₹ 86,200 for the same period. A scrutiny of the figures from both the sets of accounts revealed the following facts:

Works overhead under-recovered in costs	₹ 1,560
Administrative overheads over-recovered in costs	₹ 850
Depreciation charged in financial accounts	₹ 5,600
Depreciation recovered in costs	₹ 6,250
Interest on investments not included in costs	₹ 4,000
Loss due to obsolescence charged in financial accounts	₹ 2,850
Income-tax provided in financial accounts	₹ 20,150
Bank interest and transfer fee in financial books	₹ 375
Stores adjustment (credit in financial books)	₹ 237
Value of opening stock in:	
Cost accounts	₹ 24,800
Financial accounts	₹ 26,300
Value of closing stock in:	
Cost accounts	₹ 25,000
Financial accounts	₹ 23,000
Interest charged in cost accounts	₹ 2,000
Goodwill written off	₹ 5,000
Loss on the sale of furniture	₹ 600

Prepare a statement showing the reconciliation between the figure of net profit as per cost accounts and the figure of net profit as shown in the financial books.

Solution:

**Reconciliation Statement
For the year ending 31st March, 2008**

Particulars	Amount (₹)	Amount (₹)
Profit as per cost accounts		86,200
Add: Administration overheads over recovered in cost accounts	850	
Depreciation overcharged in cost books		
Cost books	6,250	
Financial books	5,600	650
Receipts and gains credited in financial books but not shown in cost books:		
Interest on investments	4,000	
Bank interest and transfer fee	375	
Stores adjustments	237	
Interest charged in cost accounts	2,000	8,112
		94,312
Less: Works overhead under-recovered in cost books	1,560	
Expenses and losses debited in financial books but excluded from cash books:		
Income tax	20,150	
Loss due to obsolescence	2,850	
Goodwill written-off	5,000	
Undervaluation of opening stock in cost accounts	1,500	
Overvaluation of closing stock in cost accounts	2,000	
Loss on the sale of furniture	600	33,660
Profit as per Financial Accounts		60,652

Example: From the following particulars, prepare:

- A statement of cost of manufacture for the year, 2013,
- A statement of profit as per cost accounts, and
- Profit and loss accounts in the financial books and show how you would attribute the difference in the profit as shown by (b) and (c).

Opening stock of raw materials	₹ 30,000
Opening stock of finished goods	₹ 60,000
Purchases of raw materials	₹ 1,80,000
Stock of raw materials at the end	₹ 45,000
Stock of finished goods at the end	₹ 15,000
Direct wages	₹ 75,000

Calculate the factory expenses at 25% on prime cost, and office expenses at 75% on factory expenses.

Actual factory expenses amounted to ₹ 58,125 and actual office expenses amounted at ₹ 45,750. The selling price was fixed at a profit of 25% on cost.

Solution:**(a) Statement of Cost of Manufacture for the year 2013**

Particulars	Amount (₹)
Opening stock of raw materials	30,000
Add: Purchases of raw materials	1,80,000
	2,10,000
Less: Closing stock of raw materials	45,000
Cost of raw materials consumed	1,65,000
Direct wages	75,000
Prime Cost	2,40,000
Factory expenses (25% on prime cost)	60,000
Works or Factory Cost	3,00,000
Office expenses (75% on factory expenses)	45,000
Total Cost of Production	3,45,000

(b) Statement of Profit

Particulars	Amount (₹)
Total cost of production	3,45,000
Add: Opening stock of finished goods	60,000
	4,05,000
Less: Closing stock of finished goods	15,000
Cost of Goods Sold	3,90,000
Profit (25% on cost)	97,500
Sales	4,87,500

(c) Profit and Loss Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Opening stock of finished goods	60,000	By Sales	4,87,500
To Raw materials consumed	1,65,000	By Closing stock of finished goods	15,000
To Direct wages	75,000		
To Factory expenses	58,125		
To Office expenses	45,750		
To Net profit	98,625		
	5,02,500		5,02,500

Reconciliation Statement

Particulars	Amount (₹)
Profit as per cost accounts	97,500
Add: Factory expenses overcharged in cost account (₹ 60,000 D 58,125)	1,875
	99,375
Less: Office expenses under charged in cost account (₹ 45,750 D 45,000)	750
Profit as per Financial Accounts	98,625

Check Your Progress

Fill in the blanks:

1. Discount on debentures and bonds is an example of _____.
2. National depreciation on assets fully depreciated in the books is shown in _____ accounts.
3. Valuation of stock in financial accounts is invariably based on the _____ price.
4. If overhead expenses in cost accounts are more than the actual, it is called _____.
5. _____ account is presented in debit and credit form but it is not a part of double entry system of book-keeping.
6. In cost accounts, the _____ may be depreciated on the straight line method.

11.5 LET US SUM UP

- When cost accounts and financial accounts are separately maintained in two different sets of books, two profit and loss accounts will be prepared. One for costing books and second for financial books. The profit or loss shown by the cost accounts may not agree with the profit or loss shown by financial accounts or books. Therefore, it becomes necessary that profit or loss shown by the two sets of accounts is reconciled.
- According to Wheldon, "No system is complete unless it is linked up with the financial accounting, that results shown by both cost and financial accounting may be reconciled." The need for reconciliation arises owing to seek reasons for the difference in the profit or loss in cost and financial accounts.
- There are a number of items which are included in financial accounts but they find no place in cost accounts. While reconciling any items under this category must be considered. Overheads absorbed in cost accounts on the basis of estimation like percentage on direct materials, percentage on direct wages, etc. may be more or less than the actual amount incurred. If overheads are not fully absorbed, i.e. the amount in cost accounts is less than the actual amount, the shortfall is called under-absorption.
- Abnormal losses and abnormal gains are completely kept separate from cost accounts or they are transferred to costing profit and loss account. Work-in-progress is valued either at the stage of prime cost, works cost or cost of production. In cost accounts, the basis followed may be quite different than that followed in financial accounts. This difference in the method of valuing work-in-progress gives rise to preparation of reconciliation statement.
- The procedure of memorandum reconciliation account preparation is similar to that of reconciliation statement. the only difference is that items shown under Dr column are shown on the credit side and items shown under Cr column are shown on the debit side of the memorandum reconciliation account.

11.6 UNIT END ACTIVITY

Critically examine what value do you attach to the reconciliation of cost accounts and financial accounts? Explain the main reasons for the difference in the net profits shown by the two sets of accounts.

11.7 KEYWORDS

Reconciliation: Reconciliation is the determination of the items necessary to bring the balances of two or more related accounts or statements into agreement.

Reconciliation of Cost and Financial Accounts: Reconciliation of cost and financial accounts means tallying the profit or loss revealed by both set of accounts.

Memorandum Reconciliation Account: This account is presented in debit and credit form but it is not a part of double entry system of book-keeping.

Under Absorbed Overheads: If overhead is under absorbed, this means that more actual overhead costs were incurred than expected, with the difference being charged to expense as incurred.

Over Absorbed Overheads: If overhead is over absorbed, this means that fewer actual overhead costs were incurred than expected, so that more cost is applied to cost objects than were actually incurred.

11.8 QUESTIONS FOR DISCUSSION

1. What is the concept of reconciliation statement? What is the need for reconciliation statement?
2. Explain Reasons for difference between cash profit and financial profit.
3. Discuss the causes of difference between costing profits and financial profits.
4. Explain the reconciliation procedure. Under what circumstances, a reconciliation statement can be avoided?
5. Enumerate the items which are generally excluded from cost accounts.
6. What is memorandum reconciliation account?
7. Calculate the amount of profit as per profit and loss account on the basis of the following information:

Profit as per cost account ₹ 16,000

Factory overheads were under-recorded in cost account by ₹ 320

Depreciation charges were over recovered in cost account by ₹ 200

Administrative exp. was under recorded in financial accounts by ₹ 400

Provision for income-tax made in financial books is ₹ 9,600

Goodwill written-off ₹ 250 were not recorded in financial book

Interest received on investment during the year ₹ 300

Transfer fee amounting to ₹ 100 were received during the year in connection with registration of transfer of shares

8. Net profits of Kartik Industries for the year ended on 31st March, 2009 as per cost accounts was ₹ 1,60,000. However, financial records showed a different net profit. Scrutiny of the books of accounts revealed the following information:

Depreciation charged in financial a/c ₹ 18,650

Depreciation charged in cost a/c ₹ 21,250

Interest on investments ₹ 10,000

Income tax provided ₹ 48,000

Works overhead under-recovered in cost a/c	₹ 3,540
Share transfer fees received	₹ 6,750
Loss due to obsolescence	₹ 6,800
Bank interest and transfer fees in financial a/c only as expenditure	₹ 1,250
Prepare a reconciliation statement and show the amount of net profit as per financial accounts.	
9. The net profit of the Mahesh Engineering Company Limited appeared at ₹ 15,194 as per financial records for the year ended on 31 st March, 2008. The cost book, however, showed a profit of ₹ 15,080 for the same period. The difference was due to the following reasons:	
Valuation of work-in-progress (financial books)	₹ 1,920
Valuation of work-in-progress (cost books)	₹ 2,000
Closing stock of finished goods (financial books)	₹ 2,900
Closing stock of finished goods (cost books)	₹ 2,820
Stores adjustment (credit - financial books)	₹ 114
Reconciliation statement.	

Check Your Progress: Model Answer

1. Purely Financial Charges
2. Cost
3. Cost or Market
4. Over-absorption
5. Memorandum Reconciliation
6. Assets

11.9 REFERENCES/SUGGESTED READINGS

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UNIT V

UNIT 12

MARGINAL COSTING

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- 12.18 Reference / Suggested Readings

12.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Define marginal cost and marginal costing
- Understand the meaning of variance analysis

- State the advantages and disadvantages of marginal costing
- Define key factor
- Understand cost-volume-profit analysis
- Apply marginal costing technique to various decision-making areas

12.1 INTRODUCTION

It is one of the premier tools of management not only to take decisions but also to fix an appropriate price and to assess the level of profitability of the products/services. This is the only costing tool demarcates the fixed cost from the variable cost of the product/service in order to guide the firm to know the minimal point of sales to equate the cost of production. It is a tool of analysis highlighting the relationship in between the cost, volume of sales and profitability of the firm. Fixed expenses remain constant in aggregate amount and do not vary with the increase or decrease in production up to a particular level of output or production. Just contrary to this, variable expenses increase or decrease in proportion to increase or decrease in output or production and remain constant per unit of output. Fixed expenses per unit continue to vary with the increase or decrease in production because these expenses remain constant up to a certain level of production.

Thus, fixed overheads lead to different costs per unit at different levels of production. On account of this, a technique known as marginal costing has been developed which excludes fixed overheads entirely from cost of production and gives us the same cost per unit upto particular level of output. Thus, under marginal technique, fixed expenses are not allocated to cost units but are charged against Contribution which arises out of excess of selling price over total variable costs. The technique of marginal costing is related to the concept of marginal cost. Marginal costing is one of the special techniques of costing used for analysis and interpreting cost data for the purpose of assessing the profitability of the products, departments and cost centres.

12.2 CONCEPT OF MARGINAL COST

Marginal cost means the same thing as variable cost. The accountant's concept of marginal cost differs from economists' concept of marginal cost. Economists define marginal cost as the additional cost of producing one additional unit of product. This shall include an element of fixed cost also.

According to **Certified Institute of Management Accountants, London**, "*Marginal cost means the amount at any given volume of output by which aggregate costs are changed if the volume of output is increased or decreased by one unit.*" Marginal cost is also termed as variable cost because within the capacity of the industry or organisation, an increase of one unit in production will cause an increase in variable costs only.

Thus, marginal cost is the amount by which total cost changes when there is a change in output by one unit. To ascertain the marginal cost, we need the following elements of cost:

- Direct materials
- Direct labour or wages
- Direct expenses
- Total variable overheads

That is, $\text{Marginal Cost} = \text{Prime Cost} + \text{Total Variable Overheads}$

Or, $\text{Marginal Cost} = \text{Total Cost} - \text{Fixed Cost}$

An important point is that marginal cost per unit remains unchanged irrespective of the level of activity or output.

12.3 CONCEPT OF MARGINAL COSTING

Batty defines marginal costing as "A technique of cost accounting which pays special attention to the behaviour of costs with changes in the volume of output."

According to **CIMA, London**, "Marginal costing is a technique where only the variable costs are charged to cost units, the fixed attributable being written off in full against the contribution for that period."

The **ICWAI** defines marginal costing as "A method that considers only the variable cost as cost of production, leaving out period costs to be absorbed from the marginal contribution."

In other words, marginal cost is "The cost of any unit of production is the increase in total costs to which the firms become committed by the production of that unit. But, if one part of total costs is fixed, this part will remain unchanged, as output expands—only the variable costs will increase."

In marginal costing, only variable costs are charged to cost units. Variable cost is one which tends to vary directly with the volume of output. Variable cost changes with the increase or decrease in production. In direct costing, variable cost is known as direct costing.

Other terms in use for marginal costing are contributory costing and comparative costing. In the marginal costing, profit is calculated by contribution minus fixed cost.

Marginal costing and direct costing are often treated as interchangeable terms. Profit is measured by deducting fixed costs from the total contribution. Contribution or gross margin is the difference between sales and the marginal cost of sales. Marginal costing assumes that the contribution provides a pool out of which fixed cost is met; any surplus being the profit or net margin. Contribution margin is also termed as marginal income, variable gross margin, profit contribution or contribution to fixed costs.

Marginal cost is the cost nothing but a change occurred in the total cost due to changes taken place on the level of production i.e. either an increase/decrease by one unit of product.

The firm XYZ Ltd incurs ₹ 1000 for the production of 100 units at one level of operation. By increasing only one unit of product i.e. 101 units, the firm's total cost of production amounted ₹ 1010.

Total cost of production at first instance (C_1) = ₹ 1000

Total cost of production at second instance (C_2) = ₹ 1010

Total number of units during the first instance (U_1) = 100

Total number of units during the second instance (U_2) = 101

Increase in the level of production and cost of production:

Change in the level of production in units = $U_2 - U_1 = \Delta U$

Change in the total cost of production = $C_2 - C_1 = \Delta C$

Marginal Cost = $\frac{\text{Change (increase) in the total cost of production}}{\text{Change (increase) in the level of production}}$

$$\frac{\Delta C}{\Delta U} = \frac{10}{1} = ₹ 10$$

If the same firm reduces the total volume from 100 units to 99 units, the total cost of production = 990/-

Decrease in the level of production and cost of production:

$$\begin{aligned}\text{Marginal Cost} &= \frac{\text{Change (increase) in the total cost of production}}{\text{Change (increase) in the level of production}} \\ &= \frac{\Delta C}{\Delta U} = \frac{10}{1}\end{aligned}$$

The following are the important areas of decision-making or applications of marginal costing:

1. Fixation of Price,
2. Decision to Make or Buy,
3. Selection of a Profitable Product Mix,
4. Decision to Accept a Bulk Order, and
5. Closure of a Department or Discontinuing a Product.

Why Marginal Cost is called as Incremental Cost?

From the above example, it is obviously understood that marginal cost is nothing but a cost which incorporates the incremental changes in the cost of production due to either an increase or decrease in the level of production by one unit, meant as incremental cost.

Why Marginal Cost is called in Other Words as Variable Cost?

From the following classifications of cost, the inter-twined relationship in between the variable cost and marginal cost is explained as below:

Table 12.1: Statement of Fixed, Variable and Total Costs per Unit

S. No.	Units	Fixed Cost (₹)	Fixed Cost per unit (₹)	Variable Cost (₹)	Variable Cost per unit (₹)	Marginal Cost (₹) $\Delta C/\Delta U$	Total Cost (₹)
1.	1	500	500	10	10	10	510
2.	50	500	100	500	10	10	1000
3.	100	500	5	1000	10	10	1500
4.	150	500	3.333	1500	10	10	2000

Fixed Cost: It is a cost which remains constant or fixed irrespective of the level of production.

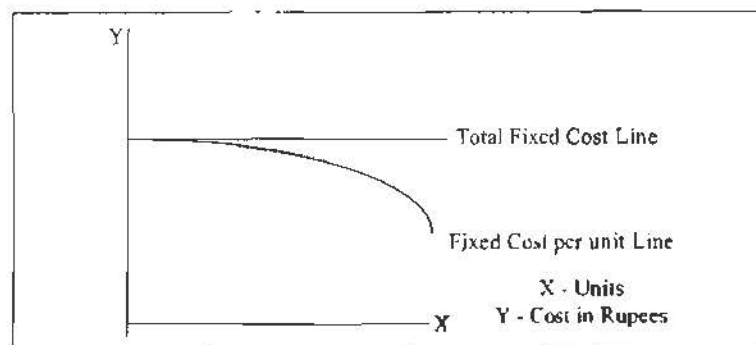


Figure 12.1: Fixed Cost Curve

Variable cost: It is a cost, which varies with level of production.

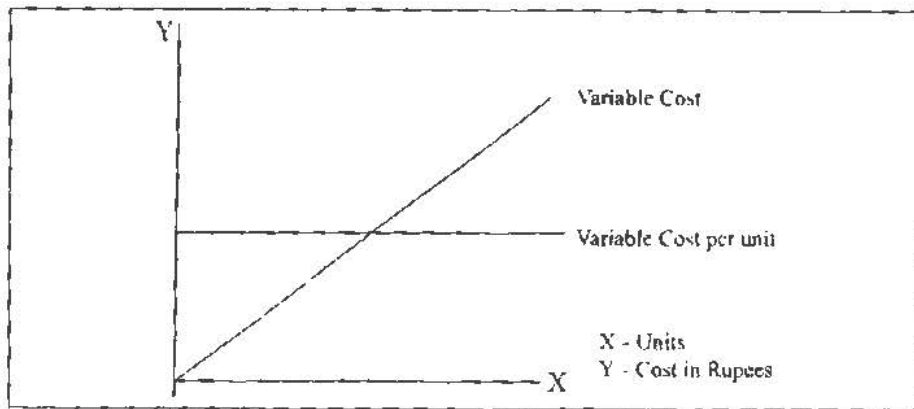


Figure 12.2: Variable Cost Curve

Components of Variable Cost

- **Direct material:** Items such as raw material, standard and specialized parts used for the manufacturing of a product are direct material.
- **Direct labour:** Wages paid to the labourers who directly involved in the production of goods.
- **Direct expenses:** Expenses that are directly related to production or operation.
- **Variable overheads:** The indirect costs of operating a business that fluctuate somewhat with the level of business activity and are incurred even if business activity is minimal.
- **Fixed overhead:** The costs like rent, utilities, basic telephone, loan payments, etc. which remain constant whether sales go up or down.
- **Semi-variable overheads:** One that varies with changes in volume but, unlike a variable cost, does not vary in direct proportion is also called *mixed cost*. In other words, this cost contains both a variable and fixed components.

