LOVELY PROFESSIONAL UNIVERSITY

COST ACCOUNTING – I

Edited By

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SYLLABUS

Cost Accounting – I

Objectives: To familiarise the students with the various cost concepts, elements of cost, methods and techniques of cost control and also to expose the students to the tools and techniques used in financial statement analysis.

Sr. No.	Topics
1.	**Nature and Scope of Cost accounting:** meaning, importance & limitations of cost accounting, Costing- An Aid to management, distinction between Cost and Financial accounting, Costing system- characteristics of an ideal costing system, steps for installation, difficulties while installation and how to overcome these difficulties, role of cost accountant.
2.	**Cost:** Analysis, Concepts, Cost Classification, cost sheet and One unit costing.
3.	**Material Control:** techniques of material control i.e. Level Setting, Economic Order Quantity, JIT Inventory System, ABC Analysis, VED Analysis, Perpetual Inventory System and FNSD Analysis. Material Purchase and Storage.
4.	**Methods of valuing Material Issues:** Cost Price Methods- FIFO, LIFO, Average Cost, Inflated Price, Specific Price, Base Stock and HIFO. Market Price Method- Replacement Price, Realisable Value. Standard Price Methods- Current Standard Price and Base Standard Price.
5.	**Labour Cost:** meaning, labour turnover, Job Analysis, Job Evaluation, Merit Rating, Time Keeping, Idle Time and Overtime.
6.	**Remuneration and Incentives:** methods of wage payment and incentives plan- Time Wage System, Piece Rate System, Taylor's Differential Piece Rate System, Merrick's Multiple Piece Rate System, Gant's Task and Bonus Plan, Halsey Premium Plan and Rowan Plan.
7.	**Overhead:** Classifications, Overhead Accounting- allocation, apportionment, re-apportionment and absorption of Overheads.
8.	Job, Batch & Contract costing.
9.	**Process Costing:** features, application of process costing, process losses-normal loss, abnormal loss and abnormal gain, inter-process profits and evaluation of different processes through practical problems.
10.	**Equivalent production in Process Costing:** meaning, calculation of Equivalent production and evaluation of Equivalent production through practical problems, Joint Product and By- Product Costing.

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Unit 1: Nature and Scope of Cost Accounting

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Objectives

After studying this unit, you will be able to:

- Know the introduction to cost accounting;
- Learn the objective and nature of cost accounting;
- Identify the functions of cost accounting;
- Identify the limitations of cost accounting;
- Explain the costing – An aid to management;
- Describe the difference between financial accounting and cost accounting;
- Understand the costing system.

Introduction

Cost accounting is a branch of accounting and has been developed due to limitations of financial accounting. The financial accounting is primarily concerned with record keeping directed towards the preparation of gross profit account, profit and loss account and balance sheet. It provides information regarding the gross profit, profit and loss that the business or enterprise

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is making and also its financial position on a particular period. The information concerning the business or enterprise is helpful to the management to control on business.

The management of every business enterprise is interested to know much more than the usual information supplied to outsiders. In order to carry out its functions of planning, decision-making and control, it requires additional cost data. The financial accounts fail, to some extent, to provide required cost data to management and hence a new system of accounting which could provide internal report to management was conceived of.

1.1 Meaning and Objectives of Cost Accounting

Meaning and objectives of cost accounting are discussed below:

1.1.1 Meaning 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 organised 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.

Caution The cost accounting system is not independent of the financial accounts. It merely represents an elaboration of the basic financial accounting system.

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.

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(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.

"Cost accounting is the provision of such analysis and classifications of expenditure as will enable the total cost of any particular unit of production to be ascertained with reasonable degree of accuracy and at the same time to disclose exactly how such total cost is constituted".

– Walter W. Bigg

1.1.2 Objectives of Cost Accounting

The objectives 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. 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 type 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 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 a 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) ***Provide 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.

Did u know? The management of every business or organisation constantly relies upon the reports on cost data in order to know the level of efficiency relating to purchase, production, sales and operating positions. Financial accounts provide various information only at the end of the year because closing stock value is available only at the end of the year. But cost accounts provide the value of closing stock time to time by a system of continuous stock verification. Using the value of closing stock, it is possible to prepare final accounts and know the operating results of the business or industry.

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1.2 Nature and Importance of Cost Accounting

The nature and importance of cost accounting can be identified as under:

1.2.1 Nature of Cost Accounting

Cost accounting is a special branch of knowledge. Though considered as a branch of financial accounts, cost accounting is one of the important special branches of knowledge, i.e., a discipline by itself. It is an organised body of knowledge consisting of its own concepts, principles and conventions.

(i) Cost accounting is an art in the sense it requires the ability and skill on the part of cost accountant in applying the concepts, principles, methods and techniques of cost accountancy to various management decisions. These decisions include the ascertainment of products and services, control of costs, ascertainment of profitability, etc.

(ii) Cost accounting is a science as it is a body of systematic knowledge relating to not only cost accounting but relating to a wide variety of courses such as law, office practice and procedure, data processing and presentation, production and control, etc. It is necessary for a cost accountant to have intimate special knowledge of all these field of study in order to carry on his day-to-day business or organisation activities.

(iii) Cost accounting determines the cost of incomplete work or job in case if the work remains uncompleted. It is also provides measures for control and guidance for various levels of management i.e., top, middle and lower management.

(iv) Cost accounting is a profession. In recent years cost accounting has become one of the important professions which have become more challenging. This view is evident from two facts. First, the setting up of various professional bodies. Secondly, a large number of students have enrolled in various institutes to obtain costing degrees and memberships for earning their livelihood.

1.2.2 Importance of Cost Accounting

The importance of any subject refers to the various areas of study included in that subject. As regards, the scope of cost accounting is very wide and includes the following:

(i) ***Technique and Process of Costing:*** The technique of costing involves two distinct steps, namely, (a) classification of costs according to various elements and (b) allocation and apportionment of the expenses which cannot be directly charged to production. As a process, costing is concerned with the routine ascertainment of cost with a formal and selected procedure.

(ii) ***Cost Control:*** Cost control is the guidance and regulation by executive action of the costs of operating and undertaking. This guidance and regulation is done by the executive who is responsible for causing the deviation. This process will become clear by enumerating the steps involved in any technique of cost control. Cost control is exercised through a variety of techniques such as inventory control, product control, quality control, budgetary control, standard costing, etc.

(iii) ***Ascertainment of Cost:*** It deals with the collection and analysis of expenses, the measurement of production at different stages and linking up of production with the expenses. To achieve the first step, costing has developed different systems such as Historical or Actual Cost, Estimated Cost and Standard Cost. For achieving the second step, costing has developed different methods such as single or output costing, job costing, contract costing, etc. Finally, for achieving the last step costing has developed important techniques such as, Marginal

Costing, Standard Costing, Budgetary Control, Total Absorption Costing and Uniform Costing.

(iv) ***Cost Audit:*** The terminology of ICMA, London, defines cost audit, as "the verification of the correctness of cost accounts and of the adherence to the cost accounting plan". Cost audit has a much wider role to play in an industry or organisation than people could imagine. The aim of cost audit is to highlight the shortcomings inherent in the cost accounting system.

(v) ***Budgetary Control:*** According to Heiser, budgetary control can be defined as "an overall blue print of a comprehensive plan of operations and actions expressed in financial terms". According to him, budgeting process involves the preparation of a budget, comparison of budgeted and actual expenditure and income, planning and coordinating for control, etc.

Self Assessment

State whether the following statements are true or false:

1. Financial accounting is concerned with the classification, accumulation, control and assignment of costs.
2. The cost accounting system is directly concerned with control of inventories, plant assets and funds expanded on functional activities.
3. The cost accounting system is independent of the financial accounts.

Fill in the blanks:

4. …… is the guidance and regulation by executive action of the costs of operating and undertaking.
5. The aim of …… is to highlight the shortcomings inherent in the cost accounting system.
6. …… process involves the preparation of a budget, comparison of budgeted and actual expenditure and income, planning and coordinating for control, etc.