12.4 FEATURES OF MARGINAL COSTING

The main features of marginal costing may be expressed in the following ways:

1. In marginal costing, a differentiation is made between the fixed costs elements and the variable costs elements. No other category of costs is taken into consideration.
2. In marginal costing, only variable costs are taken into account for computing cost of production.
3. The finished stocks and work-in-progress are valued at marginal cost.
4. In marginal costing, prices are determined on the basis of marginal costs plus contribution.
5. Marginal income or marginal contribution is known as the income or the profit.
6. Fixed costs remain constant irrespective of level of activity.
7. The difference between the contribution and fixed costs is the net profit or loss.
8. Sales price and variable cost per unit remain the same.

9. Cost-volume-profit relationship is fully employed to reveal the state of profitability at various levels of production activity.
10. In marginal costing technique, first profit is determined in respect of each product or department.

12.5 ADVANTAGES AND DISADVANTAGES OF MARGINAL COSTING

The advantages and disadvantages of marginal costing are given below:

12.5.1 Advantages of Marginal Costing

The following are the main advantages of marginal costing:

1. **Fixation of Selling Price:** The differentiation between fixed costs and variable costs is very helpful in determining the selling price of the products. Sometimes, different prices are charged for the same product in different markets to meet varying degrees of competition.
2. **Helpful to Management:** It enables the management to start a new line of production which is advantageous. It is helpful in determining which is profitable whether to buy or manufacture a product. The management can take decision regarding pricing and tendering.
3. **Effective Cost Control:** It divides cost into fixed and variable. Fixed cost is excluded from product. As such, management can control marginal cost effectively.
4. **Helps in Production Planning:** It shows the amount of profit at every level of output with the help of cost volume profit relationship. Here the break-even chart is made use of.
5. **Helpful in Budgetary Control:** The classification of expenses is very helpful in budgeting and flexible budget for various levels of activities.
6. **Helpful in Making or Buying Decision:** Sometimes a decision has to be made whether to manufacture a component or a product or to buy it readymade from the market. The decision to purchase it would be having taken if the price paid recovers some of the fixed expenses.
7. **Better Presentation:** The statements and graphs prepared under marginal costing are better understood by management. The break-even analysis presents the behaviour of cost, sales, contribution, etc. in terms of charts and graphs.
8. **Preparing Tenders:** Many business organisations have to compete in the market in quoting the lowest price. Total variable cost, when separately calculated, becomes the 'floor price'. Any price above this floor price may be quoted to increase the total contribution.

12.5.2 Disadvantages of Marginal Costing

Marginal costing technique suffers from the following limitations:

1. **Difficulty in the Fixation of Price:** Under marginal costing, selling price is fixed on the basis of contribution. In case of cost plus contract, it is very difficult to fix price.
2. **Difficulty to Analyse Overhead:** Separation of costs into fixed and variable is a difficult problem. In marginal costing, semi-variable or semi-fixed costs are not considered.

3. **Unrealistic Assumption:** Assumption of sale price will remain the same at different levels of operation. In real life, they may change and give unrealistic results.
4. **Problem of Variable Overheads:** Marginal costing overcomes the problem of over and under-absorption of fixed overheads. Yet there is the problem in the case of variable overheads.
5. **Unreliable Stock Valuation:** Under marginal costing, stock of work-in-progress and finished stock is valued at variable cost only. No portion of fixed cost is added to the value of stocks. Profit determined, under this method, is depressed.
6. **Complete or Full Information not given:** It does not explain the reason for increase in production or sales.
7. **Sales-oriented:** Successful business has to go in a balanced way in respect of selling production functions. But marginal costing is criticised on account of its attaching over-importance to selling function. Thus, it is said to be sales-oriented. Production function is given less importance.
8. **Automation:** Now-a-days, increasing automation is leading to increase in fixed costs.

12.6 MARGINAL COSTING AND VARIANCE ANALYSIS

Variances are the differences between expected and actual results, allowing us to prepare operating statements, which help reconcile actual profit with budgeted profit or contribution. Variance analysis will be dealt in detail along with standard costing in the subsequent lesson.

12.6.1 Importance of Marginal Costing

Marginal costing has been so much emphasized because,

1. It is easy to understand and operate, plus it avoids the complexities of apportionment of fixed costs which are really only arbitrary.
2. It helps the management in deciding the product mix in order to maximize the profits.
3. With the aid of break-even techniques, the effect on large profits of producing a large or smaller volume of output can be ascertained without great difficulty.
4. When fixed costs are charged to production the unit cost varies from one month to another, simply because the number of units produced is different. Marginal cost remains the same per unit of product, irrespective of volume of output.

12.6.2 Marginal Costing Profitability Statement and Types of Contribution

The costs are classified into two categories, viz fixed and variable cost.

Variable cost per unit is considered as marginal cost of the product.

Fixed costs are charged against contribution of the transaction.

Selling price of the product = Marginal cost + Contribution.

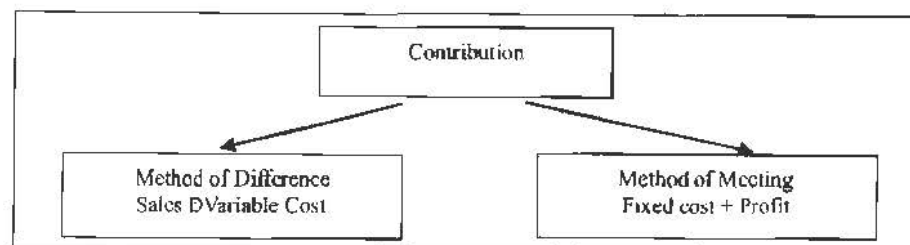


Figure 12.3: Methods of Calculating Contribution

Marginal costing profitability statement is as follows:

Sales	xxxx
Variable Cost	<u>xxxx</u>
Contribution	xxxx
Fixed Cost	<u>xxxx</u>
Profit	<u>xxxx</u>

Sales = 1,00,000, variable cost = 25,000 and fixed cost = 20,000, find out the contribution and profit.

Sales	1,00,000
Variable Cost	<u>50,000</u>
Contribution	50,000
Fixed Cost	<u>20,000</u>
Profit	<u>30,000</u>

Method of Difference

Under this method, the contribution can be computed through finding the differences in between Sales and Variable Cost, i.e. Contribution = Sales \ominus Variable Cost = = 1,00,000 \ominus 50,000 = = 50,000.

Method of Coverages

In this method, the contribution is equated with the summation of Fixed cost and Profit i.e. Contribution = Fixed Cost + Profit = = 20000 + 30000 = = 50,000.

12.7 COST-VOLUME-PROFIT ANALYSIS

Cost-volume-profit analysis is a part of marginal costing. The cost-volume-profit analysis is the analysis of three variables, viz., cost, volume and profit. In cost-volume-profit analysis, an attempt is made to measure variations of various costs and profit with the volume. Profit as a variable is the reflection of a number of internal and external conditions which exert influence on sales revenue and costs.

According to CIMA, London, "Cost-volume-profit analysis is the study of the effects on future profits of changes in fixed cost, variable cost, sales price, quantity and mix."

In the words of Heiser, "The most significant single factor in profit planning of the average business is the relationship between the volume of business, costs and profit."

The cost-volume-profit analysis is the relationship among cost, volume and profit. Profit of a business organisation depends upon a number of factors such as selling

price, sales volume, per unit of variable cost, fixed cost and sales mix. The cost-volume-profit analysis explains the inter relationships of these variables for decision-making. The management is always interested in knowing that which product or product mix is most profitable; what effect a change in the volume of output will have on the cost of production and profit etc. Under cost-volume-profit analysis, when volume of output increases, unit cost of production decreases, and vice-versa; because, the fixed cost remains unaffected. When the output increases; the fixed cost per unit decreases. Therefore, profit will be more, when sales price remains constant. The basic purpose of cost-volume-profit analysis is to determine the impact of fluctuations in cost and volume on the financial results of the business firm or organisation. All these problems are solved with the help of the cost-volume-profit analysis.

The Cost-Volume-Profit (CVP) analysis helps management in finding out the relationship of costs and revenues to profit. The aim of an undertaking is to earn profit. Profit depends upon a large number of factors, the most important of which are the costs of the manufacturer and the volume of sales affected. Both these factors are interdependent. Volume of sales depends upon the volume of production, which in turn is related to costs. Cost again is the result of the operation of a number of varying factors such as:

- Volume of production,
- Product mix,
- Internal efficiency,
- Methods of production,
- Size of plant, etc.

Of all these, volume is perhaps the largest single factor which influences costs which can basically be divided as fixed costs and variable costs. Volume changes in a business are a frequent occurrence, often necessitated by outside factors over which management has no control and as costs do not always vary in proportion to changes in levels of output, management control of the factors of volume presents a peculiar problem.

As profits are affected by the interplay of costs and volume, the management must have, at its disposal, an analysis that can allow for a reasonably accurate presentation of the effect of a change in any of these factors which would have no profit performance. Cost-volume-profit analysis furnishes a picture of the profit at various levels of activity. This enables management to distinguish between the effect of sales volume fluctuations and the results of price or cost changes upon profits. This analysis helps in understanding the behaviour of profits in relation to output and sales.

Fixed costs would be the same for any designated period regardless of the volume of output accomplished during the period (provided the output is within the present limits of capacity). These costs are prescribed by contract or are incurred in order to ensure the existence of an operating organisation. Their inflexibility is maintained within the framework of a given combination of resources and within each capacity stage such costs remain fixed regardless of the changes in the volume of actual production. As fixed costs do not change with production, the amount per unit declines as output rises.

Absorption or full costing system seeks to allocate fixed costs to products. It creates the problem of apportionment and allocation of such costs to various products. By their very nature, fixed costs have little relation to the volume of production.

Variable costs are related to the activity itself. The amount per unit remains the same. These costs expand or contract as the activity rises or falls. Within a given time span,

distinction has to be drawn between costs that are free of ups and downs of production and those that vary directly with these changes.

Study of behaviour of costs and CVP relationship needs proper definition of volume or activity. Volume is usually expressed in terms of sales capacity expressed as a percentage of maximum sales, volume of sales, unit of sales, etc. Production capacity is expressed as a percentage of maximum production, production in revenue of physical terms, direct labour hours or machine hours.

Analysis of cost-volume-profit involves consideration of the interplay of the following factors:

- Volume of sales
- Selling price
- Product mix of sales
- Variable cost per unit
- Total fixed costs

The relationship between two or more of these factors may be (a) presented in the form of reports and statements, (b) shown in charts or graphs, or (c) established in the form of mathematical deduction.

12.8 OBJECTIVES OF COST-VOLUME-PROFIT ANALYSIS

The objectives of cost-volume-profit analysis are given below:

- In order to forecast profit accurately, it is essential to know the relationship between profits and costs on the one hand and volume on the other.
- Cost-volume-profit analysis is useful in setting up flexible budgets which indicate costs at various levels of activity.
- Cost-volume-profit analysis is of assistance in performance evaluation for the purpose of control. For reviewing profits achieved and costs incurred, the effects on cost of changes in volume are required to be evaluated.
- Pricing plays an important part in stabilising and fixing up volume. Analysis of cost-volume-profit relationship may assist in formulating price policies to suit particular circumstances by projecting the effect which different price structures have on costs and profits.
- As pre-determined overhead rates are related to a selected volume of production, study of cost-volume relationship is necessary in order to know the amount of overhead costs which could be charged to product costs at various levels of operation.

12.9 MARGINAL COST EQUATION

The element of cost can be written in the form of an equation. This equation is known as **Marginal cost equation**. The equation is shown below:

$$\text{Sales} = \text{Variable cost} + \text{Fixed cost} + \text{Profit} \quad \text{Or, } S = VC + FC + P$$

$$\text{Sales} \ominus \text{Variable cost} = \text{Fixed cost} + \text{Profit} \quad \text{Or, } S \ominus VC = FC + P$$

$$\text{Sales} \ominus \text{Variable cost} = \text{Contribution} \quad \text{Or, } S \ominus VC = C$$

From the above marginal cost equation, we can understand that in order to earn profit, the contribution must be more than the fixed cost. To avoid any loss, the contribution must be equal to fixed cost.

12.9.1 Contribution

The important element of the marginal cost equation is the Contribution factor which is resulted from the sales value after deduction of variable costs. It has been stated above that Contribution is the composition of fixed costs plus profit. Contribution is also known as gross margin. In other words, contribution is the difference between sales and marginal cost. Contribution enables to meet fixed costs and add to the profit. Contribution minus fixed cost is profit, but where fixed cost is more than contribution, the difference is loss. Contribution can be expressed by the following formula:

$$\text{Contribution} = \text{Sales} - \text{Marginal cost} \quad \text{Or, } C = S - \text{DMC}$$

$$\text{Contribution} = \text{Sales} - \text{Variable cost} \quad \text{Or, } C = S - \text{DVC}$$

$$\text{Contribution} = \text{Fixed cost} + \text{Profit} \quad \text{Or, } C = \text{FC} + \text{P}$$

$$\text{Profit} = \text{Contribution} - \text{Fixed cost} \quad \text{Or, } P = C - \text{FC}$$

$$\text{Sales} - \text{Variable cost} = \text{Fixed cost} + \text{Profit} \quad \text{OR } S - \text{DVC} = \text{FC} + \text{P}$$

Example: From the following information, find out the (a) Contribution, and (b) Amount of profit earned during the year:

Fixed cost	5,00,000
Variable cost	10 per unit
Selling price	15 per unit
Output	1,50,000 units

Solution:

(a) Calculation of contribution:

$$\text{Contribution} = \text{Sales} - \text{Marginal cost}$$

$$\text{Contribution} = (1,50,000 \times 15) - (1,50,000 \times 10)$$

$$\text{Contribution} = 22,50,000 - 15,00,000$$

$$\text{Contribution} = ₹ 7,50,000$$

(b) Calculation of amount of profit:

$$\text{Profit} = \text{Contribution} - \text{Fixed cost}$$

$$\text{Profit} = 7,50,000 - 5,00,000$$

$$\text{Profit} = ₹ 2,50,000$$

12.10 PROFIT-VOLUME (P/V) RATIO

The profit-volume ratio, popularly known as the P/V ratio, expresses the relation of contribution to sales. This ratio is also known as contribution to sales or the marginal income ratio. The profit-volume ratio is often expressed as a percentage and is a guide to the profitability of a business firm. Normally, this ratio is expressed in percentage. P/V ratio is very important in decision-making. It can be used for the calculation of BEP and in problems regarding profit sales relationship.

The formula for computing the P/V ratio is given below:

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 \quad \text{Or,} = \frac{C}{S} \times 100$$

$$\text{P/V Ratio} = \frac{\text{Contribution per unit}}{\text{Selling price per unit}} \times 100 \quad \text{Or,} = \frac{C \text{ per unit}}{SP \text{ per unit}} \times 100$$

In addition to above, the P/V ratio can be expressed in the following further forms:

$$\text{P/V Ratio} = \frac{\text{Fixed cost} + \text{Profit}}{\text{Sales}} \times 100 \quad \text{Or,} = \frac{F + P}{S} \times 100$$

$$\text{P/V Ratio} = \frac{\text{Sales} \ominus \text{Variable cost}}{\text{Sales}} \times 100 \quad \text{Or,} = \frac{S \ominus V}{S} \times 100$$

$$\text{P/V Ratio} = \frac{\text{Change in profit (in two periods)}}{\text{Change in sales (in two periods)}} \times 100$$

12.10.1 Improvement of P/V Ratio

Profit-volume ratio is the function of sales and variable costs. Therefore, an improvement of the ratio will mean increasing the gap between sales and variable costs. A comparison for P/V ratios of different products can be made to find out which product is more profitable. Higher the P/V ratio more will be the profit and lower the P/V ratio, lesser will be the profit. P/V ratio can be improved by:

- (i) Increasing the selling price per unit.
- (ii) Reducing direct and variable costs by effectively utilising men, machines and materials.
- (iii) Altering sales mixture, i.e., product having low P/V ratio will be substituted by a product with a higher ratio.

12.10.2 Uses of Profit-Volume Ratio

The profit-volume ratio is usually used to ascertain the following:

- (i) To determine the variable cost for any volume of sales,
- (ii) To determine the volume of sales required to earn a given profit,
- (iii) To fix the selling prices,
- (iv) To locate the break-even point and margin of safety,
- (v) To determine the volume of sales required for maintaining the present level of profit, if selling price is reduced, and
- (vi) To compute the profit when margin of safety is given.

Example: Calculate P/V ratio from the following information:

Sales ₹ 50,000

Marginal cost ₹ 20,000

Solution:

$$\begin{aligned} \text{Contribution} &= \text{Sales} \ominus \text{Marginal cost} \\ &= 50,000 \ominus 20,000 \\ &= ₹ 30,000 \end{aligned}$$

$$\begin{aligned} \text{P/V Ratio} &= \frac{\text{Contribution}}{\text{Sales}} \times 100 \\ &= \frac{30,000}{50,000} \times 100 = 60\% \end{aligned}$$

Example: The following data are obtained from the records of XYZ company:

	First Year (₹)	Second Year (₹)
Sales	90,000	1,00,000
Profit	8,000	10,000

Calculate the P/V ratio.

Solution:

$$\begin{aligned} \text{P/V Ratio} &= \frac{\text{Change in profit}}{\text{Change in sales}} \times 100 \\ &= \frac{10,000 - 8,000}{1,00,000 - 90,000} \times 100 \\ &= \frac{2,000}{10,000} \times 100 = 20\% \end{aligned}$$

12.11 KEY FACTOR

Key factor is nothing but a limiting factor or deterring factor on sales volume, production, labour, materials and so on.

The limiting factor normally differs from one to another.

- **Volume of sales:** The limiting factor is that production of required number of articles.
- **Volume of production:** The limiting factors consist in adequate supply of raw materials, labour, and inability to sell the produced articles and so on.

The limiting factors are studied in the lights of the contribution. The limiting factor is bearing the inverse relationship with the volume of contribution. To study the worth of the business proposals among the limiting factors, the contribution is considered as a parameter to rank them one after another.

Example: From the following data, which product would you recommend to be manufactured in a factory, time being the key factor?

Particulars	Per unit of Product A (₹)	Per unit of Product B (₹)
Direct Material	24	14
Direct Labour (at ₹ 1 per hr)	2	3
Variable overhead (₹ 2 per hr)	4	6
Selling price	100	110
Standard time to produce	2 Hours	3 Hours

The product is being chosen by the manufacturer based on the ability of generating higher contribution. The higher contribution leads to a better position for the firm. The worth of the product is being selected on the basis of following factors:

Particulars	Per unit of Product A (₹)		Per unit of Product B (₹)	
Selling price		100		110
Less: Direct Material	24		14	
Direct Labour @ ₹ 1 per hr.	2		3	
Variable overhead ₹ 2 per hr.	4	30	6	23
Contribution		70		87
Standard time to produce		2 Hours		3 Hours
Contribution per hour per product		₹ 70/2 Hrs = ₹ 35		₹ 87/3 Hrs = ₹ 29

From the above calculation, it is obviously understood that the firm is having higher contribution margin per hour in the case of product A over the other one, and portrays the product A is better than B.

Example: The following particulars are obtained from costing records of a factory:

Particulars	Per unit of Product A (₹)	Per unit of Product B (₹)
Direct Material ₹ 20 per Kg	80	320
Direct Labour @ ₹ 10 per hr.	100	200
Variable overhead	40	80
Selling price	400	1,000
Total fixed overheads		₹ 30,000

Comment on the profitability of each product during the following conditions:

- In adequate supply of raw material
- Production capacity is limited
- Sales quantity is limited
- Sales value limited

The first step is to determine the contribution per product.

According to the constraints given in the problem, contribution of two products should be compared.

Particulars	Per unit of Product A (₹)		Per unit of Product B (₹)	
Selling price		400		1,000
Direct Material ₹ 20 per Kg	80		320	
Direct Labour @ ₹ 10 per hr.	100		200	
Variable overhead	40	220	80	600
Contribution margin per unit		180		400

Now the contribution per unit has found out with the help of above given information, the next step is to study the contribution margin per unit to the tune of given constraints of the firm.

- The first constraint is an adequate supply of the raw material:** The raw materials are considered to be precious due to insufficient supply to the requirement of the firm. Having considered the scarcity of the raw material, the constraint in availing the raw material is denominated in terms of ability of contribution generation.

Particulars	Per unit of Product A (₹)	Per unit of Product B (₹)
Contribution margin per unit	180	400
Consumption of raw material per unit		
Cost of raw material per unit	$\frac{80}{20} = 4 \text{ Kgs}$	$\frac{320}{20} = 16 \text{ Kgs}$
Cost of material per Kg		
Contribution per Kg	$\frac{180}{4 \text{ Kgs}} = 45$	$\frac{400}{16 \text{ Kgs}} = 25$

It is obviously understood that the firm enjoys greater contribution margin per kg. in the case of Product A during the scarcity of raw material than the product B.

- (b) Then the production capacity of the firm is subject to the availability of the labour and the hours normally consumed by them for the production of a single product. Due to shortage of the labour, the firm should identify the product which requires lesser labour hours as well as able to generate more contribution margin per labour hour.

In the next step, contribution margin per hour should be calculated as under:

Particulars	Per unit of Product A (₹)	Per unit of Product B (₹)
Contribution margin per unit	180	400
Consumption of Labour Hrs.		
Cost of Labour per unit	$\frac{100}{10} = 10 \text{ Hrs.}$	$\frac{200}{10} = 20 \text{ Hrs}$
Cost of Labour per Hour		
Contribution per hr. of the product	$\frac{180}{10 \text{ Hrs.}} = 18$	$\frac{400}{20 \text{ Hrs.}} = 20$

The contribution per hour is greater in the case of the product B, considered to be as a better product among the given. It means that the firm has better opportunity to earn greater contribution in the case of product B than A.

- (c) The next one is that sale of the quantities is the major limiting factor. It means that the vendor finds somewhat difficulties in selling the articles. While considering the difficulties in selling the quantities, the firm should identify the product which is able to generate greater contribution.

From the earlier calculation, it is clearly understood that, the product B is bearing greater value of contribution margin per unit than the product.

- (d) If the sales value is considered to be a limiting factor, to choose one among the given products PV ratio is being applied as a measure. It means that the sales value of the products is ignored for comparison in between them. To identify the better product, irrespective of the price, PV ratio should be applied. The PV ratio of the Product A & B is calculated as below:

$$\text{Profit volume ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100$$

For A = 45%

For B = 40%

The PV ratio is greater in the case of product A than B. The product A has to be chosen.

12.12 DECISION-MAKING

Marginal cost helps management to make decision involving consideration of cost and revenue. Basically, marginal costing furnishes information regarding additional costs to be incurred if an additional activity is to be taken up or the saving in costs which may be expected if an activity is given up. This can be compared with the benefit expected from the proposed course of action and thus the management will be able to take the appropriate decision.

Decision-making describes the process by which a course of action is selected as the way to deal with a specific problem. A decision involves the act of choice and the alternative chosen out of the available alternatives.

According to **Heinz Wehrich and Harold Koontz**, "Decision-making is defined as the selection of a course of action from among alternatives."

George R. Terry says, "Decision-making is the selection based on some criteria from two or more possible alternatives."

According to **Haynes and Masie**, "Decision-making is a course of action which is consciously chosen for achieving the desired results."

The following are the important areas of decision-making or applications of marginal costing:

1. Fixation of Price
 2. Decision to Make or Buy
 3. Selection of a Profitable Product Mix
 4. Decision to Accept a Bulk Order
 5. Closure of a Department or Discontinuing a Product
 6. Maintaining a Desired Level of Profit
 7. Evaluation of Performance
1. **Fixation of Price:** Product pricing is a most important function of management. One of the purposes of cost accounting is the ascertainment of cost for fixation of selling price of product. Marginal cost of a product represents the minimum price of the product. During normal circumstances, price of product is based on full cost. The theory is that only those products should be produced or sold which make the largest contribution towards the recovery of fixed costs. The selling price fixation is also done under different circumstances.

Example: P/V ratio is 50% and the marginal cost of the product is ₹ 60. What will be the selling price?

Solution:

$$\begin{aligned}\text{Selling Price} &= \frac{\text{Variable cost}}{(100 \text{ P/V ratio})} = \frac{60}{(100 - 50\%)} \\ &= \frac{60 \times 100}{50} = ₹ 120\end{aligned}$$

$$\begin{aligned}\text{Verification: P/V Ratio} &= \frac{\text{Contribution}}{\text{Sales}} \times 100 \quad \text{OR} = \frac{S - V}{S} \times 100 \\ &= \frac{120 - 60}{120} \times 100 \\ &= \frac{60}{120} \times 100 = 50\%\end{aligned}$$

2. **Decision to Make or Buy:** A business firm may make some products, parts or tools or sometimes, it may buy the same thing from outside. The management must decide which is more profitable to the business firm. If the marginal cost of the product is lower than the price of buying from outside, then the business firm should make the product.

Example. A Pen Manufacturing Company finds that while it costs ₹ 6.25 to make each component X 2730, the same is available in the market at ₹ 4.85 each, with an assurance of continued supply. The breakdown of cost is:

Raw material	₹ 2.75 each pen
Direct wages	₹ 1.75 each pen
Other variable costs	₹ 0.50 each pen
Fixed cost	₹ 1.25 each pen
	<u>6.25 each pen</u>

Should you make or buy?

Solution: Variable cost of manufacturing is ₹ 5 (₹ 6.25 - ₹ 1.25), but the market price is ₹ 4.85. If the fixed cost of ₹ 1.25 is also added, it is not profitable to make the component. Because there is a profit of ₹ 0.15 even in variable cost, it is profitable to procure pens from outside.

3. **Selection of a Profitable Product Mix:** In a multi-product manufacturing organisation, a problem is faced by the management as to which product mix or sales mix will give the maximum profit. The product mix which gives the maximum profit must be selected. Product mix is the ratio in which various products are produced and sold.

The marginal costing technique helps the management in taking decisions regarding changing the ratio of product mix which gives maximum contribution or in dropping unprofitable product line. The product which has comparatively less contribution may be reduced or discontinued.

Example: Present the following information to show to the management: (i) the marginal cost of product and the contribution per unit, (ii) the total contribution and profits resulting from each of the following sales mixtures:

	Type of Products	Per unit (₹)
Materials	X	10
	Y	9
Wages	X	3
	Y	2

Fixed cost ₹ 2,000

Variable costs are allocated to products as 100% of wages

Selling price	X	₹ 20
	Y	₹ 16

Sales mixtures:

- (a) 1,000 units of product X and 2,000 units of product Y,

(b) 1,500 units of product X and 1,500 units of product Y,

(c) 2,000 units of product X and 1,000 units of product Y.

Solution:

(i) **Statement of Marginal Cost:**

	Type of Products	
	X (₹)	Y (₹)
Materials	10	9
Wages	3	2
Variable cost (100% of wage)	<u>3</u>	<u>2</u>
Marginal Cost	<u>16</u>	<u>13</u>
 Selling price	 20	 16
Less: Marginal cost	<u>16</u>	<u>13</u>
Contribution	<u>4</u>	<u>3</u>

(ii) **Product Mix Choice:**

Particulars	(a) `	(b) `	(c) `
Total sales	52,000 ⁽¹⁾	54,000 ⁽¹⁾	56,000 ⁽¹⁾
Less : Marginal cost	42,000 ⁽²⁾	43,500 ⁽²⁾	45,000 ⁽²⁾
Contribution	10,000	10,500	11,000
Less : Fixed cost	2,000	2,000	2,000
Profit	8,000	8,500	9,000

Therefore, sales mixture (c) will give the highest profit and as such, mixture (c) can be adopted.

Working notes:

(1) $(1,000 \times 20 + 2,000 \times 16) = 52,000$, $(1,500 \times 20 + 1,500 \times 16) = 54,000$, and $(2,000 \times 20 + 1,000 \times 16) = 56,000$

(2) $(1,000 \times 16 + 2,000 \times 13) = 42,000$, $(1,500 \times 16 + 1,500 \times 13) = 43,500$, and $(2,000 \times 16 + 1,000 \times 13) = 45,000$

4. **Decision to Accept a Bulk Order:** Large scale purchasers may demand products at less than the market price. A decision has to be taken now whether to accept the order or to reject it. By reducing the normal sales price, the volume of output and the sales can be increased. If the sales price is below the total cost, rejection of the order is aimed at.

In marginal costing, the offer may be accepted, if the quoted sales price is above marginal cost, because of the reason that existing business contribution can recover the fixed cost and the margin of profits. In such cases, the contribution made by bulk orders will be an addition to the profit. But the sales price should not be less than the marginal cost. Moreover, it should not affect the normal market price.

Example: ABC to industrial depression, a plant is running at present at 50% of its capacity. The following details are available:

Cost of Production per unit	
Materials	₹ 2.5
Labour	₹ 1.5
Variable cost	₹ 3.0
Fixed cost	₹ 1.5
	₹ 8.5
Production per month in units	20,000
Total cost of production	₹ 1,70,000
Sales price	₹ 1,50,000
Loss	₹ 20,000

An exporter offers to buy 6,000 units per month at the rate of ₹ 7.50 per unit and the company is reluctant to accept the offer for fear of increasing its already operating losses.

Advise whether the company should accept or decline this offer.

Solution:

Particulars	Existing (20,000 units) (₹)	Offer (6,000 units) (₹)	Total (₹)
(a) Sales	1,50,000	45,000	1,95,000
(b) Marginal cost			
Materials @ ₹ 2.5 per unit	50,000	15,000	65,000
Labour @ ₹ 1.5 per unit	30,000	9,000	39,000
Variable cost @ ₹ 3 per unit	60,000	18,000	78,000
Total Marginal Cost	1,40,000	42,000	1,82,000
Contribution (a-b)	10,000	3,000	13,000
Less : Fixed cost	30,000	—	30,000
Profit/Loss	(₹) 20,000	3,000	(₹) 17,000

The firm must accept the offer, because the amount of loss stands reduced from ₹ 20,000 to ₹ 17,000.

5. **Closure of a Department or Discontinuing a Product:** Marginal costing technique shows the contribution of each product to fixed cost and profit. If a department or a product contributes the least amount, then the department can be closed or its production can be discontinued. It means the product which gives a higher amount of contribution may be chosen and the rest should be discontinued.

Example: The records of Rajesh Limited which has three departments give the following figures:

Particulars	Department X (₹)	Department Y (₹)	Department Z (₹)	Total Amount (₹)
Sales	15,000	19,000	23,000	57,000
Marginal cost	14,000	7,000	17,000	38,000
Fixed cost	3,000	4,000	11,000	18,000
Total cost	17,000	11,000	28,000	56,000
Profit/Loss	(₹) 2,000	(+) 8,000	(₹) 5,000	(+) 1,000

The management wants to discontinue product Z immediately as it gives the maximum loss. How would you advise the management?

Solution:

Statement of Marginal Cost

Particulars	X (₹)	Y (₹)	Z (₹)	Total (₹)
Sales	15,000	19,000	23,000	57,000
Less : Marginal cost	14,000	7,000	17,000	38,000
Contribution	1,000	12,000	6,000	19,000
Fixed cost				18,000
Profit				1,000

Department Z gives a contribution of ₹ 6,000. If department Z is closed, then it may lead to further loss. Therefore, Z will be continued.

6. **Maintaining a Desired Level of Profit:** A manufacturing organisation has to cut or reduce prices of its products from time to time due to competition, government policies and other reasons. The contribution per unit on account of such cutting is reduced while the organisation is interested in maintaining a minimum level of its profits. Marginal costing technique can ascertain how many units have to be sold to maintain the same level of profits. According to Charles, *"When desired profits are agreed upon; their attainability may be quickly appraised by computing the number of units that must be sold to secure the wanted profits. The computation is easily made by dividing the fixed costs plus desired profits by the contribution margin per unit."*

Sales are required to earn a desired profit:

$$\text{Sales (in ₹)} = \frac{\text{Fixed cost} + \text{Desired profit}}{\text{P/V ratio}} \quad \text{OR} = \frac{F + P}{P/V}$$

$$\text{Sales (in units)} = \frac{\text{Fixed cost} + \text{Desired profit}}{\text{Contribution per unit}} \quad \text{OR} = \frac{F + P}{C}$$

Example:

Sales 20,000 units (@ ₹ 20 per unit)

Variable cost ₹ 10 per unit

Fixed cost ₹ 1,50,000

Find out the sales for earning a profit of ₹ 1,00,000.

Solution:

Sales to earn a profit of ₹ 1,00,000:

$$\begin{aligned} &= \frac{\text{Fixed cost} + \text{Desired profit}}{\text{Contribution}} \\ &= \frac{1,50,000 + 1,00,000}{2,00,000} \times 4,00,000 \\ &= \frac{2,50,000}{2,00,000} \times 4,00,000 \\ &= ₹ 5,00,000 \end{aligned}$$

7. **Evaluation of Performance:** Marginal costing helps the management in measuring the performance efficiencies of a department or a product line or sales division. The department or the product or sales division which gives the highest

P/V ratio will be the most profitable or that is having the highest performance efficiency.

12.13 APPLICATION OF MARGINAL COSTING

Marginal costing technique helps management in several ways. These are discussed below:

1. **Profit Planning:** There are four important ways of improving the profit performance of a business: (i) increasing the volume, (ii) increasing the selling price, (iii) decreasing variable cost, and (iv) decreasing fixed costs. Profit planning is the planning of future operations so as to attain maximum profit. The contribution ratio shows the relative profitability of various sectors of business whenever there is a change in the selling price, variable cost etc.
2. **Introduction of a New Product:** Sometimes, a product may be added to the existing lines of products with a view to utilise idle facilities to capture a new market or for any other purpose. The profitability of this new product has to be found out initially. Usually, the new product will be manufactured if it is capable of contributing something toward fixed costs and profit after meeting its variable costs.
3. **Level of Activity Planning:** Marginal costing is of great help while planning the level of activity. Maximum contribution at a particular level of activity will show the position of maximum profitability.
4. **Pricing Decisions:** Marginal costing techniques help a firm to decide about the prices of various products in a fairly easy manner.
5. **Accepting Foreign:** Order Marginal costing technique can also be used to take a decision as to whether to accept a foreign offer or not. The specialty of this situation is that normally foreign order is requiring the manufacturer to supply the product at a price lower than the inland selling price. Here the decision is taken by comparing the marginal cost of the product with the foreign price offered. If the foreign order offers a price higher than the marginal cost then the offer can be accepted subject to availability of sufficient installed production capacity.