1.3 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. Following are the main functions of cost accounting to:

(i) Establish various cost centres in the business or industry.

(ii) Provide necessary data to the management for fixing the selling price.

(iii) Prepare various reports on wastages, loss of labour, idle capacity of machines so as to improve profitability of business or industry.

(iv) Ascertain the cost of every product, job or process both in terms of total cost and per unit cost of product.

(v) Implement various cost control techniques such as budgetary control, historical costing and standard costing.

(vi) Design suitable system for defining responsibilities and controlling cost.

(vii) Prepare cost schedules to assist management in decision-making.

(viii) Prepare cost statements and profit and loss account for giving advice to management.

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(ix) 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) Help in supervising the working of punched card accounting or data processing through computers.

(xi) Organise cost reduction programmes with the help of departmental managers.

(xii) Organise the internal audit systems to ensure effective working of different departments.

(xiii) Undertake cost audit programmes as per the directives issued by the central government and the provisions of Indian Companies Act.

(xiv) Design suitable forms for organising an effective cost system of reporting.

1.4 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 get 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 incurred 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 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.

Task Discuss the main functions of cost accounting in order to serve the management in execution of various policies.

1.5 Costing –An Aid to Management

A good costing system serves the needs of large sections of people.

Notes

(i) ***Helps in the Preparation of Final Accounts:*** By the process of continuous stock taking it enables to know the value of closing stock of materials at any time. This facilitates preparation of final accounts wherever desired.

(ii) ***Fixation of Selling Price:*** By providing cost data it helps management to fix the selling price of product in advance. Hence, quotations can be supplied to prospective customers to secure orders.

(iii) ***Fixation of Responsibility:*** Whenever a cost centre is established, it implies establishing a kind of relationship between superior and subordinates. Thus, responsibilities are fixed on every individual who is concerned with cost of product or unit.

(iv) ***Reconciliation with Financial Accounting:*** A well maintained cost accounting system militates reconciliation with financial accounting to check the arithmetical accuracy of both the systems.

(v) ***Helps in Minimising Wastages and Losses:*** Cost accounting system enables to locate the losses and wastages relating to materials, idle time and under utilisation of plant and machinery.

(vi) ***Help in Decision-making:*** It helps top management in suitable decisions such as new products, replacement of labour, machines, etc.

(vii) ***Help in Performance of Business:*** By applying cost control techniques such as marginal costing, budgetary control and standard costing it helps in assisting the performance of business or industry.

(viii) ***Help in Future Production Policy:*** Cost data help management in determining future production policy. Any expansion or contraction of production for the future is based on previous cost data and information.

(ix) ***Helpful to Employees:*** Cost accounting system enables employees to earn better wages through overtime and incentive systems of wage payment. By providing better facilities it ensures job security to employees. Employees benefit by merit rating techniques which is conducted by scientific process of management.

(x) ***Helpful to the Government:*** It helps government in formulating various policies regarding import-export, taxation, price control measures, wage fixation, etc. It helps in assessing excise duty, sales tax and income tax of the business.

(xi) ***Helpful in Increasing Profitability:*** Costing reports provide information about profitable or unprofitable areas of operation. The management can discontinue that product line or that department which are responsible for incurring losses.

(xii) ***Helpful to Creditors:*** It increases the confidence of creditors in the capital employed in the business. The frequent preparation of reports and statements help in knowing solvency position of the business.

1.6 Relationship and Differences between Financial Accounting and Cost Accounting

The main relationship between financial accounting and cost accounting are given as under:

(i) The fundamental principles of double entry system are applicable in financial accounting as well as cost accounting.

(ii) The results of business or organisation are revealed by both the systems of accounts.

Notes

(iii) The determination of future business activities and policy is guided by both accounting systems.

(iv) A basis for comparison of expenditures is being provided by both the accounting systems.

(v) The invoices and vouchers constitute the common basis for recording transactions under both the systems of accounting.

(vi) The causes for losses and wastages of a business or industry are provided by financial and cost accounting.

Did u know? 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.

Table 1.1: Differences between Financial Accounting and Cost Accounting

Basis of Difference	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 objectives of cost accounting is internal reporting to management.
Maintenance of Accounts	This is to be maintained compulsorily by forms of business organizations. 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 a 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 less.	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.
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.

Self Assessment

Notes

State whether the following statements are true or false:

7. Financial accounts deal with all the items of expenses, losses, income and gains in total but the cost accounts deal with items of cost alone.
8. Financial accounts cover a short period usually a week.
9. Cost accounting will generally present a better picture to the public who can not understand the intricacies of the maintenance of accounting.

Some of the responsibilities that are taken care of by the cost accountant analyst are:

1. Analyze as well as put to rights monthly material, labor and the overhead expenses.
2. Reconcile daily productions with accounting transactions.
3. Coordinate with R&D and production on the commercialization of new items.
4. Assistance with the month end reconciliation as well as analysis.
5. He has to assist the controller as well as the improvement manager in developing cost improvement opportunities.
6. He might even have to attend the meetings with the marketing department to discuss the marketing agenda as well as costing.
7. He also has to prepare the new product costing as well as do the gross profit analysis for the marketing in order to determine the feasibility and profitability before presenting the samples and pricing to the customers.

1.7 Costing System

An ideal system of costing is that which achieves the objectives of a costing system and brings all advantages of costing to the business. The following are the main essentials of an ideal cost accounting system:

(i) ***Simplicity:*** The system of costing should be simple and plain so that it may be easily understood even by a person of average intelligence. Cost accounting system involves detailed analysis of cost. To avoid complications in the procedure of cost ascertainment an elaborate system of costing should be avoided and every care must be taken to keep it as simple as possible.

(ii) ***Suitability to the Business:*** The cost accounting system should be capable of adopting itself to the changing situations of business. It must be capable of expansion or contraction depending upon the needs of the business.

(iii) ***Accuracy:*** The system of cost accounting must provide for accuracy in terms of both ascertainment of cost and presentation of cost data. Otherwise it will prove to be misleading.

(iv) ***Comparability:*** The records to be maintained must facilitate comparison over a period of time. The past records must serve as a basis to guide the future.

(v) ***Economical:*** The costs of production costing system must be less. It must result in increased benefit when compared to the expenses incurred in installing it.

(vi) ***Uniformity:*** The various forms and documents used under costing system must be uniform in size and quality of paper. Printed forms must be used to avoid delay in the preparation of various reports. This also reduces the unnecessary burden of clerical staff. Forms of different colours can be used in different documents or reports.

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(vii) ***Reconciliation of Cost and Financial Accounts:*** If possible the cost and financial accounts should be interlocked into one internal accounting scheme. The system of cost accounts must be capable of reconciling with financial accounts so as to check accuracy of both the system of accounts.

(viii) ***Promptness:*** An ideal costing system is one which provides cost data in an analytical form to the management. So all the departments of an industry must analyse and record the relevant items of cost promptly in order to furnish cost information on a regular basis to various levels of management. This helps in checking up the progress of the business activities on a regular basis.

(ix) ***Equity:*** The basis of apportioning overheads to products, departments or jobs must be fair and equitable.

(x) ***Duties and Responsibilities of the Cost Accountant:*** Under a good system of cost accounting the duties and responsibilities of the cost accountant should be clearly defined. The cost accountant should have access to all works and departments.

1.8 Installation of Cost Accounting

At the outset it is to be understood that a common cost accounting system cannot be installed for all types of business enterprises. The cost accounting system depends upon the nature of business or industry and the product. Before a suitable system of cost accounting is installed it is necessary to undertake a preliminary investigation so as to know the feasibility of installing cost accounting system to such business activities. While introducing a system of cost accounting it should be borne in mind that cost accounting system must suit the business. This means the system must be simple and it must lead to savings through the control of cost, i.e., materials, labour and overheads. For the successful functioning of the costing system, the following conditions are essential:

(i) The duties and responsibilities of cost accountant must be clear.