Check Your Progress

Fill in the blanks:

1. _____ is measured by deducting fixed costs from the total contribution.
2. Under marginal costing, selling price is fixed on the basis of _____.
3. The element of cost can be written in the form of an equation is known as _____.
4. The profit-volume ratio is often expressed as a _____.
5. A _____ involves the act of choice and the alternative chosen out of the available alternatives.
6. _____ expenses are expenses that are directly related to production or operation.

12.14 LET US SUM UP

- Marginal costing is one of the special techniques of costing used for analysis and interpreting cost data for the purpose of assessing the profitability of the products, departments and cost centres. Economists define marginal cost as the additional cost of producing one additional unit of product. This shall include an element of fixed cost also.
- Marginal cost is the amount by which total cost changes when there is a change in output by one unit. In marginal costing, only variable costs are charged to cost units. Variable cost is one which tends to vary directly with the volume of output.
- In marginal costing, a differentiation is made between the fixed costs elements and the variable costs elements. No other category of costs is taken into consideration. Sometimes a decision has to be made whether to manufacture a component or a product or to buy it readymade from the market. The decision to purchase it would be having taken if the price paid recovers some of the fixed expenses.
- Under marginal costing, selling price is fixed on the basis of contribution. In case of cost plus contract, it is very difficult to fix price. Cost-volume-profit analysis is a part of marginal costing. The cost-volume-profit analysis is the analysis of three variables, viz., cost, volume and profit.
- In cost-volume-profit analysis, an attempt is made to measure variations of various costs and profit with the volume. The element of cost can be written in the form of an equation. This equation is known as marginal cost equation. The important element of the marginal cost equation is the contribution factor which is resulted from the sales value after deduction of variable costs.
- The profit-volume ratio, popularly known as the P/V ratio, expresses the relation of contribution to sales. The marginal costing technique helps the management in taking decisions regarding changing the ratio of product mix which gives maximum contribution or in dropping unprofitable product line.
- Marginal costing technique shows the contribution of each product to fixed cost and profit. Marginal costing technique can ascertain how many units have to be sold to maintain the same level of profits. Marginal costing helps the management in measuring the performance efficiencies of a department or a product line or sales division.

12.15 UNIT END ACTIVITY

Critically examine how marginal costing is a useful tool to management?

12.16 KEYWORDS

Marginal Cost: The amount of any given volume of output by which aggregate variable costs are changed if the volume of output is increased by one unit.

Marginal Costing: Marginal costing is not a special method of costing but is an application of the existing methods in such a way that costs are presented in a particular form by segregating fixed and variable costs.

Contribution Margin: Contribution margin of a product is the difference between the selling price and its variable cost. It is obtained by subtracting marginal cost from sales revenue of a given activity. The difference between sales revenue and variable cost is called contribution since it contributes towards fixed expenses and profit of the entire business.

P/V Ratio: The profit-volume ratio is the contribution expressed as a percentage of sales.

Cost-Volume-Profit (CVP) Analysis: It helps management in finding out the relationship of costs and revenues to profit.

Variances: Variances are the differences between expected and actual results, allowing us to prepare operating statements, which help reconcile actual profit with budgeted profit or contribution.

Direct Expenses: These expenses are directly related to production or operation.

Marginal Cost: It is a change occurred in the cost of operations due to change in the level of production.

Fixed Cost: It is a cost which is fixed or remains the same for irrespective level of production.

Variable Cost: It varies along with the level of production.

Key Factor: Factor of influence on the component of contribution.

Desired Profit: It is a profit level desired by the firm to earn at the given level of sales volume.

12.17 QUESTIONS FOR DISCUSSION

1. What do you mean by marginal costing?
2. Explain the main features of marginal costing.
3. Discuss the meaning, advantages and disadvantages of marginal costing.
4. Marginal costing is essentially a technique of cost analysis and cost presentation. Discuss the statement with reference to advantages and limitations of marginal costing.
5. Distinguish between marginal costing and absorption costing.
6. Explain the following terms:
 - (a) Contribution
 - (b) P/V Ratio
 - (c) Angle of incidence
7. Elucidate the key factor analysis.
8. What is presentation of cost data?
9. What are the key implications of marginal costing?
10. What are the objectives of cost-volume-profit analysis?

Check Your Progress: Model Answer

1. Profit
2. Contribution
3. Marginal cost equation
4. Percentage
5. Decision
6. Direct

12.18 REFERENCES/SUGGESTED READINGS

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UNIT 13

BREAK-EVEN ANALYSIS

CONTENTS

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13.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Define break-even analysis
- Discuss the various methods of calculating break-even analysis
- Highlight the advantages and drawbacks of break-even analysis
- Describe break-even models and planning for profit
- Understand the concept of margin of safety
- Compare and contrast marginal/direct costing and absorption costing

13.1 INTRODUCTION

The need for a decision arises in business because a manager is faced with a problem and alternative courses of action are available. A manager has to take different decisions like make or buy, continue or shut down, etc. to make the maximum profit. In deciding which option to choose he will need all the information which is relevant to his decision; and he must have some criteria on the basis of which he can choose the best alternative. Some of the factors affecting the decision may not be expressed in monetary value. Hence, the manager will have to take 'qualitative' judgements, e.g., in deciding which of two personnel should be promoted to a managerial position. A 'quantitative' decision, on the other hand, is possible when the various factors, and relationships between them, are measurable.

13.2 BREAK-EVEN ANALYSIS

Break-even analysis examines the relationship between the total revenue, total costs and total profits of the firm at various levels of output. It is used to determine the sales volume required for the firm to break-even and the total profits and losses at other sales level. Break-even analysis is a method, as said by Dominick Salvatore, of revenue and total cost functions of the firm. According to Martz, Curry and Frank, a break-even analysis indicates at what level cost and revenue are in equilibrium.

In case of break-even analysis, the break-even point is of particular importance. Break-even point is that volume of sales where the firm breaks even, i.e. the total costs equal total revenue. It is, therefore, a point where losses cease to occur while profits have not yet begun. That is, it is the point of zero profit.

$$\text{BEP} = \frac{\text{Fixed Costs}}{\text{Selling price} - \text{Variable costs per unit}}$$

$$\text{For example,} = \frac{\text{Fixed Costs (£ 10,000)}}{\text{Selling price (£ 5 per unit) - Variable costs (£ 3 per unit)}}$$

$$\text{Therefore, BEP} = \frac{£ 10,000}{5 - 3} = 5,000 \text{ units.}$$

The conclusion that can be drawn from the above example is that sales volume of 5000 units will be the accurate point at which the manufacturing unit would not make any loss or profit.

13.2.1 Uses of Break-Even Analysis

Break-even analysis is generalised approach for dealing with a wide variety of questions associated with profit planning and forecasting.

Some of the important practical applications of break-even analysis are given below:

- What happens to overall profitability when a new product is introduced?
- What level of sales is needed to cover all costs and earn, say, £ 1,00,000 profit or a 12% rate of return?
- What happens to revenues and costs if the price of one of the products of a company is changed?

- What happens to overall profitability if a company purchases new capital equipment or incurs higher or lower fixed or variable costs?
- Between two alternative investments, which one offers the greater margin of profit (safety)?
- What are the revenue and cost implications of changing the process of production?
- Should one make, buy or lease capital equipment?

13.2.2 Assumptions of Break-Even Analysis

The break-even analysis is based on certain assumptions, namely:

- All costs are either perfectly variable or absolutely fixed over the entire period of production but this assumption does not hold fair in practice.
- The volume of production and the volume of sales are equal; but in reality they differ.
- All revenues are perfectly variable with the physical volume of production and this assumption is not valid.
- The assumption of stable product mix is unrealistic.

13.3 METHODS OF CALCULATING BREAK-EVEN ANALYSIS

The break-even analysis can be performed by the following two methods:

1. Break-Even Charts
2. Algebraic Method

13.3.1 Break-Even Chart

The difference between Price and Average Variable Cost (P-AVC) is defined as 'profit contribution'. That is, revenue on the sale of a unit of output after variable costs are covered represents a contribution towards profit. At low rates of output, the firm may be losing money because fixed costs have not yet been covered by the profit contribution. Thus, at these low rates of output, profit contribution is used to cover fixed costs. After fixed costs are covered, the firm will be earning a profit.

A manager may want to know the output rate necessary to cover all fixed costs and to earn a "required" profit of R. Assume that both price and variable cost per unit of output (AVC) are constant. Profit is equal to total revenue (P.Q.) less the sum of total variable costs (Q.TVC) and fixed costs. Thus

$$\pi_R = PQD[(Q, AVC) + FC]$$

$$\pi_R = TR - DTC$$

The break-even chart shows the extent of profit or loss to the firm at different levels of activity. A break-even chart may be defined as an analysis in graphic form of the relationship of production and sales to profit. The break-even analysis utilises a break-even chart in which the Total Revenue (TR) and the Total Cost (TC) curves are represented by straight lines, as given in Figure 13.1.

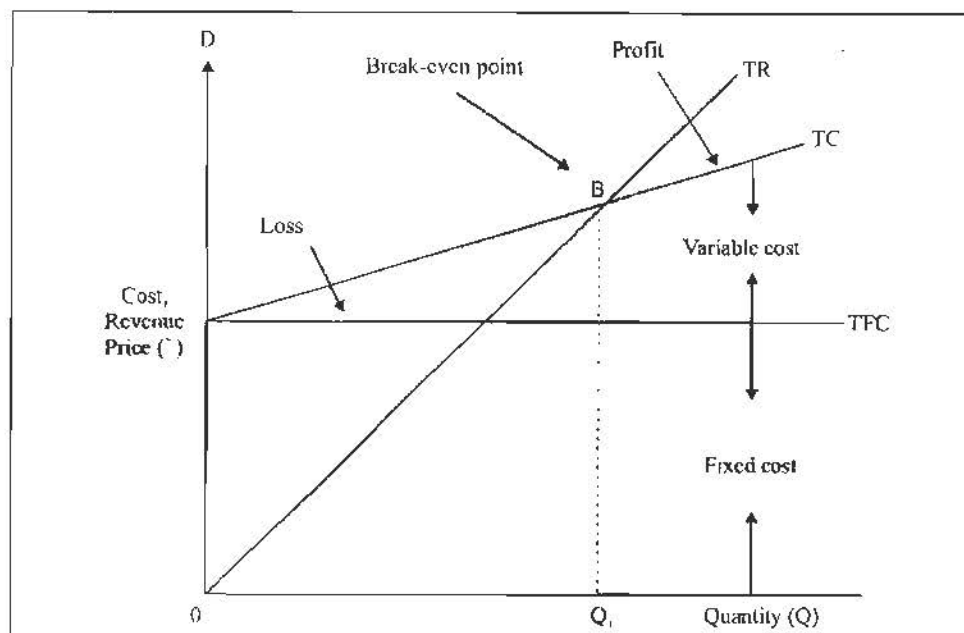


Figure 13.1: Break Chart Even

In the figure total revenues and total costs are plotted on the vertical axis whereas output or sales per time period are plotted on the horizontal axis. The slope of the TR curve refers to the constant price at which the firm can sell its output. The TC curve indicates Total Fixed Costs (TFC) (the vertical intercept) and a constant average variable cost (the slope of the TC curve). This is often the case for many firms for small changes in output or sales. The firm breaks even (with $TR = TC$) at Q_1 (point B in the figure) and incurs losses at smaller outputs while earnings profits at higher levels of output.

Both the Total Cost (TC) and Total Revenue (TR) curves are shown as linear. TR curve is linear as it is assumed that the price is given, irrespective of the output level. Linearity of TC curve results from the assumption of constant variable costs.

If the assumptions of constant price and average variable cost are relaxed, break-even analysis can still be applied, although the key relationship (total revenue and total cost) will not be linear functions of output. Non-linear total revenue and cost functions are shown in Figure 13.2. The cost function is conventional in the sense that at first, costs increase but less than in proportion to output and then increase more than in proportion to output. There are two break-even points D L and M. Note that profit which is the vertical distance between the total revenue and total cost functions, is maximised at output rate Q^* .

Of the two break-even points, only the first, corresponding to output rate Q_1 is relevant. When a firm begins production, management usually expects to incur losses. But it is important to know at what output rate the firm will go from a loss to a profit situation. In Figure 13.2, the firm would want to get to the break-even output rate Q_1 as soon as possible and then of course, move to the profit maximising rate Q^* . However, the firm would not expand production beyond Q^* because this would result in a reduction of profit.

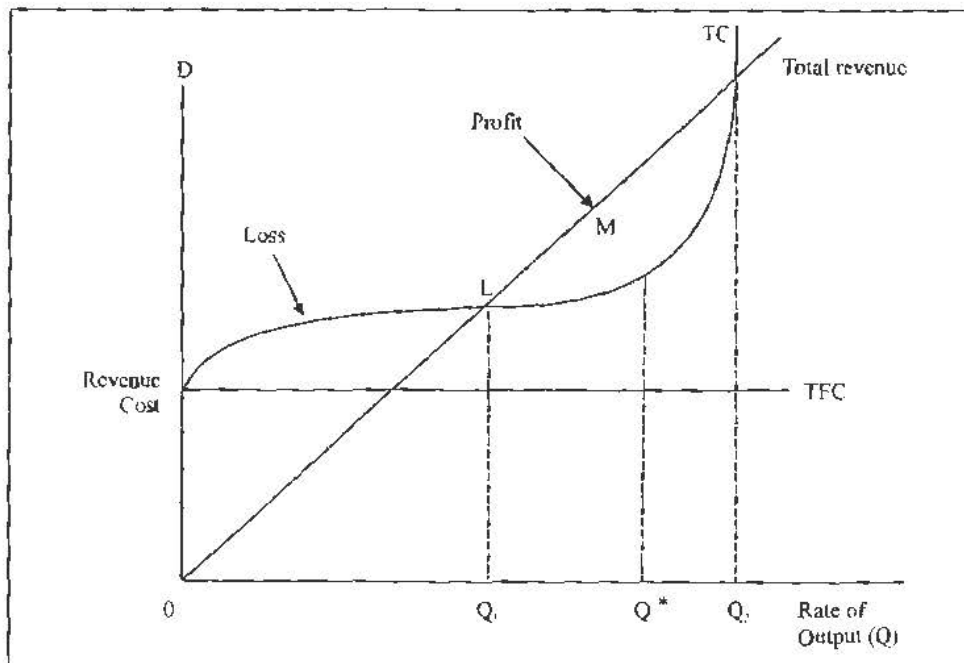


Figure 13.2: Non-Linear Total Revenue and Cost Functions

Contribution Margin

In the short run, where many of the firm's costs are fixed, businessmen are often interested in determining the contribution additional sales make towards fixed costs and profits. Contribution analysis provides this information. Total contribution profit is defined as the difference between total revenues and total variable costs, which equals price less average variable cost on a per unit basis. Figure 13.3 highlights the meaning of contribution profit. Total contribution profit, it can be seen below, is also equal to total net profit plus total fixed costs.

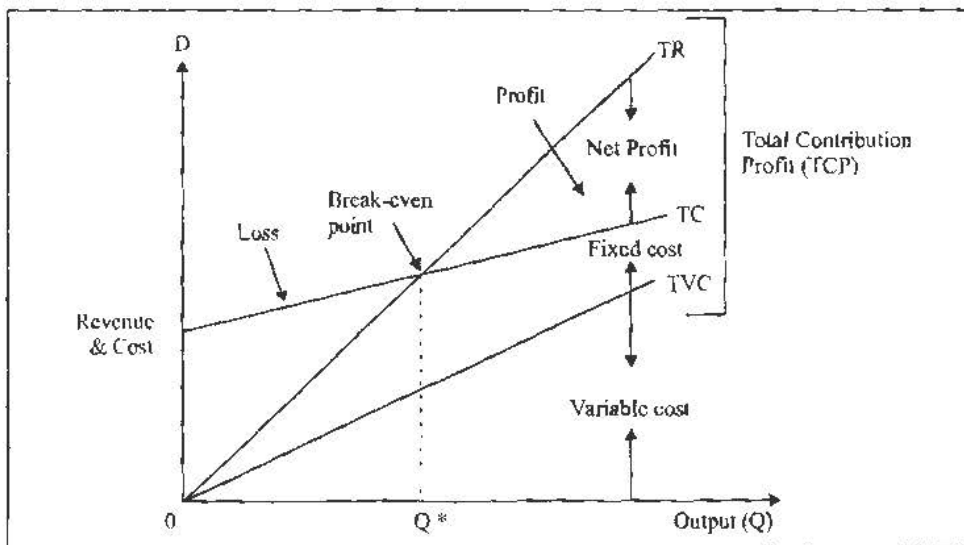


Figure 13.3: Total Contribution Profit Calculation Graphical Representation

Contribution profit analysis provides a useful format for examining a variety of price and output decisions.

As is clear from Figure 13.3, Total Contribution Profit (TCP) = Total revenue (TR) - Total variable cost (TVC).

$$= \text{Total Net Profit (TNP)} + \text{Total Fixed Cost (TFC)}$$

Therefore, if $\text{TNP} = 0$ then, $\text{TCP} = \text{TFC}$. This occurs at break-even point. From the above equation it is also clear that

$$\text{TR} = \text{TCP} + \text{TVC}$$

$$= (\text{TNP} + \text{TFC}) + \text{TVC}$$

$$\text{Total Contribution Profit (TCP)}$$

$$= \text{TR} - \text{TVC}$$

$$= \text{Net Profit} + \text{Fixed Cost}$$

13.3.2 Algebraic Method

Break-even analysis can also be performed algebraically, which is discussed as below. Total revenue is equal to the selling price (P) per unit times the quantity of output or sales (Q). That is:

$$\text{TR} = (P) \cdot (Q)$$

Total costs equal total fixed costs plus total variable costs (TVC). Since TVC is equal to the average (per unit) variable cost (AVC) times the quantity of output or sales, we have

$$\text{TC} = \text{TFC} + \text{TVC}$$

$$\text{or, TC} = \text{TFC} + (\text{AVC}) \cdot (Q)$$

Setting total revenue equal to total costs and substituting Q_B (the break even output) for Q, we have

$$\text{TR} = \text{TC}$$

$$(P) \cdot (Q_B) = \text{TFC} + (\text{AVC}) \cdot (Q_B)$$

$$\text{Or, TFC} = P \cdot (Q_B) - (\text{AVC}) \cdot (Q_B)$$

$$\text{TFC} = Q_B \cdot (P - \text{AVC})$$

$$Q_B \text{ (the break-even output)} = \frac{\text{TFC}}{(P - \text{AVC})} = \frac{\text{TFC}}{\text{ACM}}$$

The denominator in the above equation (*i.e.*, $P - \text{AVC}$) is called the contribution margin per unit (ACM) because it represents the portion of the selling price that can be applied to cover the fixed costs of the firm and to provide for profits.