(ii) There must be an efficient system of material control in business or industry.

(iii) A sound and well designed method of wage payment must be set up in business or industry.

(iv) Printed forms must be used for quick compilation of various types of cost reports.

(v) The existence of sound basis for collection of overheads and a basis for its apportionment to various production departments.

The following are the main factors to be considered before installing a cost accounting system:

(i) ***Nature of Business:*** The nature of a business implies the duration of its existence, position in the industry or factory, the rate of growth and policy of management and the like. The nature of business serves as the basis for designing the cost accounts in respect of simplicity, necessity and investment involved in installing cost accounting system.

(ii) ***Organisational Factors:*** The problem of installing cost accounting is somewhat difficult in case of an existing business organisation when compared to new business. However, the existing set up of the business organisation should be least disturbed should the need arise. In order to fix up responsibility to the executives, it may be necessary to group the departments. The organisational factors to be considered are : size and type of organisation, the levels of management, delegation and responsibility, centralisation and decentralisation, departmentalisation, availability of modern office equipments, and number of supervisory or managerial staff.

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(iii) ***Accounting Aspects:*** The factors to be considered in respect of accounting are: number of financial records, existing forms, registers used in business and number of copies required in business activities.

(iv) ***Area of Control:*** The areas where cost control is to be exercised is to be identified so that each manager may take action relevant to his business activities. If material and labour control occupies significant area of control, it must be given topmost priority for exercising control over materials and labour.

(v) ***Product Price:*** The price or range of products manufactured and sold also determine the method of costing to be selected. Accordingly price or range of products must be analysed in terms of size, models, fashions, market area, competitors and whether the products are made to customer's specification or for stocking and selling.

(vi) ***Reporting:*** The cost accounting system to be installed must ensure frequency and promptitude in reporting cost data to the management. It must also to be pointed out that duplication of reporting is to be avoided. Further, only that information which is relevant for the management in a particular context alone should be reported.

(vii) ***Selling and Distribution:*** The chief factors to be considered with regard to distribution process are the warehousing facilities, internal and external transport, market survey and other relevant measures, terms and conditions of sale and procurement of orders from customers.

(viii) ***Use of Electronic Data Processing:*** In modern time, it has become a common practice to use electronic data processing equipments and computers. In this situation, it is essential to ensure that the equipment meets the needs of the system but not the other way round.

(ix) ***Technical Considerations:*** Technical considerations that influence the installation of cost accounts are size of factory, flow of production, existence of departments and laboratories, capacity of machines and equipments, cost control techniques, internal transport, etc.

(x) ***Uniformity:*** The practice of adopting uniform costing facilitates interfirm comparison among various firms belonging to the same industry of factory. Further, it also has the benefit of adopting common costing practice if a holding company has number of subsidiaries.

Task List the characteristics of an ideal costing system.

Steps involved in installation of accounting system are given below:

1. ***Understanding of the process flow:*** In any type of organisation whether it is manufacturing or service, understanding of product or service process flow will be important to install the costing system, this process involves study the entire flow of the product or process from input stage to output stage of the product or service. This starts from the order receiving from the customer and how the same will be processed inside the organisation, what and all activities involved in the process and how it will be delivered to the customer. Understanding of process flow first steps to install the costing system in any organisation

2. ***Understanding of the costing methods:*** Each industry has got different costing methods involving in the operations. Costing methods are process costing, job costing, batch costing, service costing, contract costing, etc. Manufacturing industries mostly apply process costing, job & batch costing system. Service costing and contract costing will apply for the service industries. So to study and understand the applicable method of costing is the next step to install the costing system.

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3. ***Identifying the cost of an each activity:*** Based on the study of process flow as mentioned in the point no.1, we need to examine and identify the cost of on each activity, this method also called Activity Based Costing system (ABC). Each and every activity need to be linked with the output product and service and also need to be examined the value addition of that activity to the end product and process. It will help to install the costing system effectively towards help to control the cost.

4. ***Understanding of the prime cost structure:*** In any costing system we can have the prime cost which directly related to the activity of the operations. Prime cost which includes the Material, labour and other direct expenses which related to the manufacturing or operations. This is very basic understanding to install any costing system.

5. ***Understanding the nature of cost & over head cost behavior:*** After identified the cost of activities and prime cost structure, we need to examine and understand the nature of cost like fixed cost, variable cost, semi-fixed or semi-variable. Each cost has different nature with its related activity, nature purely based on the activity related. Based on this cost can be categorized as variable, fixed or semi-fixed or semi-variable. So carefully examine the activities and decide the nature of cost. This is very important step for further all the costing and management related analysis about the cost and profitability of the product or service.

6. ***Setting of proper allocation and apportionment methods:*** All the costs may not be possible to identify the specific activity. Some of the cost we unable to identify to the specific sector, like shared services department cost we unable to identify the specific activity, so while setting costing system we need to decide the correct cost allocation and apportionment method in the organistion.

7. ***Creating cost awareness:*** Costing is not only the function of cost department, costing is the collective function of all the departments. Also costing system not only for identify the cost of the product or process it also covers the cost control and cost optimization, so only costing team will not do this job, all the department should involve this process, example the cost of designing of the product should aware the designing team then only the cost control or optimization can be done, so installation of costing system should create the cost awareness to all in the organisation.

Difficulties at the time of installation of cost accounting system are mentioned as follows:

1. ***Resistance by existing accounting staff:*** Very often the existing accounting staff resists the installation of the cost accounting system on two grounds. Firstly, they feel that the new system of accounting might lead to excess work. Secondly, they are afraid of their job security. But this difficulty may be overcome by encouraging them about the usefulness of cost accounting as a supplement to financial accounts and the generation of more employment opportunities from the installation of cost accounting system.

2. ***Non-cooperation from middle and bottom level management:*** At times the middle and bottom level managers such as foremen, supervisors and inspectors also fail to extend their wholehearted cooperation fearing additional work which may be entrusted to them this problem may be overcome by suggesting them about the simplicity of the system and the existence of a separate cost accounting department to look after costing matters. However, they may be required to provide necessary reports concerning their area of activity so as to enable functioning of cost accounting department efficiently.

3. ***Lack of support from management:*** Wherever costing system is installed, it is essential to seek the support of various departmental managers. Very often the managers show hostile attitude towards the costing system. They feel that this system will interfere in their routine work and probably as a means of checking their efficiency. Under such circumstances it is better to convince them about the utility of costing system for the business as a whole.

Notes

4. ***Heavy expenses in installing and maintaining the system:*** The setting up of a separate costing department with staff often poses a problem. In addition to installation, the operating expenses in the form of printing and stationery, heating and lighting, depreciation and insurance, rent and rates are to be incurred. However, as was mentioned earlier, the system of cost accounting must be a useful investment, i.e., benefits derived from it must be more than the investment made on it. If this is not possible, for the time being the system must be discarded.

5. ***Lack of trained staff:*** This was no doubt a problem in olden days. Today this problem is overcome, thanks to the establishment of the institute of cost and works accountant of India in our country which offers professional course in costing and also offers training facilities through various companies to the candidates undergoing the course. In spite of this facility, it is somewhat difficult to get the competent and experienced staff at the time of installation. This problem can be overcome by paying attractive salaries to the cost accountants.

Measures to overcome difficulties:

1. ***Simplicity:*** Cost accounting system involves detailed analysis of cost to avoid complications in the procedure of cost ascertainment an elaborate system of costing should be avoided and every care must be taken to keep it as simple as possible.

2. ***Comparability:*** The records to be maintained must facilitate comparison over a period of time. The past records must serve as a basis to guide the future.

3. ***Reconciliation with financial accounts:*** The system of cost accounts must be capable of reconciling with financial accounts so as to check accuracy of both the system of accounts

4. ***Accuracy:*** The system of cost accounting must provide for accuracy in terms of both cost ascertainment and presentation. Otherwise it will prove to be misleading.