13.4 ADVANTAGES AND DRAWBACKS OF BREAK-EVEN ANALYSIS

The advantages and drawbacks of break-even analysis are given below:

13.4.1 Advantages of Break-Even Analysis

The main advantages of using break-even analysis in managerial decision-making can be discussed as following:

- It helps in determining the optimum level of output below which it would not be profitable for a firm to produce.
- It helps in determining the target capacity for a firm to get the benefit of minimum unit cost of production.

- With the help of the break-even analysis, the firm can determine minimum cost for a given level of output.
- It helps the firms in deciding which products are to be produced and which are to be bought by the firm.
- Plant expansion or contraction decisions are often based on the break-even analysis of the perceived situation.
- Impact of changes in prices and costs on profits of the firm can also be analysed with the help of break-even technique.
- Sometimes a management has to take decisions regarding dropping or adding a product to the product line. The break-even analysis comes very handy in such situations.
- It evaluates the percentage financial yield from a project and thereby helps in the choice between various alternative projects.
- The break-even analysis can be used in finding the selling price which would prove most profitable for the firm.
- By finding out the break-even point, the break-even analysis helps in establishing the point wherefrom the firm can start payment of dividend to its shareholders.

13.4.2 Drawbacks of Break-Even Analysis (BEA)

This analysis will be useful only in situations relatively stable and slow moving rather than volatile and erratic ones. In conditions when proper managerial accounting techniques and procedures are maintained, the BEA will be useful. In a particular period costs are affected not by the output of that period but due to past output or a preparation for future output. As such the BEA cannot pin down that cost is the result of output of a particular period. It is difficult to deal with selling costs under the framework of BEA because changes in selling costs are a cause to bring out changes in output and not the result of output sales. In the real world, perfect competition is very rare and as such it is necessary to make calculations at different time periods. The relationship between cost, revenue and volume (output) is realistic only over narrow ranges of output and for long ranges. If too many products and too many plants are grouped together in a productive process, the BEA cannot identify which is good or which is bad, since all are grouped together. The BEA assumes that profits are the result of output but ignores that other factors like technological changes, improved management and variations in the proportions of fixed factors are also possible for profits. In spite of these, BEA is an important tool in decision-making.

13.5 THREE ALTERNATIVES

The break-even point may now be computed in one of the three different but interrelated ways. To illustrate, assume that a factory can produce a maximum of 20,000 units of output per month. These 20,000 units can be sold at a price of ₹ 100 per unit. Variable costs are ₹ 20 per unit and the total fixed costs are ₹ 2,00,000.

$$\begin{aligned}
 1. \text{ By direct application of the equation, } Q_B &= \frac{\text{TFC}}{(P - AVC)} \\
 &= \frac{₹ 2,00,000}{₹ 100 - ₹ 20} = 2500 \text{ units}
 \end{aligned}$$

In order to verify this, we could simply compute the TR and the TC when output equals 2500 units

$$\begin{aligned}
 TR &= P \times Q \\
 &= 100 \times 2500 \\
 &= ₹ 250,000 \\
 TC &= TFC + Q (AVC) \\
 &= (200,000) + (2500) (₹ 20) \\
 &= ₹ 250,000
 \end{aligned}$$

2. By modification of the equation above when one is to determine the break-even measured in terms of rupee sales

$$Q_B = \frac{TFC}{P - AVC} = \frac{TFC}{1 - \frac{AVC}{P}} \quad \dots (1)$$

or

$$\begin{aligned}
 S_B &= P \cdot Q_B = \left(\frac{TFC}{P - AVC} \right) \cdot P \\
 &= \frac{TFC}{1 - \left(\frac{AVC \cdot Q_B}{P \cdot Q_B} \right)} \\
 S_B &= \frac{TFC}{1 - \left(\frac{TVC}{TR} \right)} \quad \dots (2)
 \end{aligned}$$

or,

where S_B is the break-even sales level. The denominator, $1 - \left(\frac{TVC}{TR} \right)$, provides a measure of the contribution made by the product to recover fixed costs. For example, the break-even level in rupee sales is:

$$S_B = \frac{₹ 2,00,000}{1 - \left(\frac{20}{100} \right)} = ₹ 2,50,000$$

That is, the same result which can be obtained by multiplying the break-even quantity by unit price. In equation (1), the contribution margin is calculated on a per unit basis from the ratio of AVC to price. In equation (2), the contribution margin is calculated on a total sales revenue basis from the ratio of TVC to TR. The ratio is the same in each case and in both the situations the calculated ratio is subtracted from the equation, $Q_B (P - AVC) = TVC$, to yield the percentage of revenue that contributes to recovery of fixed costs or overheads.

3. In order to determine, the break-even point in terms of percentage utilisation of plant capacity (% B), (or load factor to be achieved) the equation:

$$\begin{aligned}
 Q_B &= \frac{TFC}{(P - AVC)} = \frac{TFC}{ACM} \text{ has to be modified as} \\
 \% B &= \frac{TFC}{(P - AVC) \times Q(\text{cap})} \times 100
 \end{aligned}$$

where, $Q(\text{cap})$ is the maximum capacity of the plant expressed in units of output.

$$\% B = \frac{₹ 2,00,000}{(₹ 100 - ₹ 20) 20,000} \times 100$$

= 12.5%, this indicates that the firm can in break even by using only 12.5% of its capacity.

Example: Indian Airlines has a capacity to carry a maximum of 10,000 passengers per month from Kolkata to Guwahati at a fare of ₹ 500. Variable costs are ₹ 100 per passenger, and fixed costs are ₹ 3,00,000 per month. How many passengers should be carried per month to break even? What load factor (*i.e.*, average percentage of seating capacity filled) must be reached to break even?

Solution:

$$P - AVC = ₹ 500 - ₹ 100 = ₹ 400$$

$$Q_B (\text{Passengers}) = \frac{₹ 30,00,000}{₹ 400}$$

$$= 7,500 \text{ passengers}$$

The break-even sales value

$$Q_B = \frac{₹ 30,00,000}{1 - \left(\frac{₹ 100}{₹ 500}\right)} = \frac{₹ 30,00,000}{0.8}$$

$$= ₹ 37,50,000$$

13.6 BREAK-EVEN MODELS AND PLANNING FOR PROFIT

The break-even point represents the volume of sales at which revenue equals expenses; that is, at which profit is zero. The break-even volume is arrived at by dividing fixed costs (costs that do not vary with output) by the contribution margin per unit, *i.e.* selling price minus variable costs (costs that vary directly with output). In certain situations, and especially in the consideration of multi-products, break even volume is measured in terms of rupee sales value rather than units. This is done by dividing the fixed costs or overheads by the contribution margin ratio (contribution margin divided by selling price). Generally, in these types of computations, the desired profit is added to the fixed costs in the numerator in order to ascertain the sales volume necessary for producing the target profit.

If management plans for a certain profit, then revenue needed to cover all costs plus the desired profit is

$$P, Q = TR = TFC + AVC \times Q + \text{Profit}$$

$$\text{and } Q_B = \frac{TFC + \text{Profit}}{P - AVC}$$

$$\text{or } Q_B = \frac{TFC + \pi}{P - AVC} = \frac{TFC + \pi}{ACM} \quad \text{where, } \pi = \text{Profit.}$$

$$\text{and } S_B = P, Q_B = \frac{TFC + \pi}{1 - \left(\frac{AVC}{P}\right)}$$

$$\text{and } \% B = \frac{TFC + \pi}{(P - AVC) (Q(\text{cap}))}$$

Thus, in the example used above,

$$Q_{\text{cap}} = 20,000$$

$$P = ₹ 100$$

$$AVC = ₹ 20$$

$$TFC = ₹ 200,000$$

$$Q_B = 2500 \text{ units}$$

$$S_B = ₹ 250,000$$

$$\% B = 12.5$$

If the management now wants to earn a target profit of ₹ 50,000, then we get new levels of $Q_B = 321,500$ and $\% B = 15.625$. If we add this target profit to the fixed costs we see that the break-even levels of all three factors we increased. The information in this example could be extended so as to make provisions for such factors as payment of taxes or for payment of any other fixed obligations that might be associated with the fixed costs (such as interest payments on bonds or debentures used to finance an investment).

13.7 MARGIN OF SAFETY

Margin of safety is the excess volume of sales over the break-even sales. It is highlighted in the form of absolute sales or in percentage. It is the difference in between the actual sales and break even sales. It elucidates the extent in which sales can be reduced without incurring a loss.

$$\text{Margin of Safety} = \text{Actual Sales} - \text{Break-even Sales}$$

(or)

$$= \text{Profit/PV ratio}$$

The greater the margin of safety leads to soundness of the firm's business.

It is important that there should be reasonable margin of safety otherwise a reduced level of activity may prove disastrous. The soundness of a business is gauged by the size of the margin of safety. A low margin of safety usually indicates high fixed overheads so that profits are not made until there is a high level of activity to absorb fixed costs.

A high margin of safety shows that break-even point is much below the actual sales, so that even if there is a fall in sales, there will still be a point. A low margin of safety is accompanied by high fixed costs, so action is called for reducing the fixed costs or increasing sales volume.

The margin of safety may be improved by taking the following steps:

- (i) Lowering fixed costs.
- (ii) Lowering variable costs so as to improve marginal contribution.
- (iii) Increasing volume of sales, if there is unused capacity.
- (iv) Increasing the selling price, if market conditions permit.
- (v) Changing the product mix as to improve contribution.

Example: From the following information relating to Quick Standards Ltd., you are required to find out (i) PV ratio, (ii) Break-even point, (iii) Margin of safety and (iv) Calculate the volume of sales to earn profit of ₹ 6,000.

Total Fixed Costs	₹ 4,500
Total Variable Cost	₹ 7,500
Total Sales	₹ 15,000

First step to find out the contribution volume

Sales	₹ 15,000
Variable Cost	₹ 7,500
Contribution	₹ 7,500
Fixed Cost	₹ 4,500
Profit	₹ 3,000

(i) Second step to determine the PV ratio

$$\text{PV ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{7,500}{15,000} \times 100 = 50\%$$

(ii) Third step to find out the break-even sales

$$\text{Break-even sales} = \frac{\text{Fixed cost}}{\text{PV ratio}} = \frac{4,500}{50\%} = 9,000$$

(iii) Margin of safety can be found out in two ways

$$\begin{aligned} \text{(a) Margin of Safety} &= \text{Actual sales} - \text{Break-even sales} \\ &= ₹ 15,000 - ₹ 9,000 = ₹ 6,000 \end{aligned}$$

$$\text{(b) Margin of Safety} = \frac{\text{Profit}}{\text{PV ratio}} = \frac{₹ 3,000}{50\%} = ₹ 6,000$$

(iv) Sales required to earn profit = ₹ 6,000

To determine the sales volume to earn desired level of profit

$$\begin{aligned} &= \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{PV ratio}} \\ &= \frac{₹ 4,500 + ₹ 6,000}{50\%} = ₹ 21,000 \end{aligned}$$

Example:

Break even sales	₹ 1,60,000
Sales for the year 1987	₹ 2,00,000
Profit for the year 1987	₹ 12,000

Calculate:

- Profit or loss on a sale value of ₹ 3,00,000
- During 1988, it is expected that selling price will be reduced by 10%. What should be the sale if the company desires to earn the same amount of profit as in 1987?

The major aim to compute fixed expenses

In this problem, the profit volume is given which amounted ₹ 12,000

$$\text{Profit} = \text{Contribution} - \text{Fixed expenses}$$

From the above equation, the volume of contribution has only to be found out.

To find out the volume of contribution, the PV ratio has to be found out.

Before finding out the PV ratio, the margin of safety should be found out.

$$\text{Margin of safety} = \text{Actual sales} - \text{Break-even sales}$$

$$= ₹ 2,00,000 - ₹ 1,60,000 = ₹ 40,000$$

Another formula to find out the Margin of safety is as follows:

$$\text{Margin of safety} = \frac{\text{Profit}}{\text{PV ratio}}$$

$$\text{PV ratio} = \frac{\text{Profit}}{\text{Margin of safety}} = \frac{₹ 12,000}{₹ 40,000} = 30\%$$

What is PV ratio?

$$\text{PV ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100$$

$$30\% = \frac{\text{Contribution}}{₹ 2,00,000}$$

$$\text{Contribution} = ₹ 2,00,000 \times 30\% = ₹ 60,000$$

Now with the help of the available information, the fixed expenses to be found out from the illustrated formula.

$$\text{Fixed expenses} = \text{Contribution} - \text{Profit} = ₹ 60,000 - ₹ 12,000 = ₹ 48,000$$

The next one is to find out the corresponding variable cost. The variable cost could be found out with the help of the following formula:

$$\text{Sales} - \text{Variable cost} = \text{Contribution}$$

$$₹ 2,00,000 - ₹ 60,000 = \text{Variable cost} = ₹ 1,40,000$$

(a) Profit or loss on the sale value of ₹ 3,00,000

For a sale value of ₹ 3,00,000, what is the contribution?

$$\text{Contribution for ₹ 3,00,000 sale} = ₹ 3,00,000 \times 30\% = ₹ 90,000$$

$$\text{Profit or Loss} = \text{Contribution} - \text{Fixed expenses} = ₹ 90,000 - ₹ 48,000 = ₹ 42,000 \text{ (Profit)}$$

(b) Sales to be found out to earn same level of profit

Sale value reduced 10% from the actual

$$₹ 2,00,000 - ₹ 20,000 = ₹ 1,80,000$$

$$\text{Variable cost} = ₹ 1,40,000$$

$$\text{Contribution} = ₹ 40,000$$

For the new level of sale volume in rupees, the new PV ratio has to be found out

$$\text{PV ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{₹ 40,000}{₹ 1,80,000} \times 100 = \frac{2}{9} \text{ Times}$$

The next important step is to determine the volume of the sales to earn the desired level of profit

$$= \frac{\text{Fixed expenses} + \text{Desired level profit}}{\text{PV ratio}}$$

$$= \frac{₹ 48,000 + ₹ 12,000}{2.9} = ₹ 2,70,000$$

13.8 DISTINCTION BETWEEN MARGINAL/DIRECT COSTING AND ABSORPTION COSTING

Since the closing stocks do not have any element of fixed costs, profit shown by marginal costing technique may be different from that shown by absorption costing. When the entire stock is sold, there is no inventory, i.e. neither there is opening nor will closing stock, the profit revealed by both the methods be same. But when sales and production are out of balance, difference in net profit is reported. When absorption costing is applied, the fixed manufacturing costs are shifted from one year to another year as a part of the inventory cost, i.e. stock. If a company produces more than it sells in a given period, not all of the current manufacturing overheads will be deducted from sales, i.e. closing stock will include a portion of fixed overheads. In other words, in absorption costing, inventory will be valued at a higher figure; therefore, profit will be more as revealed by absorption costing than marginal costing. Hence, profits will not necessarily increase with an increase in sale value. The position will be reverse, in case a company produces less than it sells in a given period. Thus, marginal costing can produce a net profit figure which is similar than or greater than or equal to the net profit as shown under absorption costing.

The differences between absorption costing and marginal costing are given below:

- In absorption costing, items of stock are accumulated as cost to include a fair share of fixed production overhead, whereas in marginal costing, stocks are valued at variable production cost only. The value of closing stock will be higher in absorption costing than in marginal costing.
- As a consequence of carrying forward an element of fixed production overheads in closing stock values, the cost of sales used to determine profit in absorption costing will:
 - ❖ Include some fixed production overhead costs incurred in a previous period but carried forward into opening stock values of the current period;
 - ❖ Exclude some fixed production overhead costs incurred in the current period by including them in closing stock values.

In contrast marginal costing charges the actual fixed costs of a period in full into the profit and loss account of the period. (Marginal costing is, therefore, sometimes known as period costing.)

- In absorption costing, actual fully absorbed unit costs are reduced by producing in greater quantities, whereas in marginal costing, unit variable costs are unaffected by the volume of production (that is, provided that variable costs per unit remain unaltered at the changed level of production activity). Profit per unit in any period can be affected by the actual volume of production in absorption costing; this is not the case in marginal costing.
- In marginal costing, the identification of variable costs and contribution enables management to use cost information more easily for decision-making purposes

(such as in budget decision-making). It is easy to decide by how much contribution (and therefore profit) will be affected by changes in sales volume. (Profit would be unaffected by changes in production volume).

- In absorption costing, however, the effect on profit in a period of changes in both production volume and sales volume is not easily seen, because behaviour is not analysed and incremental costs are not used in the calculation of actual profit.

Example: The following information relates to Sweets Ltd. and to a new product that has been produced at the commencement of the period just completed:

Sales 10,000 units sold at £ 5 each.

Production 15,000 units were produced at the following costs:

Direct materials 15,000
Direct labour 30,000
Variable expenses 6,000
Fixed expenses 12,000

(a) Prepare Profit & Loss A/c for the period under absorption and marginal bases.

(b) Reconcile the resulting profits/losses.