The role of cost accountant may be enumerated as under:

1. ***Traditional way:*** The traditional functions comprise the routine functions of cost accountant. Such functions are needed to:
   (a) Prepare cost schedules to assist management in making decisions and in formulating policies.
   (b) Establish various cost centers in the organisation.
   (c) Prepare reports on wastages of material, loss of labour time, idle capacity of machines so as to improve profitability of business.
   (d) Ascertain the cost of every product, job or process both in terms of total and per unit of product.
   (e) Provide necessary data to enable management in fixing the price.
   (f) Design suitable system for defining responsibilities and controlling cost.
   (g) Prepare periodical cost statements and profit and loss account.
   (h) 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 unnecessary.

2. ***Modern way:***
   (a) To work in close co-ordination with various departmental managers so as to implement cost reduction programmes and methods of improvement.
   (b) To undertake cost audit programmes as per the directives issued by the government and the provisions of the Indian Companies Act of 1956.
   (c) Supervising the functions of mechanised accounting.
   (d) Organization of internal audit in the field of accounting.

Notes

Case Study

Mhlume Sugar Company Limited: A Case Study in Costing & Pricing

Robert L. Hurt Accounting

This article discusses a field study of Mhlume Sugar Company Limited. The main motivation for the study was to observe, discuss, and learn about Mhlume's activity-based costing system in order to reflect upon some fundamental issues regarding costing and pricing. This article describes: (1) the physical process of sugar refining, (2) the basic nature and principles of activity-based costing (ABC), and (3) the accounting issues raised by Mhlume's operation, including their application of activity-based costing and transfer pricing considerations in their operation.

The Sugar Refining Process

Mhlume's operation is set up in two basic parts. The estate operation is concerned with cultivating and harvesting the sugar cane and transferring it to the mill; the mill operation then takes the raw sugar cane and processes it into brown sugar. (Making white sugar involve further processing which the Mhlume mill is not equipped to do at this time.)

The estate's harvesting cycle begins roughly around 1 May each year and ends roughly in November or December. (The company's fiscal year also coincides with its physical operations.) Harvesting the cane involves two basic steps. First, the standing fields of sugarcane are burned. Burning removes the leaves from the standing cane and facilitates the harvesting process. Without the process of burning the fields, the cane would have to be harvested with its leaves intact; the leaves would then have to be removed during the mill process. Further, burning the fields heats up the sucrose inside the cane, making it easier to work with. In addition, burning the fields drives away the native snakes, making it safer for the workers to cut the cane. Eventually, environmental laws in Swaziland may prohibit burning the fields prior to harvest; at that time, Mhlume and other sugar processing plants will have to revise their harvesting and milling procedures. After burning the fields, the sugar cane is harvested. Migrant workers are engaged each year to cut down the cane by hand. Workers are paid a fixed daily salary with the possibility of earning incentive pay for cutting more than their daily quota. Harvesting the cane is a very labor intensive process, making it well-suited to the Swazi economy, where labor resources are plentiful but machinery is not. The cut cane is transported to Mhlume's mill. On arrival at the mill, the cut cane is crushed to extract the liquid from its core. (The crushed cane can then be burned, producing the by product bagasse, which is used to fuel the mill's machinery.) The liquid is heated, causing the sucrose to fall to the bottom where it can be collected for further processing. At this point, the sucrose itself is dark and thick, resembling molasses (indeed, molasses is the other by product of the process). Chemicals are added to the sucrose to cause crystallization into the brown sugar that is the mill's principal product. With good soil, sugar cane is a perennial; that is, the cane will grow back every year without replanting. However, because the Mhlume estates have poor soil, the cane must be replanted approximately every five years. A specially grown seed cane is used to re-plant the fields on a rotating basis. Mhlume produces about one-third of Swaziland's total sugar output annually (the kingdom's total annual sugar output is about 450,000 tons). Approximately one third of the kingdom's total output is used internally, with the remaining two-thirds being sold on the world market.

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Activity-based Costing Systems

Costs in most manufacturing operations can be divided into three categories: materials labor, and overhead. Materials, sometimes referred to as direct materials, are the major raw inputs that go into producing a product or service for sale. For example, Mhlume's main raw material is sugar cane. Labor, sometimes referred to as direct labor, represents the salaries/wages and related costs of employing the workers directly involved with physical production. In Mhlume's case, the wages paid to the workers who harvest the cane is an example of a direct labor cost. Through time-and-motion studies and related physical measures of a firm's overall operation, it is a relatively simple matter to link direct materials and direct labor costs to the final product. The third category of cost, factory overhead, is more problematic. Factory overhead, sometimes referred to as factory burden, comprises all the related costs of producing product or service. For example, Mhlume would incur the following overhead costs in it operation: equipment depreciation, processing chemicals, water, power for the factory, and supervisor salaries. Unlike direct materials and direct labor costs, which can be linked to the product by direct attribution, overhead costs must be linked through a process of allocation. Naturally, that allocation must be done in some consistent, rational, logical manner. Activity-based costing is one way to allocate overhead to a product or service. Activity-based costing begins with establishing cost pools. Cost pools are groups of related costs in a production operation. Some of the cost pools employed at Mhlume include: land preparation, fertilizing, weed control, and irrigating. Costs are assigned to a cost pool on the basis of a common cost driver. In activity-based costing, a cost driver is anything which causes (drives) a cost in the production operation. For example, in a typical company purchasing costs might be a cost pool, with number of purchase orders processed being the cost driver. Once the cost pools and cost drivers are established, accountants can determine the amount of cost absorbed by each unit of the cost driver. For example, if the total cost of a purchasing department during a period was $10,000, and the department processed 5,000 purchase orders, the cost per purchase order would be $2. To tie purchasing costs to the product or service, then, accountants (working with production staff) must determine how many purchase orders were processed to move a certain group of goods through the factory. If given lot of goods required five purchased orders, the accounting system would allocate in purchasing costs to that order. A similar process would be performed for each cost pool, thus building up the overhead costs associated with a given group of goods.

Accounting Issues at Mhlume

Mhlume's operation raises at least three accounting issues: (1) the application of activity based costing, (2) product pricing and cost control, and (3) transfer pricing.

Activity-based Costing

In general, companies establish activity-based costing systems to gain a more accurate perception of their product's cost. Knowing a product's cost, naturally, is key to setting its price in the market. However, in Mhlume's case, the motivation for establishing an ABC system was different. As previously noted, cultivating, harvesting and processing sugar is a labor-intensive operation. In other words, most of Mhlume's costs are labor costs (Prior to the introduction of activity-based costing in the harvesting operation, all of Mhlume's harvesting labor costs were aggregated in a single general ledger account. Thus, managers had a difficult time determining which parts of the cultivating operation were more expensive and which were relatively less expensive. Mhlume introduced ABC to help managers of the cultivating operation control their costs more effectively and efficiently. (Note, however, that activity-based costing has only been applied to cultivating the sugar cane. The harvesting and milling operations have not adopted ABC, nor have they asked for it to be introduced.) For external accounting purposes, salaries and wages

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are still reported as a single line item on the profit and loss statement. However, for internal accounting purposes, salary and wage costs from cultivating the sugar cane are allocated to one of several cost pools: land preparation, planting, post-harvest management, fertilizing, weed control, pest & disease control, ripening, irrigating, canal construction, drainage sub-surface, or drainage maintenance. Those cost pools are reported clearly on Mhlume's internal profit and loss statements, allowing managers to see clearly how much cost was incurred in each area. Costs are allocated to the pools on the basis of labor hours.