Solution:

Preparing Profit & Loss A/c under absorption and marginal costing

(a)

		Absorption costing		Marginal costing
Sales		£ 50,000		£ 50,000
Cost of production:				
Direct materials	£ 15,000		£ 15,000	
Direct labour	30,000		30,000	
Variable overhead	6,000		6,000	
Fixed overhead	12,000		0	
	63,000		51,000	
Less: Closing stock* (5,000 units)	(21,000)	(42,000)	(17,000)	(34,000)
Less:				
Fixed overhead				(12,000)
Net profit		8,000		4,000

Notes: *Closing stocks:

Under absorption costing = £ 21,000

Under marginal costing = £ 17,000

- (b) The difference between the profits of (£ 8,000 £ 4,000) = £ 4,000 is owing to the difference in stock valuations of (£ 21,000 £ 17,000) = £ 4,000.

Under the marginal basis all the fixed overheads have been charged to the period, whereas under the absorption basis one-third of the fixed overhead £ 4,000 has

been carried forward in closing stock, thereby escaping from the income statement, and thus rendering it higher than the marginal statement.

Example: A company producing a single article sells it at ₹ 10 each. The marginal cost of production is ₹ 6 each and fixed cost is ₹ 400 per annum. You are required to calculate the following:

Profits for annual sales of 1 unit, 50 units, 100 units and 400 units

P/V ratio

Breakeven sales

Sales to earn a profit of ₹ 500

Profit at sales of ₹ 3,000

New breakeven point if sales price is reduced by 10%

Margin of safety at sales of 400 units

Solution:

Particulars	Amount	Amount	Amount	Amount
Units produced	1	50	100	400
Sales (units × 10)	10	500	1000	4000
Variable cost	6	300	600	2400
Contribution (Sales - VC)	4	200	400	1600
Fixed cost	400	400	400	400
Profit (Contribution - FC)	-396	-200	0	1200

Profit Volume Ratio (PVR) = $\text{Contribution/Sales} \times 100 = 0.4$ or 40%

Breakeven sales (₹) = $\text{Fixed cost/PVR} = 400/40 \times 100 = ₹ 1,000$

Sales at BEP = $\text{Contribution at BEP/PVR} = 100$ units

Sales at profit ₹ 500

Contribution at profit ₹ 500 = $\text{Fixed cost} \div \text{Profit} = ₹ 900$

Sales = $\text{Contribution/PVR} = 900/4 = ₹ 2,250$ (or 225 units)

Profit at sales ₹ 3,000

Contribution at sale ₹ 3,000 = $\text{Sales} \times \text{P/V ratio} = 3000 \times 0.4 = ₹ 1,200$

Profit = $\text{Contribution} - \text{Fixed cost} = ₹ 1200 - ₹ 400 = ₹ 800$

New P/V ratio = $9 \div 6 = 1.5$

Sales at BEP = $\text{Fixed cost/PV ratio} = \frac{₹ 400}{1/3} = ₹ 1,200$

Margin of safety (at 400 units) = $4000 - 1000/4000 \times 100 = 75\%$
(Actual sales - BEP sales/Actual sales × 100)

Check Your Progress

Fill in the blanks:

1. A _____ indicates at what levels of cost and revenue are in equilibrium.
2. The _____ indicates Total Fixed Costs (TFC) (the vertical intercept) and a constant average variable cost (the slope of the TC curve).
3. _____ is also equal to total net profit plus total fixed costs.
4. _____ is equal to the selling price (P) per unit times the quantity of output or sales (Q).
5. The break-even point represents the volume of sales at which revenue equals expenses at which profit is _____.
6. The value of closing stock will be _____ in absorption costing than in marginal costing.

13.9 LET US SUM UP

- Break-even analysis examines the relationship between the total revenue, total costs and total profits of the firm at various levels of output. Break-even analysis is a generalised approach for dealing with a wide variety of questions associated with profit planning and forecasting.
- The difference between Price and Average Variable Cost (P-AVC) is defined as 'profit contribution'. That is, revenue on the sale of a unit of output after variable costs are covered represents a contribution toward profit.
- A break even chart may be defined as an analysis in graphic form of the relationship of production and sales to profit.
- Break-even analysis can also be performed algebraically, as follows. Total revenue is equal to the selling price (P) per unit times the quantity of output or sales (Q).
- The break-even volume is arrived at by dividing fixed costs (costs that do not vary with output) by the contribution margin per unit, i.e. selling price minus variable costs (costs that vary directly with output).
- Margin of safety is the excess volume of sales over the break-even sales. It is highlighted in the form of absolute sales or in percentage.

13.10 UNIT END ACTIVITY

S V Ltd., a multi-product company, furnishes you the following data relating to the year 1979:

Particulars	First half of the year	Second half of the year
Sales	45,000	50,000
Total cost	40,000	43,000

Assuming that there is no change in prices and variable costs that the fixed expenses are incurred equally in the two half year periods thereof for the year 1979.

Calculate:

- (a) PV ratio
- (b) Fixed expenses
- (c) Break-even sales
- (d) Margin of safety

13.11 KEYWORDS

Break-even Point: It is the level of activity at which total costs of the units are to equal total revenue, leaving no profit or loss.

Break-even Chart: The break-even chart is a graphical representation of cost volume profit relationship. It depicts the profitability/loss, breakeven of the undertaking at different levels of output.

Total Cost (TC): Total cost (TC) describes the total economic cost of production and is made up of variable costs, which vary according to the quantity of a good produced and include inputs such as labour and raw materials, plus fixed costs, which are independent of the quantity of a good produced and include inputs (capital) that cannot be varied in the short term.

Contribution Margin: The contribution margin is the amount of money a company has to cover its fixed costs after it pays all of its variable expenses. It is also the amount, after covering fixed costs, which contributes to the net operating profit or net operating loss of the business firm.

Margin of Safety: The margin of safety is the amount of sales over a company's break-even point.

13.12 QUESTIONS FOR DISCUSSION

1. What do you mean by break-even analysis?
2. What are its assumptions?
3. Briefly explain the term 'Break-even point' and give its uses.
4. How can the break-even point be computed?
5. The ratio of profit and volume of a company is 50% while its margin of safety is 4/1. The sales volume is ₹ 50 lacs. Find out its break-even point and the net profit.
6. The Profit-Volume (P/V) ratio of a pharmaceutical company is 50% and the margin of safety is 40%. Find out the break-even point and the net profit if the sales volume is ₹ 50 lacs.
7. What is the difference between absorption costing and marginal costing?
8. What is 'profit contribution'?
9. Draw a break even chart in which the Total Revenue (TR) and the Total Cost (TC) curves are represented by straight lines.
10. Write a short note on margin of safety.

Check Your Progress: Model Answer

1. Break-even analysis
2. TC curve
3. Total contribution profit
4. Total revenue
5. Zero
6. Higher

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UNIT 14

COST AUDIT

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14.0 AIMS AND OBJECTIVES

After studying this lesson, you should be able to:

- Explain the meaning, objectives, scope, importance and types of cost audit
- Discuss the advantages and disadvantages of cost audit
- Describe the appointment, eligibility, rights, responsibilities and functions of a cost auditor
- Interpret cost audit in India
- Understand the programme of cost audit

14.1 INTRODUCTION

Cost Audit is a critical review undertaken to verify the correctness of Cost Accounts and to check that cost accounting principles and planning have been efficiently followed. With the emergence of accountability as an important aspect of business enterprise whether in the public sector or in the private sector, the auditing of accounts has assumed enormous significance. As such, different types of audit are in use, which are as under: Cost Audit, Financial Audit and Management Audit.

14.2 MEANING AND DEFINITIONS OF COST AUDIT

It is an audit process for verifying the cost of manufacture or production of any article, on the basis of accounts as regards utilisation of material or labour or other items of costs, maintained by the company. In simple words, the term 'Cost audit' means a systematic and accurate verification of the cost accounts and records and checking of adherence to the objectives of the cost accounting.

As per ICWA London, "Cost audit is the verification of the correctness of cost accounts and of the adherence to the cost accounting plan."

As per the section 233 B of Company Law 1956, there is the provision for cost audit. Under this section, cost audit is compulsory for all the public and govt. companies which are associated with the processing and production. If their aggregate value of net worth exceeds ` 5 crores or total sale exceeds ` 20 crores, the cost audit is must.

ICWA, India defines cost audit as, "An audit of efficiency of minute details of expenditure while the work is in progress and not a post-mortem examination. Cost audit is mainly a preventive measure, a guide for management policy and decision in addition to being a barometer of performance."

In other words, the term 'Cost audit' means examination of books of accounts and vouchers so as to ascertain their accuracy in the system.

Cost Audit has been defined by the Chartered Institute of Management Accountants (CIMA) of London as "the verification of cost accounts and a check on the adherence to the cost accounting plan."

This definition implies the following:

- (i) The objects of cost accounting with reference to which the cost accounting plan must have been drawn up have to be kept in mind to see whether or not the plan itself and the figures collected will lead to the achievement of the goal or objective set. For instance, if the objective is to achieve maximum efficiency, the plan and the analysis of data will be different from the case where the only objective is to fix prices.

- (iii) It has to be examined whether the methods laid down for ascertaining costs and other relevant decisions are being implemented. Treatment and determination of abnormal losses or treatment of certain expenses as direct or indirect are cases in point.

(iii) The correctness of the figures has to be vouched.

Statutory Cost Audit is a system of audit introduced by the Government of India for the review examination and appraisal of the cost accounting record and added information required to be maintained by specified industries (ICWA of India).

ICWAI defines Statutory Cost Audit as a "system of audit introduced by the Government of India for the review, examination and appraisal of the cost accounting records and added information required to be maintained by the specified industries".

Cost Audit is a critical review undertaken for the purpose of:

- (a) Verification of the correctness of cost accounts, and
- (b) Checking that Cost Accounting Plan is adhered to.

From the above definitions, the meaning of cost audit comprises the following:

- (i) The verification of Cost Accounting Records, such as Cost Accounts, Cost Reports, Cost Statements, Cost Data and Costing Techniques.
- (ii) Examining these records to ensure that they adhere to the cost accounting principles, plans, procedures and objectives.
- (iii) Cost Audit is to be conducted with regard to (i) provisions of Companies Act, 1956, (ii) Cost Accounting Records Rules, (iii) Cost Accounting (Report) Rules and (iv) Cost and Works Accountants Act, 1959.

The Companies Act, 1956 was amended by the Companies Amendment Act, 1974 introducing section 233B empowering the Central Government to order audit of cost accounts for which maintenance of Cost Accounts was prescribed in respect of companies engaged in production, processing, manufacturing or mining activities under section 209(1)(d) such particulars relating to utilization of material, labour or other items of cost as may be prescribed.

14.3 SCOPE AND IMPORTANCE OF COST AUDIT

Cost audit is concerned mainly with propriety and efficiency audit. The company law is silent in respect of scope and areas of cost audit. Some of the areas/scopes which may be examined by the cost auditor are mentioned below:

- (a) **Raw Materials:** The cost auditor must make the following tests about raw materials:
 - (i) Check the purchasing routine, the purchase order, stores indent, bills of payment, etc.
 - (ii) Verify the various levels of stock, i.e., maximum level, minimum level and average level,
 - (iii) Is the stock of raw material in conformity with the output activities? Exceeding the quantity necessary for the output reduces the liquidity of funds naturally increases the output costs,
 - (iv) Raw materials have been issued under signed acquisition cards by the authorized persons,

- (v) Check the routine of storage, bin cards, stores ledger, disposal, wastages and damages,
 - (vi) The different items related with the receipt, issue and balance have been the subject matter of adequate accounting in terms of quantity and price. The ledger of raw materials should be verified from the hand-over slips or receipt vouchers,
 - (vii) Check the issue of raw materials, pricing of issues, etc.
 - (viii) Effecting in purchasing raw materials, whether materials are purchased at economic buying quantity,
 - (ix) Reasonableness of losses, scraps, wastage, etc., arising out of manufacture,
 - (x) Adequacy of the procedure for posting stores ledger and bin card on a day-to-day basis,
 - (xi) The auditor must also see whether there exists any loophole by the theft of the raw material is possible, and
 - (xii) Reasonableness of the value of closing stock vis-à-vis opening stock and production programme.
- (b) **Labour:** Proper utilisation of labour will lead to increase in efficiency and productivity. The auditor(s) duty will, therefore, be to assess performance efficiency of labour. In measuring actual performance, the auditor should:
- (i) Verify that the analysis of direct labour and indirect labour is correctly done,
 - (ii) Ensure the physical checking of attendance and see that time cards are maintained,
 - (iii) Check the reconciliation to attendance time with effective time and idle time,
 - (iv) Confirm that the incentive bonus schemes are in operation,
 - (v) Examine job cards and idle time cards,
 - (vi) Examine whether inefficiencies are reported to the management in time so as to ensure maximum utilisation of labour,
 - (vii) Check and verify that there is any arrangement to keep the account of the extra-work done by the labourers? Are written orders passed to get the extra work done?
 - (viii) Verify the labour cost is distributed properly into direct and indirect cost. In the division of cost of labour in various jobs, does it work properly?
 - (ix) Check, is the manpower used judiciously or the productivity of the labour satisfactory?
- (c) **Overheads:** The auditor must examine the following overheads:
- (i) Check all possible increases or decreases in overhead expenses,
 - (ii) Check whether allocation, apportionment, and absorption methods are correct,
 - (iii) Legitimacy of payments made for overhead costs,
 - (iv) Correctness of calculation of overhead absorption rates,
 - (v) Adequacy and reasonableness of overhead costs compared to volume of production,

- (vi) Method of valuation of closing stock to ensure that overhead costs are consistently included or excluded in record.
 - (vii) Check the actual overheads are excess of standard or budget overheads? If, yes, what are its effective reasons, and
 - (viii) Check the absorption has been done on various works and job adequately and on the due rate.
- (d) **Capital Expenditure:** The auditor must check and verify the capital expenditure as follows:
- (i) Maintenance of proper asset register,
 - (ii) Accounting of capital expenditure including charges for transport, etc., to capital heads,
 - (iii) Propriety and authority for a capital expenditure,
 - (iv) Correctness of depreciation rates and physical verification of fixed assets, and
 - (v) Collection of capital expenditure and comparison with budget regularly.
- (e) **Capacity Utilisation:** The auditor should examine the following:
- (i) General imbalance in production capacity and facilities,
 - (ii) Reasonableness of idle capacity and reasons for idle capacity,
 - (iii) Optimum utilisation of resources, and
 - (iv) Reasonableness of cost of maintenance, repairs, replacement, etc.

14.4 OBJECTIVES OF COST AUDIT

The broad objectives of cost audit are given as follows:

- (i) Detecting errors or ensuring that cost records are compiled correctly.
- (ii) To examine and verify the arithmetical exactness in the cost ledgers or cost books.
- (iii) Ensuring that the cost accounting routine laid down is properly carried out.
- (iv) To trace and check the errors and fraud in cost ledgers.
- (v) Verifying that cost accounts are correctly maintained in conformity with accepted cost accounting principles adopted in the enterprise or industry.
- (vi) To establish that the policies and procedures fixed by management for effective decisions are being pursued uniformly or not.
- (vii) The present use of capital is adequate or not whether it can be bettered or not.
- (viii) To see whether the determined policies, procedures, various reports and descriptions for presentation are adequate and appropriate or not.
- (ix) To check whether the adopted procedure is effective in carrying out managerial decisions or not.
- (x) In the event of cost plus contract, to verify the purity of output of cost.

14.5 TYPES OF COST AUDIT

The following are the main types of cost audit:

- (i) On the basis of Origin, and
- (ii) On the basis of Nature.

14.5.1 On the Basis of Origin

On this basis of origin, the cost audit is divided into following categories:

Internal Cost Audit

It means the audit under which the auditors are appointed to help the managerial decisions of enterprise taken by the top management. Internal cost audit can be further divided into:

- **Continuous Internal Audit** continues for the year round with the cost accounts. This audit helps in tracing the faults and errors and provides ready time to correct them. Cost accounting is not left incomplete, therefore, whatever information is needed, is available at hand.
- **Periodic Internal Audit** is done after a definite period of time, wherein the accounts of that period are checked and examined.

Specific Cost Audit

The specific cost audit is arranged by customers, business enterprises, government or special undertakings for some specific objectives. The objectives of specific cost audit can be divided into following categories:

1. **Cost Audit on behalf of Government:** The government may appoint a cost auditor to conduct cost audit where it is necessary:
 - (a) To do so in the opinion of the government under section 233B of the Companies Act, 1956,
 - (b) To ascertain correct cost of specific units when government is approached for protection or related help,
 - (c) To ascertain correct cost of contract given to private enterprise under Cost plus method, and
 - (d) To fix reasonable prices of products.
2. **Cost Audit on behalf of a Customer:** Sometimes, cost audit may be conducted on behalf of a customer when he agrees to pay price for a product on Cost plus method. The customer in such a case gets cost accounts of the product concerned audited to establish correct cost so that he may be able to pay price on the basis of correct cost plus an agreed margin of profit.
3. **Cost Audit on behalf of Trade Association:** Sometimes, a trade association may appoint a cost auditor to conduct cost audit:
 - (a) To ascertain comparative profitability of association of members,
 - (b) To determine minimum price to avoid competition among its members, and
 - (c) To maintain prices at various levels.
4. **Cost Audit on behalf of Tribunals:** Sometimes, Labour Tribunals may direct the audit of cost accounts to settle trade disputes for more wages, bonuses, share in profit, etc. Similarly, Income-Tax Tribunals may also direct the audit of cost accounts to assess correct profit for tax purposes.

Statutory Cost Audit

Statutory cost audit means that audit which is arranged to fulfill the provisions of a certain statute. It may be both financial audit and cost audit. Such audit of the accounts of the government departments and statutory bodies is conducted by the representative of the CAG of India.

14.5.2 On the Basis of Nature

On the basis of nature, the cost audit is divided into following categories:

Propriety Audit

This audit is the audit of such actions and plans of management which have a bearing on the finance and expenses of the company or enterprise. The cost auditor has to examine the following activities:

- Whether the size and channels of expenses were designed to produce the best results,
- Whether the return from expenses on capital as well as current operations could not be bettered by some other alternative plan of action, and
- To examine the planning of expenses so as to ascertain whether possible result is obtained or not.

Efficiency Audit

It is the test of the efficiency of organisation. This is the valuation of the executed action. So that it is concluded that the effective efficient implementation of the predetermined plan has been carried on. It starts with the study of the plan and extends to the comparison of the actual performance against the budgeted performance and investigation into the reasons of variables. The main functions of efficiency audit are as following:

- To ensure that every investment in capital or other fields gives the optimum return,
- In matters of work and financial matters, the adjustment has been made in such a way so that the optimum result is obtained, and
- This audit is related with valuation and examination of profitability so it is known as performance or profitability audit.

14.6 CIRCUMSTANCES UNDER WHICH A COST AUDIT IS ORDERED

With reference to "Types of Cost Audit" in 14.5 above, following are the circumstances under which a cost audit is ordered:

- (i) When a company or a product incurs continuous losses.
- (ii) In case of cost-plus contracts
- (iii) For price fixation
- (iv) In case of major cost variations within the different units of the industry
- (v) In case of granting subsidy by the Government
- (vi) In case of fixation of levies and duties on products by the Government
- (vii) For settling trade disputes on account of higher wages, bonus, etc.
- (viii) When a trade union wants to negotiate with the Government for certain benefits.

14.7 ADVANTAGES AND DISADVANTAGES OF COST AUDIT

The followings are the main advantages and disadvantages of cost audit to management, cost accountant, shareholders, tax-payers, government and consumers:

14.7.1 Advantages

The advantages of cost audit are as follows:

- (i) It will help management in taking important decisions because prompt, accurate and reliable information is made available to management with the help of cost audit.
- (ii) It will bring more reliability on the costing data and hence can be more effectively used for inter-firm comparison. Management by exception is possible since cost audit separates efficient from inefficient operations and fixes individual responsibility for inefficient operations.
- (iii) Cost audit is very useful in public enterprises because it pinpoints the inefficiency of the employees. Thus, it will help in reducing cost of production of goods produced by such organisations.
- (iv) The existence of cost audit has a great moral influence on the employees, as a result of which the efficiency is increased.
- (v) Cost audit will establish the accuracy of cost ledgers or other accounts and will assist in prevention of errors and frauds. It will also help to improve cost accounting methods and techniques to facilitate prompt and reliable information to management.
- (vi) Cost audit reports raise the status of cost accountant. Being external, it helps in improving cost methods and can solve specific problems which ultimately raise the status of cost department.
- (vii) Analysis of variances is facilitated with cost audit because a comparison of actual production with standard production and sales is made. Hence, the systems of standard costing and budgetary control will be gainfully applied with the cost audit.
- (viii) Cost audit assists the financial auditor because he can safely rely on many important costing data such as cost of closing stock of raw materials, work-in-progress and finished goods.

In financial accounts, closing stock is valued at cost or market price, whichever is less. The actual cost of closing stock can be reliably taken from costing books. In other matters, like payment of commission, bonus to staff, etc., the data supplied by cost accounts and audited by cost auditor can be taken as correct by the financial auditor.
- (ix) It provides information relating to weak, inefficient or mismanaged units for taking proper corrective action. It also helps to identify the sickness in a unit.
- (x) The government and the trade associations may require cost audit for the purpose of fixing selling prices to prevent excessive profit making. The government also requires cost audit to give protection to certain industries in public interest. It contributes to the betterment of the economy by increasing productivity and performance.

14.7.2 Disadvantages

The disadvantages of cost audit are as follows:

- (i) Cost audit involves cost of products and this may not be suitable for small industries.
- (ii) Cost audit may create unnecessary problems in day-to-day official work.
- (iii) When the financial and other related accounts are audited, audit of cost accounts is unnecessary work in the audit practice.
- (iv) When the various cost and other accounts are prepared or maintained by a qualified accountant, there can be no reason for getting such accounts audited by another auditor, and
- (v) The cost auditor may be a qualified man, but he may not be always right and correct opinion regarding various accounts and its information.

14.8 TECHNIQUES OF COST AUDIT

Some important techniques are discussed here:

14.8.1 Audit Sampling and Statistical Sampling

Audit sampling is the application of a compliance or substantive audit procedure to less than 100% of the items within an account balance or class of transactions to enable the auditor to obtain and evaluate evidence of some characteristic of the balance or class and to form or assist in forming a conclusion concerning that characteristic. The term Sampling denotes the selection of a part of the aggregate material representing the total affairs of a system. The term Statistical sampling refers to the whole process of carrying out a test on a scientific basis. It is designed to determine the degree of accuracy of a particular set of transactions rather to discover individual isolated errors.

Factors to be considered for 'Audit Sample' design

In designing an audit sample, an auditor should apply his judgement in consideration of the important factors:

- (i) Audit objectives,
- (ii) Population,
- (iii) Risk and assurance,
- (iv) Tolerable error, and
- (v) Expected error in the population.

Sampling, as the process of learning about a lot by looking at a little helps the Cost Auditor in making an opinion or submitting recommendations on a particular audit area by examining a small percentage of the transactions or operations.

It is a kind of audit tool that enables him to crystallize his thoughts into a recommendation. But, in the application of a sampling technique in an audit work, the Cost Auditor has to make sure, for sampling to be effective, that he has observed the three basic ingredients of successful sampling.

These are:

- (i) Selection of the sample items,
- (ii) Number of items to be selected, and
- (iii) Evaluation of the sample results.

Therefore, with a view to applying the technique of Statistical Sampling successfully in a Cost Audit Assignment, the auditor needs to be cautious and should keep in his mind the following important points:

1. He must be aware of the principles involved in a scientific sampling which should be used by him only when the audit objective necessarily so warrants depending on the circumstances.
2. Audit opinions should be based only on the sampled population but he must not be oblivious of the total population.
3. He must ensure that every item in the population has an equal opportunity of being selected for the sample.
4. During selection process of a sample he should not keep biased thought.
5. The patterns in the population should not be permitted to influence the randomness of the sample.
6. He should not come to his conclusion about the entire population from the directed sample.
7. He should base his estimates of maximum-error rate on realistic grounds and not illusory.
8. Stratification should be resorted to by him whenever necessary.
9. He should not set for himself unrealistic and unachievable goals. He should remember that all controls seek to reduce the extent and degree of audit risks.
10. After the sample results have been obtained, he should try to find out the reasons for the variances, and then recommend corrective measures or express his opinions.

Application in a Cost Audit Assignment

Statistical sampling technique in a cost audit assignment could cover the following areas specifically:

- (i) Purchases and Creditors;
- (ii) Sales and Debtors;
- (iii) Consumable stores and spares consumption;
- (iv) Workmen's attendance and leave records;
- (v) Workmen's pay-rolls;
- (vi) Employees' salaries;
- (vii) Cash disbursements;
- (viii) Consumable stores inventories;
- (ix) Posting in Priced Stores Ledger, and tallying with the Bin Cards;
- (x) Overheads (Works/Administration/Selling/Distribution).

Records or Transactions where Test-Checking Unsuitable

The methods of test-checking are not suitable for their application to the following records and transactions specifically:

- (i) Cash Book;
- (ii) Bank Account;

- (iii) Asset Records;
- (iv) Shares Register;
- (v) Investment Account;
- (vi) Account of loans and advances;
- (vii) Account of liabilities;
- (viii) Profit and Loss Account;
- (ix) Balance Sheet;
- (x) Accounts of major raw materials/components/process materials;
- (xi) Direct Expenses;
- (xii) Depreciation;
- (xiii) Quantitative Production Records;
- (xiv) Abnormal and non-recurring costs;
- (xv) Cost Statements;
- (xvi) Inter-company transactions.

14.8.2 Flow Charts

It is one of the techniques used by an auditor for reviewing and evaluating internal accounting control of a company. It is a graph showing the flow of any work activity from start to end, into which the various stages of operation or work or process of the entire activity or system are charted sequentially with the aid of certain symbols universally adopted by the accountants and auditors.

There are two approaches in the preparation of a flow chart: vertical and horizontal. Most auditors, who use this technique for audit flow chart, prefer horizontal charting for the purpose of making an intensive analysis of the movement of documents and accounting information between different employees and departments.

This way, they can obtain an understanding of how the logic of a system operates, and can trace out the system's weaknesses or inefficiencies. Special graph papers are used for the preparation of flow charts. Generally, four steps are involved in flow charting technique—designing, symbolizing, outlining and completing.

The designing, it is a first step, is very important because the overall system of the organisation is carefully studied for dividing it into a number of appropriate logical sections. If the auditor designs a flow chart, he has to visualize the information flow and the documents being processed. If, however, he uses a client-constructed flow chart he should not only interpret the symbols but also draw useful conclusions about the system depicted in it.

Accounting or auditing flow charts may be drawn (for examples) to show:

- (a) The flow of material from material stores through departments to the finished goods godown.
- (b) The flow of inward mails in office through different sections to the filing section.
- (c) The processing of vouchers and bills at different stages of recording up to finalization of accounts.

Thus, a system flow chart is one that gives a pictorial image of the general flow of information from one document to another from one location to another, and, if applicable, from one machine to another. By viewing this documentation, the auditor

is able to arrive at some tentative conclusions about the order or lack of order in the system.

14.8.3 Vouching

Vouching is the examination of the evidence offered in substantiation of the entries in the books including in such examination the proof so far as possible that no entries have been omitted from the books. To substantiate an entry in the books, the auditor has to examine the supporting documentary evidences such as vouchers, receipts, invoices, minutes, contracts, correspondence, etc.

14.8.4 Check Marks and Ticks

In order to indicate that the work has been completed, some check marks and ticks with coloured pencil or ink should be adopted.

14.8.5 Test Checks

These may be employed where transactions are numerous and the audit checks are few. In such cases, statistical techniques may be employed. There is no need of cent per cent check.

14.8.6 Audit Notes and Questionnaires

A careful and precise note must be taken of all material facts uncovered in the course of audit such as errors discovered, defects in the system of accounting or internal control and working details supporting the actual statement of accounts. The auditor may issue questionnaires to the different departmental managers so as to find an answer of each question.

A questionnaire on material (stores department) is given as under:

1. Are goods received notes obtained for all incoming goods?
2. Are bin cards entered daily from goods received notes?
3. Are stores requisitions checked as to authorization?
4. Are stores taken from bins recorded daily on bin cards?
5. Have stores debit notes been received for all materials returned to store?
6. Have they been recorded at once in bin cards?
7. Have all known losses, with their causes been reported at once?
8. Have fire appliances been checked regularly?
9. Have weighing machines been regularly maintained?
10. Has the inspector's attention been called to all cases of damage to goods?
11. Have you any suggestions to put forward to the management regarding the work of your department?

14.8.7 Audit Report

After completion of the audit, the auditor should report about the correctness or otherwise of the system and his recommendations. No standard form for an audit report can be laid down. The report should be concise and rendered speedily so as to be of effective use to the management.

14.8.8 Ratio Analysis

It is the most common of all analytical review procedures (i.e., analytical audit). It involves the following:

1. The computation of significant financial relationships.
2. The comparison of current period ratios with one or more of the following:
 - (a) Similar ratios of a prior period or periods.
 - (b) Similar ratios of the industry.
 - (c) Similar ratios designated as acceptable by bankers, other credit guarantors or the auditor.
3. The analysis of unusual and significant deviations between current period ratios and those with which they are compared.

Ratios may be classified based on their sources as follows:

1. **Balance Sheet Ratios:** They deal with relationship between two items appearing in the balance sheet. These ratios are also known as financial position ratios since they reflect the financial position of the business. Examples are: Current ratio ($= \text{Current assets} / \text{Current liabilities}$) which measures short-term liquidity and Inventory-Working Capital ratio [$= \text{Inventory} / (\text{Current assets} - \text{Current liabilities})$] which measures excessive inventory or insufficient working capital.
2. **Income Statement Ratios:** They express the relationships between two individuals or group of items appearing in the profit and loss statement. Since they reflect the operating conditions of a business, they are known as operating ratios. Examples: Gross profit ratio ($= \text{Gross profit} / \text{Sales}$) which measures pricing policy and Net Income ratio ($= \text{Net income} / \text{sales}$) which indicates operating efficiency.
3. **Mixed Ratios:** They express the relationship between two items each appearing in different statement, i.e., one appearing in the balance sheet and the other in the income statement. These are also called inter-statement ratios. Examples: Inventory turnover ratio ($= \text{Cost of goods sold} / \text{Average inventory}$) measures inventory liquidity, and Return on assets ($= \text{Net income} / \text{Total assets}$) measures efficiency of asset utilisation.

In order to develop relevant and meaningful ratios, the auditor must use his knowledge of the client and its industry. Ratio analysis has limitations in that it concentrates on the past and deals in aggregates. Ratios serve as warning signs and indicators, and are helpful in discovering existing or potential trouble spots when applied in trend analysis and variance analysis.

Ratios show a trend and may help in focusing attention to the more important areas where detailed checking may be necessary. Such ratio analysis may identify anything abnormal or anything which deviates from the expected and the known ratios highlight only symptoms. It is for the cost auditor to study those symptoms properly, correlate them, and reach definite conclusions or identify the areas for further enquiries.

14.9 DIFFERENCES BETWEEN FINANCIAL AUDIT AND COST AUDIT

In general, no difference between financial and cost audit is discernible. Both employ the similar methods, techniques and principles for examining the various accounts.

Financial audit and cost audit may be distinguished as follows:

S. No.	Basis	Financial Audit	Cost Audit
1.	Purpose	Financial audit is not necessary for a financial auditor to examine cost accounts except for the purpose of inventory valuation.	The cost auditor has to make a detailed checking of expenditures, particularly allocation and apportionment of overheads.
2.	Objective	The primary objective of financial audit is to see whether necessary accounts, records and documents have been maintained by the enterprise or organisation.	The primary objective of cost audit is to verify the cost records have been properly maintained by the accounts department or organisation.
3.	Compulsion	As per the Company Act, financial audit is compulsory for each company for every financial year.	As per the Company Act, statutory cost audit is only required for the financial year.
4.	Area	Financial audit is an audit of financial accounts, financial statements and documents.	Cost audit is an audit of cost accounts, cost statements and various cost plans.
5.	Statutory audit	The statutory financial auditor cannot conduct a statutory cost audit in the organisation.	The statutory cost auditor cannot also conduct a statutory financial audit in the financial year.
6.	Audit report	The financial auditor submits his report to the shareholders as per rule of the Company Act.	Cost auditor also submits his report to the Management. But in the case of statutory cost audit, the audit report is required to be submitted to the board of directors.
7.	Competent person	A chartered accountant is considered competent person for performing financial audit.	A qualified cost accountant is considered competent person for performing cost audit.
8.	Postmortem	Financial audit is somewhat a postmortem examination. It is back to the past of company or organization.	Cost audit also refers to the past; it creates thinking for the future.
9.	Shareholders and management	Financial audit is essentially an audit on behalf of the shareholders.	Cost audit is in the hands of management and also conducted on behalf of the management.
10.	Inventory checking	In the matter of stock or inventory, the financial auditor has only to see whether all categories of stocks or inventories have been included in the accounts.	The cost auditor has to not only check the cost of each item of stock or inventory, but also see whether the inventories of materials have been included in the proper way.

14.10 COST AUDITOR: APPOINTMENT, ELIGIBILITY, RIGHTS, RESPONSIBILITIES AND FUNCTIONS

The various rules with respect to cost auditor's appointment, eligibility, rights, responsibilities and functions are discussed below:

14.10.1 Appointment of Cost Auditor

The Cost Auditor has to be appointed by the board of directors under section 233-B of the Companies Act subject to prior approval of the Company Law Board. This will be done on receipt of specific order from the Company Law Board for getting audited the Cost records and Cost statements of a financial year for specified products. For appointment of auditor, the board of directors is required to pass a resolution either in

its meeting or by circulation with a condition that the same is subject to approval of the Central Government.

Appointment of cost auditor is made on the receipt of an order from Central Government within a specified period. The person to be appointed as cost auditor must hold a certificate of practice from the Institute of Cost and Works Accountants of India. Consent of the cost auditor should be obtained before making an appointment as cost auditor. Application in prescribed form as per rule is submitted to Central Government with the prescribed fee along with a copy of the board's resolution.

Approval for appointment of cost auditor is communicated by the Central Government to the company after considering the application and the name of the auditor proposed subject to the condition that the cost auditor is not disqualified as per related section of the Companies Act, 1956 as amended. A copy of this communication will also be sent by the Central Government to the cost auditor. The company should issue a formal letter of appointment to the cost auditor after receiving the approval of the Central Government.

After receiving the letter of his appointment, the cost auditor should communicate with the previous auditor, if any, for his reaction. He must send his formal acceptance of the assignment to the company or board of directors.

14.10.2 Eligibility for Appointment of Cost Auditor

The following persons are eligible to be appointed as a cost auditor:

- (i) Any such chartered accountant within the frame of the Chartered Accountant Act and has passed examination of the Institute of Chartered Accountants of India, or
- (ii) Cost accountant within the frame of the Cost and Works Accountants Act, or
- (iii) Other person as may hold the prescribed qualification for a cost auditor.

14.10.3 Rights of a Cost Auditor

A cost auditor has the same rights in relation to an audit conducted by him under section 233-B as an auditor of a company under section 227(1). The following are rights of a cost auditor:

- (i) He has a right to get all facilities and assistance from the related company or organisation to perform his duties as a cost auditor,
- (ii) He has a right of check at all times to the records, accounts and vouchers of the company,
- (iii) The company and every officer, in default of not providing the records, accounts, vouchers, information, explanations, etc., to the cost auditor,
- (iv) He has a right to get such information and explanations from the officers of the company or organisation as he may think necessary for the performance of his duties as a cost auditor.