Product Pricing and Cost Control

As mentioned previously, Mhlume introduced ABC to give managers better control over their costs. Cost control is critical in Mhlume's operation, as they have very little control over product pricing in their markets. Sugar is traded on the world commodity markets, much like soybeans and pork bellies. The world market, then, determines the price based on supply and demand factors. Any individual company, therefore, cannot influence the world price of sugar in any significant way. Mhlume operates in the Kingdom of Swaziland. Situated in south-eastern Africa, Swaziland is surrounded on three sides by South Africa; it also shares a border with Mozambique. As a developing nation, Swaziland receives a special concession when it sells sugar to external markets. Specifically, Swazi sugar is sold on the world market at three times the established world price for sugar; that is, if sugar is sold on the world market at $5 per ton, Swazi sugar is sold for $15 per ton. One of the main factors influencing the world price for sugar is its supply in the world market. Each sugar producing company in Swaziland receives a quota (allowance) for sugar production each year. For production up to the quota, Mhlume receives a fixed price. For production over the quota, Mhlume receives a price which is always less than the "quota" price. The two types of revenue are reported separately on Mhlume's internal profit and loss statement as "unsegregated" (amounts up to the quota) and "segregated" (amounts over the quota).

Transfer Pricing

Mhlume's operation also raises some interesting transfer pricing issues. Basically, transfer pricing is concerned with setting prices for purely internal transactions where market rules and constraints do not apply. Transfer pricing was pioneered by the U.S. automobile manufacturer General Motors when its divisions had to do business with one another. Normal laws of supply and demand do not apply to purely internal transactions, and much has been written about the options for establishing transfer prices and the consequences of the various options.

Mhlume confronts transfer pricing issues for two of its major inputs: sugar cane and water. Mhlume does not actually own most of the fields where its sugar cane is grown. Rather, the fields are owned by private individuals, who agree to sell all their output to Mhlume at a fixed price. In return, Mhlume assists the individual farmers with crop maintenance. Since the farmers have no option but to sell their output to Mhlume, and since Mhlume must buy all the farmers' output, a transfer price must be set which satisfies both parties. In this particular case, the transfer pricing problem is somewhat alleviated by Mhlume's participation in the cultivation and harvesting of the grain.

Water is one of the principal indirect materials used in processing sugar. All of Mhlume's water comes from IYSIS, a firm which has many common shareholders with Mhlume. Thus, IYSIS has a lot of control over the price Mhlume pays for water. With no external market forces governing the price, IYSIS could potentially raise the price of water to an exorbitant level, creating severe cost control problems for Mhlume's overall operation. In this case, however, the strong relationship between the two firms alleviates the potential problem, and IYSIS basically passes on its direct costs to Mhlume in the transfer price.

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Notes

Conclusion

As a precursor to grounded research, this article has discussed operating and accounting issues for Mhlume Sugar Company Limited which arose during a field study. The company has confronted and solved unique issues in product costing and pricing through the application of activity-based costing and transfer pricing concepts.

Self Assessment

Fill in the blanks:

10. Cost accounting system involves detailed analysis of ……
11. In any costing system …… is the one which directly related to the activity of the operations.
12. The system of …… must provide for accuracy.
13. A basis for …… is being provided by both the accounting systems.
14. …… help management in determining future production policy.
15. Costing methods are process costing, job costing and ……

1.9 Summary

- Cost denominates the use of resources only in terms of monetary terms.
- In brief, cost is nothing but total of all expenses incurred for manufacturing a product or attributable to given thing.
- 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.
- A budget is 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.

1.10 Keywords

Centralisation: Span of control is with the top management

Cost: Expense incurred at the either cost centre or service centre

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

Decentralisation: Process of assigning duties at lower level

Profit Analysis: Analysis of company's gains

Traditional Way of Costing: Old methods used by cost accountants

1.11 Review Questions

1. Define cost accounting.
2. Discuss the limitations or disadvantages of cost accounting.

Notes

3. "Cost accounting is becoming more and more relevant in the emerging economic scenario in India". Explain this statement.
4. "Cost accounting system that simply records costs for the purpose of fixing sale price has accomplished only a small part of its mission". Explain.
5. What are the main characteristics of an ideal cost accounting system?
6. What are the objectives of cost accounting?
7. Explain the importance of costing under present circumstances.
8. State the advantages of costing. How does it aid the management and what objections are raised against cost accounts?
9. Critically evaluate the arguments for the installation of costing system in an industry.
10. What do you mean by installation of costing system? Explain the practical difficulties involved in installing such a system in a manufacturing concern.
11. "A good costing system is a valuable aid to management". Discuss.
12. "Cost accounting has become an essential tool of management". Comment and state the steps to be taken while installing a costing system in a manufacturing concern.
13. Which method of costing would you recommend for the following industries? Give reasons:

    (i) Ship building, (ii) Automobile manufacturing,

    (iii) Cement industry, (iv) Chemicals industry,

    (v) Transport, (vi) Electricity supply or Power house,

    (vii) Oil refining, (viii) Coal mining,

    (ix) Printing, and (x) Soap manufacturing.
14. Explain the methods and techniques of cost accounting in detail.
15. Discuss cost accounting in Indian context.
16. What are the methods of costing? Explain their adaptability in different industries.
17. "Cost accounting has become an essential tool of modern management". Comment on this statement.
18. State the steps involved in the installation of a costing system in a large manufacturing company.

Answers: Self Assessment

1.	False	2.	True
3.	True	4.	Cost control
5.	cost audit	6.	Budgeting
7.	True	8.	False
9.	False	10.	Cost
11.	prime cost	12.	cost accounting
13.	comparison of expenditures	14.	Cost data
15.	batch costing		

1.12 Further Readings

Notes

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Online links

www.futureaccountant.com

www.rbi.com

Notes

Unit 2: Cost Elements and Classification

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Objectives

After studying this unit, you will be able to:

- Understand the meaning of cost unit;
- Learn the elements of cost;
- Describe the classification of cost.

Introduction

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 is 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 Crowning shield 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 scarified 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.

Notes

2.1 Cost Unit

Cost unit is defined by the ICMA as "a quantitative unit of product or service in relation to which costs are ascertained". A cost unit is a device used for the purpose of splitting total cost into smaller sub-divisions attributable to products or service. A cost unit simply stated is a unit of finished product, service of these in relation to which cost is ascertained and expressed. The following are some of the examples of cost units selected from different industries or organisations:

Table 2.1: Cost Units Selected from Different Industries

Name of the Industry or Organisation	Product	Cost Unit
Brick Industry	Bricks	Per 1,000 bricks
Power Industry	Electricity	Per kilo-watt hour
Cement Industry	Cement	Per tonne
Pharmaceutical Industry	Tablets	Per 1,000 tablets
Sugar Industry	Sugar	Per tonne
Furniture Industry	Table	Per table
Hardware Industry	Bolts and nuts	Per 1,000 pieces
Cotton Textile Industry	Yarn	Per Kg
Construction Company	House	Per contract
Transport Companies	Service	Per passenger mile
Hospital	Service	Per bed-day
Canteen	Service	Per meal

Cost Centre

A cost centre refers to a part of a factory for which costs are accumulated separately. In order to facilitate charging of costs to cost units, it is necessary to divide the factory or industry into various parts which can be used to accumulate costs for subsequent distribution. Each such part of a factory or industry is known as cost centre.

Did u know? **What is responsibility centre?**

Cost centre facilitates fixation of responsibility for every officer-in-charge of part of department or section. Hence cost centre is also known as responsibility centre.

Cost centre has been defined by ICMA as "a location, person or item of equipment or group of these in respect of which costs may be ascertained and related to cost units".

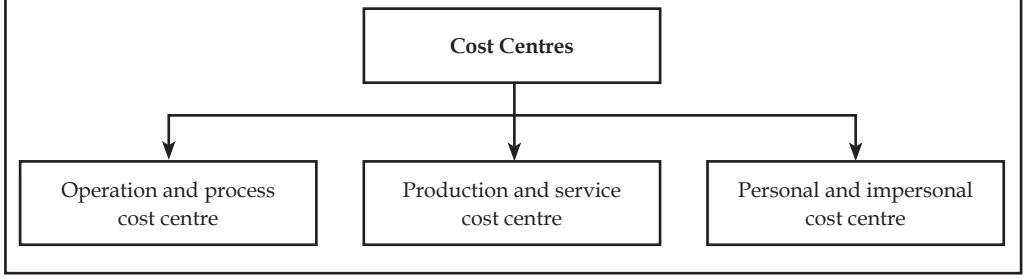
The main kinds of cost centre are given below:

- Operation and process cost centre,
- Production and service cost centre, and
- Personal and impersonal cost centre

Notes

These kinds of cost centre have been shown in the figure given as:

Figure 2.1: Types of Cost Centres



(i) ***Operation and Process Cost Centre:*** Operation cost centre consist of those machines which carry out the same operation.