14.10.4 Responsibilities of a Cost Auditor

The responsibilities and duties of a cost auditor have not been clearly given in the Companies Act. The cost auditor is also required to perform the duties as are expected from auditors in general. The main responsibilities of a cost auditor are given as under:

- (i) He should maintain his working papers as an evidence of his having carried out his duties,

- (ii) He is responsible to answer any query required/raised by the Central Government on a scrutiny of the cost audit report submitted by him,
- (iii) He is liable to take responsibility of the Company if he does not perform his duties properly or in right direction,
- (iv) He also owes a legal responsibility to third parties who might have been misled by his audit certificate.

14.10.5 Functions of a Cost Auditor

The Institute of Cost and Works Accountants of India has detailed the principal functions of a cost auditor by way of comparison with the functions of the auditor of financial accounts. The principal functions of a cost auditor, according to the aforesaid Institute are given as following:

(i) *Inventory*

- (a) Is the size of the inventory adequate or excess compared with the production programme?
- (b) Is the provision most economical?
- (c) Does it ensure optimum order size?
- (d) Does it take into account the storage cost on the one hand, and carrying cost on the other?
- (e) Does it take note of lead time of the various items or groups of items?
- (f) Does the receipt and issue system cause any bottle-neck in production?
- (g) Does it involve too many forms and too much paper work?
- (h) Is there any room for reduction of inventory cost consistent with production needs?
- (i) Is the inventory as per the priced store ledger and as certified by the management physically correct?
- (j) Is the same amount of attention and care given to monies translated into material things like raw materials, stores and supplies of all kinds as given to liquid cash?
- (k) Does the issue of raw materials make the production in accordance with the standard or schedule or otherwise or covered by authorised schedule?
- (l) Is the expenditure of consumable stores within the standard? If not, why not?

(ii) *Opening and Closing Stocks*

The cost auditor who sees the following:

- (a) That the opening stock is not unduly large compared with the volume of production during the year;
- (b) That the opening stock against various jobs really represents the actual physical stock in the production shop and is not merely an accounting figure;
- (c) That the responsibility of the shop foreman in-charge of the stock held in the production shop is clear and properly documented that he maintains proper record of actual consumption vis-a-vis the actual withdrawal from the stock.

Valuation and correct indication of closing stock in the Trading and Profit and Loss Account and in Balance Sheet is equally important. The Cost Auditor will examine and certify:

- (a) That the physical verification is correctly carried out;
- (b) That the valuation is correct with reference to the actual cost of production and recognised policy for valuation;
- (c) That volume of closing stock is commensurate with the volume of production and that it does not reflect any failure or bottleneck in sales budget or production budget; and
- (d) That the volume of unmoved stores is not abnormal in comparison with the normal rate of yearly consumption. The Cost Auditor will recommend disposal of such unmoved stores with consequent release of capital unnecessarily locked up to the advantage of the financial resources of the concern.

(iii) Store Issue Procedure in Stocks

The Cost Auditor will see:

- (a) That withdrawal of materials or stores to production shop is scientific or covered by authorised schedule and permits receipt to be located;
- (b) That there is no possibility of loss or pilferage of stock lying in the production section;
- (c) That surplus materials and scraps arising in production shops are returned to stores correctly and without delay for which necessary credit is given to unit cost of production. If transferred to other jobs, proper transfer voucher has been prepared and copies sent to the accounts, stores, etc.

(iv) Work-in-Progress

The Cost Auditor will see:

- (a) That work-in-progress has been physically verified and that it agrees with the balance in the incomplete cost card;
- (b) That valuation of the work-in-progress is correct with reference to stage of completion of each job or process and the value job cost cards or process cost sheet;
- (c) That there is no over-valuation or under-valuation of opening work-in-progress or closing work-in-progress, thereby artificially pushing up and down net profits or net assets as the case may be;
- (d) That the volume and value of work-in-progress is not disproportionate compared with the finished out-turn.

(v) Labour

- (a) Proper utilisation of labour and increase in productivity are now receiving attention, several productivity teams have emphasised importance of higher productivity. It is, therefore, essential to assess the performance efficiency of labour and compare it with standard performance, so that labour utilisation could be progressively improved. The labour force in Indian industries is generally very high compared to similar types of industries in other developed countries. Our aim should be to reach that level, though not immediately but over some time, a study of this nature would give an idea where the

inefficiency lies so that timely and adequate steps could be taken to ensure maximum utilisation of labour to reduce labour cost.

(b) Cost of labour is allocated to different jobs with reference to time or job cards.

(vi) Capacity Utilisation

The cost auditor will see:

(a) that the idle capacity in any production shop or of transport facilities for distribution is not excessive; and

(b) that production volume and overall machine time utilised are commensurate. In other words, the utilized machine hours have given the optimum output.

(vii) Overheads and indirect expenditure

The cost auditor will see and certify:

(a) That allocation of indirect expenditure over production, sales, and distribution is logical and correct;

(b) That compared with the value of production in a production shop, overhead charges are not excessive;

(c) That actual indirect expenditure does not exceed budgets or standard expenditure significantly and that any variations are satisfactorily explained and accounted for;

(d) That the relation of indirect expenditure in keeping with the load on individual production shop is appropriate;

(e) Correctness of appropriate allocation of overhead expenditure (both production and sales) will be certified by the cost auditor; and

(f) That allocation of overheads between finished products and unfinished products is in accordance with correct principles.

In this section, we shall discuss in detail the aspects to be dealt with in the cost auditor's report pursuant to the Cost Audit (Report) Rules, 1968 as amended in 1996 and again in 2001. These rules came into force from October 1, 2002. The aforesaid Rules have been issued pursuant to Section 233-B (4) of the Companies Act which requires the cost auditor to make a report on the cost accounts and cost records maintained by the company.

It may be noted that the requirement of the statutory cost audit in our Companies Act is something special, because statutes in most of the other countries do not contain a similar requirement. In most of the countries, the concept of cost audit as such is also non-existent and the objectives, whatever they may be, are achieved by properly designing the scope and depth of internal audit.

The object with which the statutory requirement of cost audit has been included in the Companies Act can only be ascertained by a study of the cost audit report requirements. They include control over cost, wastage and losses, efficiency in the utilisation of human, material, and other resources, determination of appropriate selling price, proper maintenance of cost records, appropriate use of the costing system, etc.

For determining the scope and extent of cost audit, the cost auditor will necessarily have regard to the relevant costing records required to be maintained pursuant to Section 209(0)(d) of the Companies Act, in respect of products manufactured by certain types of industries and the cost sheets prescribed. The records are broadly

based on the elements of cost and, therefore, there is a great deal of similarity between the various records prescribed for various products. The cost sheets, however, vary from product to product, having regard to the nature of the product and the production process involved. The cost auditor will also have to pay special attention to the reporting requirements laid down under the Cost Audit (Report) Rules.

14.11 COST AUDIT IN INDIA

The cost audit was recommended to Indian industries by Vivian Bose Enquiry Commission. The cost audit is necessary for optimum and proper utilisation of resources by Indian industries. Section 223-B of the Companies Act provides for ordering of cost audit by Central Government. The Cost Audit (Report) Rules, 1968 laid down by the Central Government make certain industries to get cost books compulsory audited in every financial year.

The following items are included in the cost audit report:

- (i) General information regarding the company and the cost auditor,
- (ii) A brief detail about each type of product, production and utilisation of production capacity,
- (iii) Detailed information about the wages and salaries of the employees,
- (iv) A detail note about the manufacturing process of the company,
- (v) A brief report on the present cost accounting system,
- (vi) Information regarding the financial position of the company of current and previous year,
- (vii) Detail report about the sales of product and fixation of selling price,
- (viii) A note on special expense which have been directly allocated to production process,
- (ix) The cost of raw materials both in terms of quantity and price or rate,
- (x) Details about the cost of power, steam and fuel used in the production process,
- (xi) Information about abnormal features affecting production process of the product during the financial year,
- (xii) Details about the stores and spare parts of the company, and
- (xiii) Details about depreciation policy and its implementation.

14.11.1 Cost Audit Report and Its Format

After carrying on cost audit, the cost auditor has to prepare a detail report on cost audit under rule 1968. Under rules, on a prescribed format, the cost auditor has to present the report before the Company Law Board and its one copy should be sent to company to be presented on the date before the annual general meeting of the company in 60 days in advance. If any clarification is sought by the Company Law Board within a prescribed period of auditing, the cost auditor will have to clarify. If the auditor violates any of the provisions of company act, he may be fined maximum of ₹ 500.

Format of Cost Audit Report

I, _____ (Name of cost auditor) Appointed as auditor of _____ (Name of the company) in pursuance of provisions of the Companies Act, 1956 under section 233-B, the books of account maintained by the company pursuant to the rules made by the Central Government under section 209 (1) (d).

I have conducted audit in accordance with the provision of this section and report that:

- (a) I have obtained all information and explanations which to the best of my knowledge and belief were necessary for the purpose of audit.
- (b) In our opinion, proper cost account records required under section 209(1) (d) of Companies Act, 1956 have been kept by the company.
- (c) The required statements of the branches which are not audited by us have been received for the purpose of our audit/not received or available for our audit.
- (d) In our opinion, the cost accounts books give the information required by the Companies Act, 1956.
- (e) In my opinion, the cost audit records kept by the company in the properly manner with a true and fair view of cost of manufacturing and marketing.

With cost report, we are also enclosing notes and various policies of the company which is part of our audit report and these points are considered in our investigations.

Date: É É É É É É É É

É É É É É É É É É

Place: É É É É É É É É

Signature of Cost Auditor

The Cost Audit Reports have great potential in government procurements especially in case of non-competitive procurements. There are no effective anti-trust laws in India. This always leaves a scope for the traders/suppliers to charge exorbitant prices from the government supplies.

Example: The Clayton Act in USA clearly provides that any discrimination in price, services or facilities shall be unlawful in USA. It also prohibits the discrimination in rebates, discounts or underselling in particular localities. This Act further provides that any differential in prices etc., shall have to be justified on the grounds of differences in the cost of manufacture, sale or delivery resulting from the differing methods or quantities in which such commodities are sold or delivered and the burden of rebutting the prima-facie case shall be upon the person charged with a violation of this act. The Clayton Act also provides that it shall be unlawful for any person to induce or receive discrimination in price, which is prohibited under the act. In other words, each seller of product or service can charge a uniform price only in the USA.

14.12 COST AUDIT PROGRAMME

No standard pattern can be laid down for the cost audit programme. It will be affected by the nature and size of the business, attitude of the management and existing system. The cost auditor should have a cost audit programme which should be specific to the unit concerned. A suitable programme for cost audit should be drawn out in detail.

specifying each item of audit work to be carried out. The areas which a cost audit programme should include are inventory of stores and work-in-progress, labour, overheads, selling, distribution and administrative expenses, capital expenditure and utilisation of capacity, plant and equipment.

In drawing up such a programme, the guiding factors should be:

- (i) The impact of different elements of cost on total cost.
- (ii) Comparison of actual with budgeted production and sales.
- (iii) Analysis of variances.
- (iv) Drawing up a list of priorities if more than one alternative was to be followed up.
- (v) Critical examination of all statements to be presented to the management for taking managerial decisions.
- (vi) Frequently reviewing every system laid down, or action taken.
- (vii) Discussion of raised queries while conducting cost audit.
- (viii) The effect of all abnormal factors should be separated
- (ix) The same procedure of financial audit, i.e., vouching, checking and ticking, test checks, audit notes and questionnaire should be followed to establish the verification of correctness of cost accounts.
- (x) Profit as per cost accounts should be reconciled with that as per financial accounts.

The audit programme should include all the usual broad steps that a financial auditor includes in his audit programme. However, the significant things that should not be missed are: proper vouching of expenses, capital and revenue character determination, allocation of expenses, apportionment of overheads, arithmetical accuracy, the statutory requirements, examination of contracts and agreements, review of the Board's and shareholders' minute books to trace important decisions having bearing on costs, verification of title deeds and documents relating to properties and assets, etc. Cost audit, in order to be effective, should be completed at one time as far as practicable. The exact content of cost audit largely depends on the size of the organisation, range of products, production process, the existence of a well-organised costing department and of a well-designed costing system, and the existence of a capable internal auditing system. Other relevant considerations may be given as following:

- (a) System of cost accounting in vogue and the organisation of the cost department, forms, schedules, etc.
- (b) System of internal check used in the organisation.
- (c) Frequency of audits, areas to be covered, volume of transactions, efficiency of the internal check, needs of management, purpose of cost audit, its benefits, etc.

After considering the aforesaid factors a set of procedures and instructions are evolved which may be termed the cost audit programme. Like every other audit, a systematic planning of cost audit routine is necessary. Broadly speaking, cost audit programme may be divided into the following stages:

(a) **Review of Cost Accounting Records:** This will include:

- (i) Method of costing in use - batch, process or unit.
- (ii) Method of accounting for raw materials; stores and spares, wastages, spoilage defectives, etc.

- (iii) System of recording wages, salaries, overtime and spares, wastages, etc.
 - (iv) Basis of allocation of overheads to cost centres and of absorption by products and apportionment of service department's expenses.
 - (v) Treatment of interest, recording of royalties, research and development expenses, etc.
 - (vi) Method of accounting of depreciation.
 - (vii) Method of stock-taking and its valuation including inventory policies.
 - (viii) System of budgetary control.
 - (ix) System of internal auditing.
- (b) **Verification of cost statements and other data:** This will include the verification of:
- (i) Licensed, installed and utilised capacities.
 - (ii) Financial ratios.
 - (iii) Production data.
 - (iv) Cost of raw material consumed, wages and salaries, stores, power and fuel, overheads provision for depreciation etc.
 - (v) Sales realisation.
 - (vi) Abnormal non-recurring and special costs.
 - (vii) Cost statements.
 - (viii) Reconciliation with financial books.

Check Your Progress

Fill in the blanks:

1. Cost audit reports raise the status of _____.
2. The government and the trade associations may require cost audit for the purpose of fixing selling prices to prevent excessive _____.
3. Section _____ of the Companies Act provides for ordering of cost audit by Central Government.
4. After carrying on cost audit, the cost auditor has to prepare a detail report on cost audit under rule _____.
5. The cost audit was recommended to Indian industries by _____.
6. _____ is the examination of the evidence offered in substantiation of the entries in the books including in such examination the proof so far as possible that no entries have been omitted from the books.

14.13 LET US SUM UP

- With the emergence of accountability as an important aspect of business enterprise whether in the public sector or in the private sector, the auditing of accounts has assumed enormous significance.
- The cost audit is an important system in the auditing, because the cost audit is also a well-managed examination of books and accounts by the learned auditors.
- Whether the audit is internal or periodic, it aims at providing suggestions regarding improvements in effective cost account plan and reduces the additional cost audit work.

- The existence of cost audit has a great moral influence on the employees, as a result of which the efficiency is increased.
- Cost audit reports raise/enhance the status of cost accountant. Being external, it helps in improving cost methods and can solve specific problems which ultimately raise the status of cost department.
- The Cost Auditor has to be appointed by the board of directors under section 233-B of the Companies act subject to prior approval of the Company Law Board.
- Appointment of cost auditor is made on the receipt of an order from Central Government within a specified period. The person to be appointed as cost auditor must hold a certificate of practice from the Institute of Cost and Works Accountants of India.
- A cost auditor has the same rights in relation to an audit conducted by him under section 233-B as an auditor of a company under section 227(1).
- The responsibilities and duties of a cost auditor have not been clearly given in the Companies Act. The cost auditor is also required to perform the duties as are expected from auditors in general.
- The cost audit was recommended to Indian industries by Vivian Bose Enquiry Commission. The cost audit is necessary for optimum and proper utilisation of resources by Indian industries. Section 223-B of the Companies Act provides for ordering of cost audit by Central Government.
- The cost auditor should have a cost audit programme which should be specific to the unit concerned. A suitable programme for cost audit should be drawn out in detail, specifying each item of audit work to be carried out. The areas which a cost audit programme should include are inventory of stores and work-in-progress, labour, overheads, selling, distribution and administrative expenses, capital expenditure and utilisation of capacity, plant and equipment.

14.14 UNIT END ACTIVITY

Enumerate how cost audit brings out the weaknesses in the cost accounting system.

14.15 KEYWORDS

Continuous Internal Audit: It continues for the year round with the cost accounts. This audit helps in tracing the faults and errors and provides ready time to correct them.

Cost Audit: It is the verification of cost accounts and a check on the adherence to the cost accounting plan.

Efficiency Audit: It is the test of the efficiency of organisation. This is the valuation of the executed action so that it is concluded that the effective efficient implementation of the predetermined plan has been carried on.

Internal Cost Audit: It means the audit under which the auditors are appointed to help the managerial decisions of enterprise taken by the top management.

Periodic Internal Audit: It is done after a definite period of time, wherein the accounts of that period are checked and examined.

Propriety Audit: This audit of such actions and plans of management which have a bearing on the finance and expenses of the company or enterprise.

Specific Cost Audit: The specific cost audit is arranged by customers, business enterprises, government or special undertakings for some specific objectives.

Statutory Cost Audit: Statutory cost audit means that audit which is arranged to fulfill the provisions of a certain statute.

14.16 QUESTIONS FOR DISCUSSION

1. What is cost audit? Distinguish between financial audit and cost audit. Explain in detail.
2. Describe the objectives, advantages and disadvantages of cost audit.
3. Describe the various types of cost audit in detail.
4. Describe the scope or areas of the cost audit in detail.
5. What is cost audit report?
6. Explain the provisions regarding report and give the format of cost audit report.
7. Discuss the appointment, eligibility and responsibilities of a cost auditor.
8. Write short notes on the following:
 - (a) Internal cost audit,
 - (b) Specific cost audit, and
 - (c) Statutory cost audit.
9. What are the important techniques of cost audit?
10. Distinguish between financial audit and cost audit.
11. Write a short note on Cost Audit Programme.

Check Your Progress: Model Answer

1. Cost accountant
2. Profit making
3. 223-B
4. 1968
5. Vivian Bose Enquiry Commission
6. Vouching

14.17 REFERENCES/SUGGESTED READINGS

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