A process cost centre is a cost centre in which a specific process or a continuous process of operation is carried out.

(ii) ***Production and Service Cost Centre:*** A production cost centre is one where actual production process is carried out. The manufacturing and non-manufacturing costs are charged to production cost centre.

A service cost centre is one which provides services to other cost centre. Only non-manufacturing costs are charged to service cost centre.

(iii) ***Personal and Impersonal Cost Centre:*** Personal cost centre consists of a person or group of persons. Personal cost centre follows the organisational structure of a factory or organisation. Under this type of cost centre, costs are analysed and accumulated according to; say, factory manager, sales manager, store keeper, etc. Impersonal cost centre consists of a location of equipment. A cost centre relating to location may represent an area of sales, warehouse. Cost centre relating to an item of equipment could be a machine or group of machines.

Whatever may be the kinds of cost centre, it is determined by taking into consideration the following factors:

- Responsibilities and accountabilities to be identified,
- Volume of work to be performed,
- Uses of cost centres, and
- Cost control activities exercised.

Self Assessment

Fill in the blanks:

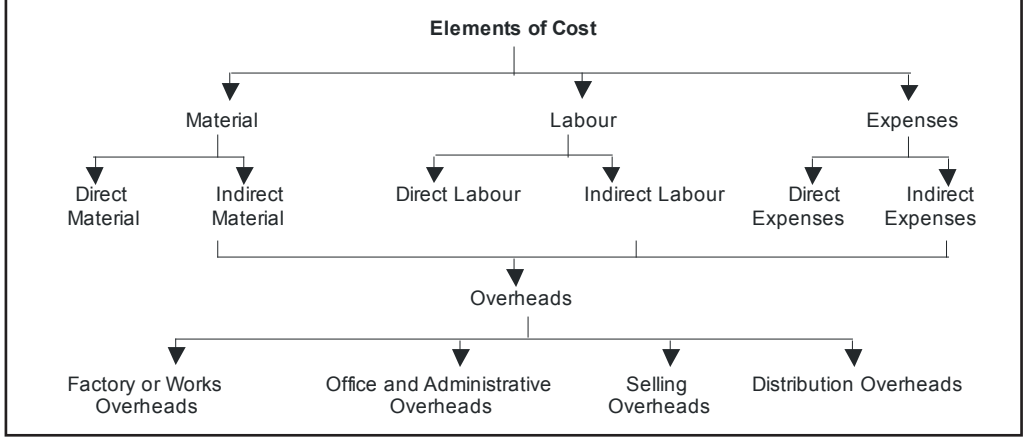
1. A …… refers to a part of a factory for which costs are accumulated separately.
2. A …… is a cost centre in which a specific process or a continuous process of operation is carried out.
3. The manufacturing and non-manufacturing costs are charged to …… cost centre.

2.2 Elements of Cost

The correct of 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:

Notes

Figure 2.2: Various Elements of Cost



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

(i) ***Direct Material:*** Direct material is material that can be directly identified with each unit of the product. Direct material can be conveniently measured and directly charged to the product.

Example: Raw cotton in textile manufactures, sugarcane in sugar industry and leather for shoe-making industry.

The cost of direct material includes the following:

- All type of raw materials issued from the store,
- Raw materials specifically purchased for the specific job or project,
- Raw materials transferred from one cost centre to another cost centre.
- Primary packing material, like cartons, cardboard boxes etc.

(ii) ***Indirect Material:*** They are those materials which do not normally form a part of the finished product. It has been defined as "materials which cannot be allocated but which can be apportioned to or absorbed by cost centres or cost units". These are:

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

(iii) ***Direct Labour:*** Direct labour is labour that can be identified directly with a unit of finished product. All the labour charges expended in altering the construction, composition, confirmation or condition of the product is included in it. It includes the payment of direct wages made to the following groups of direct labour:

- Direct labour engaged on the actual production of the product.
- Direct labour engaged in adding this manufacture by way of supervision, maintenance and tool setting, etc.
- Inspectors, analysts, etc. specially required for such production.

Notes

(iv) ***Indirect Labour:*** The wages of that labour which cannot be allocated but which can be apportioned to or absorbed by, cost centres or cost units is known as indirect labour. In other words, wages paid to labour which are employed other than or production constitute indirect labour costs. Examples of indirect labour are: charge hands and supervisors, maintenance workers, labour employed in service departments, material handling and internal transport, apprentices, trainees and instructors, factory clerical staff and labour employed in time and security office, etc.

(v) ***Direct or Chargeable Expenses:*** They include all expenditures other than direct material and direct labour that are specifically incurred for a particular product or job. Such expenses are charged directly to the particular cost account concerned as part of the prime cost. Examples of direct expenses are: excise duty, royalty, surveyor's fees, cost of rectifying defective work, travelling expenses to the job, experimental expenses of projects, expenses of designing or drawings, repairs and maintenance of plant obtained on hire and hire of special equipment obtained for a contract.

(vi) ***Indirect Expenses:*** Indirect expenses are expenses which cannot be allocated but which can be apportioned to or absorbed by cost centres or cost units as rent, insurance, municipal taxes, salary of manager, canteen and welfare expenses, power and fuel, cost of training for new employees, lighting and heating, telephone expenses, etc.

(vii) ***Overheads:*** Overheads may be defined as the cost of indirect materials, indirect labour and such other expenses including services as cannot conveniently be charged direct to specific cost units. Thus, overheads are all expenses other than direct expenses. Overheads may be divided into following categories:

- Factory or works overheads cover all indirect expenditure incurred by the undertaking from the receipt of the order until its completion is ready for dispatch either to the customer or to the finished goods store. The overheads also include: depreciation on plant and machinery, buildings and equipments, insurance charges on fixed assets, repairs and maintenance of fixed assets, electricity charges, coal and other fuel charges, rent, rates and taxes of works, etc.
- Office and administrative overhead consists of all expenses incurred in the direction, control and administration of a factory. Examples are the expenses in running the general office e.g., office rent, light, heat, salaries, salary to secretaries and accountants, general managers, directors, executives, investigations and experiments and miscellaneous fixed charges.
- Selling overheads comprise the cost of products or distributors of soliciting and recurring orders for the articles of commodities dealt in and of efforts to find and retain customers. It includes sales office expenses, salesmen's salaries and commission, showroom expenses, advertisement charges, fancy packing, samples and free gifts, after sales service expenses and demonstration and technical advice to potential customers.
- Distribution overheads comprise all expenditure incurred from the time the product is completed in the work until it reaches its destination. It includes warehouse rent, warehouse staff salaries, insurance, expenses on delivery vans and trucks, expenses on special packing for bulk transport, losses in warehouse stocks and finished goods damaged in transit and cost of repairing, etc.

Self Assessment

State whether the following statements are true or false:

4. The wages of that labour which cannot be allocated but which can be apportioned to or absorbed by, cost centres or cost units is known as direct labour.

5. Overheads may be defined as the cost of indirect materials, indirect labour and such other expenses including services as cannot conveniently be charged direct to specific cost units.

Cost Analysis and Concepts

Cost Driver

A cost driver is any activity that causes a cost to be incurred.

Cost driver is a cost accounting term. A business engages in many different activities. The cost driver for an activity is the factor that influences the amount of the resources that will be consumed by a particular activity. A cost driver is designed to allocate the activity cost pool (or related costs) to the cost objects.

1. The activity is the work that is done.
2. The resource is what the activity uses to do the work, i.e., people, equipment, services.
3. Resources cost money – The cost of the activity depends on the quantity of resources used to accomplish the activity.
4. The cost object is whatever it is you wish to cost. It could be a product, service, process, job or customer.

Example: One part of the Ace Trucking's business operation involves making deliveries by truck. The activity is delivering goods. The costs of this activity include the truck drivers' wages, fuel, depreciation of the truck, insurance, etc. The quantity of the resources that will be consumed by this activity are influenced by the number of deliveries made per year. Hence the cost driver could be the number of deliveries.

A cost driver is the reason why the cost is incurred—in other words, the cost is incurred in producing the driver.

Out of Stock Cost: Economic consequences of not being able to meet an internal or external demand from the current inventory. Such costs consist of internal costs (delays, labor time wastage, lost production, etc.) and external costs (loss of profit from lost sales, and loss of future profit due to loss of goodwill). Also called shortages costs.

Replacement cost policy: Type of homeowners insurance policy that covers the cost to replace or repair the building and/or personal possessions (up to the policy's limit) which is more than the value covered by an actual cash value policy or a market value policy.

Idle facilities cost: Costs of idle facilities or idle capacity means costs such as maintenance, repair, housing, rent, and other related costs; e.g., property taxes, insurance, and depreciation.

Actual Cost and Opportunity Cost

Actual costs are those costs, which a firm incurs while producing or acquiring a good or service like raw materials, labour, rent, etc. Suppose, we pay ₹ 150 per day to a worker whom we employ for 10 days, then the cost of labour is ₹ 1500. The economists called this cost as accounting costs because traditionally accountants have been primarily connected with collection of historical data (that is the costs actually incurred) in reporting a firm's financial position and in calculating its taxes. Sometimes the actual costs are also called acquisition costs or outlay costs. On the other hand, opportunity cost is defined as the value of a resource in its next best use. For example, Mr. Ram is currently working with a firm and earning ₹ 5 lakh per year. He decides to quit his job and start his own small business. Although, the accounting cost of Mr. Ram's labour to his

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own business is 0, the opportunity cost is ₹ 5 lakh per year. Therefore, the opportunity cost is the earnings he foregoes by working for his own firm. One may ask you that whether this opportunity cost is really meaningful in the decision making process. As we see that the opportunity cost is important simply because, if Mr. Ram cannot recover this cost from his new business, then he will probably return to his old job. Opportunity cost can be similarly defined for other factors of production. For example, consider a firm that owns a building and therefore do not pay rent for office space. If the building was rented to others, the firm could have earned rent. The foregone rent is an opportunity cost of utilizing the office space and should be included as part of the cost of doing business. Sometimes these opportunity costs are called as alternative costs.

Explicit and Implicit Cost

Explicit costs are those costs that involve an actual payment to other parties. Therefore, an explicit cost is the monitory payment made by a firm for use of an input owned or controlled by others. Explicit costs are also referred to as accounting costs. For example, a firm pays ₹ 100 per day to a worker and engages 15 workers for 10 days, the explicit cost will be ₹ 15,000 incurred by the firm. Other types of explicit costs include purchase of raw materials, renting a building, amount spent on advertising etc. On the other hand, implicit costs represent the value of foregone opportunities but do not involve an actual cash payment. Implicit costs are just as important as explicit costs but are sometimes neglected because they are not as obvious. For example, a manager who runs his own business foregoes the salary that could have been earned working for someone else as we have seen in our earlier example. This implicit cost generally is not reflected in accounting statements, but rational decision-making requires that it be considered. Therefore, an implicit cost is the opportunity cost of using resources that are owned or controlled by the owners of the firm. The implicit cost is the foregone return, the owner of the firm could have received had they used their own resources in their best alternative use rather than using the resources for their own firm's production.

Accounting and Economic Cost

For a long time, there has been a considerable disagreement among economists and accountants on how costs should be treated. The reason for the difference of opinion is that the two groups want to use the cost data for dissimilar purposes. Accountants always have been concerned with firms' financial statements. Accountants tend to take a retrospective look at firms finances because they keep trace of assets and liabilities and evaluate past performance. The accounting costs are useful for managing taxation needs as well as to calculate profit or loss of the firm. On the other hand, economists take forward-looking view of the firm. They are concerned with what cost is expected to be in the future and how the firm might be able to rearrange its resources to lower its costs and improve its profitability. They must therefore be concerned with opportunity cost. Since the only cost that matters for business decisions are the future costs, it is the economic costs that are used for decision-making. Accountants and economists both include explicit costs in their calculations. For accountants, explicit costs are important because they involve direct payments made by a firm. These explicit costs are also important for economists as well because the cost of wages and materials represent money that could be useful elsewhere. We have already seen, while discussing actual costs and opportunity costs, how economic cost can differ from accounting cost. In that example we have seen how a person who owns business chooses not to consider his/her own salary. Although, no monitory transaction has occurred (and thus would not appear as an accounting cost), the business nonetheless incurs an opportunity cost because the owner could have earned a competitive salary by working elsewhere. Accountants and economists use the term 'profits' differently. Accounting profits are the firm's total revenue less its explicit costs. But economists define profits differently. Economic profits are total revenue less all costs (explicit and implicit costs). The economist takes into account the implicit costs (including a normal profit) in addition to explicit costs in order to retain resources in a given

line of production. Therefore, when an economist says that a firm is just covering its costs, it is meant that all explicit and implicit costs are being met, and that, the entrepreneur is receiving a return just large enough to retain his/her talents in the present line of production. If a firm's total receipts exceed all its economic costs, the residual accruing to the entrepreneur is called an economic profit, or pure profit. Example of Economic Profit and Accounting Profit Mr. Raj is a small store owner. He has invested ₹ 2 lakh as equity in the store and inventory. His annual turnover is ₹ 8 lakh, from which he must deduct the cost of goods sold, salaries of hired staff, and depreciation of equipment and building to arrive at annual profit of the store. He asked help of a friend who is an accountant by profession to prepare annual income statement. The accountant reported the profit to be ₹ 1.5 lakh. Mr. Raj could not believe this and asked the help of another friend who is an economist by profession. The economist told him that the actual profit was only ₹ 75,000 and not ₹ 1.5 lakh. The economist found that the accountant had underestimated the costs by not including the implicit costs of time spent as Manager by Mr. Raj in the business and interest on owner's equity.

Controllable and Non-controllable Costs

Controllable costs are those which are capable of being controlled or regulated by executive vigilance and, therefore, can be used for assessing executive efficiency. Non-controllable costs are those, which cannot be subjected to administrative control and supervision. Most of the costs are controllable, except, of course, those due to obsolescence and depreciation. The level at which such control can be exercised, however, differs: some costs (like, capital costs) are not controllable at factory's shop level, but inventory costs can be controlled at the shop level.

Out-of-Pocket Costs and Book Costs

Out of pocket costs are those costs that improve current cash payments to outsiders. For example, wages and salaries paid to the employees are out-of pocket costs. Other examples of out-of-pocket costs are payment of rent, interest, transport charges, etc. On the other hand, book costs are those business costs, which do not involve any cash payments but for them a provision is made in the books of account to include them in profit and loss accounts and take tax advantages. For example, salary of owner manager, if not paid, is a book cost. The interest cost of owner's own fund and depreciation cost are other examples of book cost. The out-of-pocket costs are also called explicit costs and correspondingly book costs are called implicit or imputed costs. Book costs can be converted into out-of-pocket costs by selling assets and leasing them back from buyer. Thus, the difference between these two categories of cost is in terms of whether the company owns it or not. If a factor of production is owned, its cost is a book cost while if it is hired it is an out-of-pocket cost.

Relevant Costs and Irrelevant Costs

The relevant costs for decision-making purposes are those costs, which are incurred as a result of the decision under consideration. The relevant costs are also referred to as the incremental costs. Costs that have been incurred already and costs that will be incurred in the future, regardless of the present decision are irrelevant costs as far as the current decision problem is concerned. There are three main categories of relevant or incremental costs.

The present-period explicit costs, the opportunity costs implicitly involved in the decision, and the future cost implications that flow from the decision. For example, direct labour and material costs, and changes in the variable overhead costs are the natural consequences of a decision to increase the output level. Also, if there is any expenditure on capital equipments incurred as a result of such a decision, it should be included in full, not withstanding that the equipment may have a useful life remaining after the present decision has been carried out. Thus, the incremental costs of a decision to increase output level will include all present-period explicit costs, which

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will be incurred as a consequence of this decision. It will exclude any present-period explicit cost that will be incurred regardless of the present decision. The opportunity cost of a resource under use, as discussed earlier, becomes a relevant cost while arriving at the economic profit of the firm. Many decisions will have implications for future costs, both explicit and implicit.

Sunk Costs and Incremental Costs

Sunk costs are expenditures that have been made in the past or must be paid in the future as part of contractual agreement or previous decision. For example, the money already paid for machinery, equipment, inventory and future rental payments on a warehouse that must be paid as part of a long term lease agreement are sunk costs. In general, sunk costs are not relevant to economic decisions. For example, the purchase of specialized equipment designed to order for a plant. We assume that the equipment can be used to do only what it was originally designed for and cannot be converted for alternative use. The expenditure on this equipment is a sunk cost. Also, because this equipment has no alternative use its opportunity cost is zero and, hence, sunk costs are not relevant to economic decisions. Sometimes the sunk costs are also called as non-avoidable or non-escapable costs. On the other hand, incremental cost refers to total additional cost of implementing a managerial decision. Change in product line, change in output level, adding or replacing a machine, changing distribution channels etc. are examples of incremental costs. Sometimes incremental costs are also called as avoidable or escapable costs. Moreover, since incremental costs may also be regarded as the difference in total costs resulting from a contemplated change, they are also called differential costs. As stated earlier sunk costs are irrelevant for decision making, as they do not vary with the changes contemplated for future by the management. It is the incremental costs, which are important for decision-making purpose.

Fixed and Variable Costs

Fixed costs are that part of the total cost of the firm which does not change with output. Expenditures on depreciation, rent of land and buildings, property taxes, and interest payment on bonds are examples of fixed costs. Given a capacity, fixed costs remain the same irrespective of actual output. Variable costs, on the other hand, change with changes in output. Examples of variable costs are wages and expenses on raw material. However, it is not very easy to classify all costs into fixed and variable. There are some costs, which fall between these extremes. They are called semi variable costs. They are neither perfectly variable nor absolutely fixed in relation to changes in output. For example, part of the depreciation charges is fixed and part variable. However, it is very difficult to determine how much of depreciation cost is due to the technical obsolescence of assets and hence fixed cost, and how much is due to the use of equipments and hence variable cost. Nevertheless, it does not mean that it is not useful to classify costs into fixed and variable. This distinction is of great value in break-even analysis and pricing decisions. For decision-making purposes, in general, it is the variable cost, which is relevant and not the fixed cost. To an economist the fixed costs are overhead costs and to an accountant these are indirect costs. When the output goes up, the fixed cost per unit of output comes down, as the total fixed cost is divided between larger units of output.

Replacement Cost

Replacement cost is the cost, which will have to be incurred if that asset is purchased now. The difference between the historical and replacement costs results from price changes over time. Suppose a machine was acquired for ₹ 50,000 in the year 1995 and the same machine can be acquired for ₹ 1,20,000 in the year 2001. Here ₹ 50,000 is the historical or original cost of the machine and ₹ 1,20,000 is its replacement cost. The difference of ₹ 70, 000 between the two costs has resulted because of the price change of the machine during the 5 period. In the conventional financial accounts the value of assets is shown at their historical costs. But for decision-making,

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firms should try to adjust historical costs to reflect price level changes. If the price of the asset does not change over time, the historical cost will be the same as the replacement cost. If the price raises the replacement cost will exceed historical cost and vice versa. During periods of substantial price variations, historical costs are poor indicators of actual costs.

Profit Centre

A profit centre is a unit of a company that generates revenue in excess of its expenses. It is expected that, through the sale of goods or services, the unit will turn a profit. This is in contrast to a cost centre, which is a unit inside a company that generates expenses with no responsibility for creating revenue. The only expectation a cost centre has is to lower expenses whenever possible while staying with a specific budget that is determined at the corporate level.

Example: A company may have a variety of distinct departments, divisions, or operating groups, each with separate responsibilities and each contributing to the overall success of a company. Cost centres, for example, such as accounting, auditing, or inventory control, have costs, but do not contribute revenues. As a result, they do not produce profits. A profit centre, on the other hand, is directly involved in producing revenues, and, if it is managed well, its revenues exceed its costs and it produces a profit.

Why It Matters

A profit centre must be carefully managed to ensure that the sales generating activities lead to more revenues than the cost of those activities, thus producing a profit. Creating separate profit centres within a company allow the management to evaluate the profitability of each unit or business activity. When assessing a company, it is useful for an investor to classify various components of a business into cost and profit centres, allowing the investor to evaluate the prospects of various divisions on a stand-alone or restructured basis and the allocation or elimination of the costs found in the cost centres.

Difference between Cost Centres and Profit Centres

- Cost centres are the smallest segment of activity or area of responsibility for which costs are accumulated or ascertained. Where as profit centres are that segment of activity which is both responsible for Revenue and expenses and disclose profit of a particular segment of activity.
- Cost centres are created for accounting convenience, where as profit centres are created to delegate responsibility to individuals.
- A cost centres does not have target cost, but efforts are made to minimize cost. But each profit centre has a profit target.
- There may be number of cost centres in a profit centre. All profit centres are cost centres but all cost centres are not profit centres.

Differences between Cost and Profit Centres (Example of IT Firm)

- In business, an operating unit is either making money or it's detracting from a company's profits. In simple terms, it's the difference between a profit centre and a cost centre.
- Conceptually, a business unit is considered a profit centre when "it's set up as a small business — it has its own revenue and profit targets,"
- On the flip side, a company unit such as the human resources department doesn't earn revenue or turn a profit. Its objective is to hire, train and support the company's employees,

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and there's a cost to the company to run the unit. As such, human resources is typically viewed as a cost centre.

- IT departments traditionally were set up as cost centres. An IT organization would charge back costs to a business unit. For example, IT would charge a commercial loan division of a bank for monthly transaction processing costs or mainframe use costs. But it wouldn't bring in a profit because the division would be charged at cost. In some cases, those costs may be absorbed by the company or as part of a business unit's overhead.
- However, it's common for IT organizations to be set up as cost centres in highly-regulated industries, such as financial services or electric utilities, "to show regulators where the costs are" by charging IT costs to individual business units.
- Other companies, such as The Hartford Financial Services Group in Hartford, Conn., have elected to set up their IT organizations as profit centres with a goal of generating zero profit.

Case Study

Bank Hapoalim

Since its founding in 1921, Bank Hapoalim has played an important role in the rapid growth of Israel's economy. Today, it is the country's largest bank with more than 280 branches, US$94 billion in assets and operations in 20 countries.

Profitability analytics is the latest in a long line of data-based solutions which have enabled the bank to precipitate faster response times to business changes—a critical advantage in an unpredictable financial and regulatory environment. Teradata Magazine spoke with Gilat Rottenberg, business project manager for Bank Hapoalim, about the benefits.

How Does Profitability Analytics Impact the Way Bank Hapoalim Operates?

Rottenberg: Our profitability system is heavily integrated into every management process so the impact spans across the entire organization. It's crucial in planning and managing the bank; it's the basis for our business and risk models, marketing campaigns, compensation programs and much more.

Do you Measure Return on Investment (ROI) for Your Profitability Analytics Solution?

Rottenberg: We don't have ROI plans. ROI is difficult to quantify because it's a data project that enables many other projects and decision making. It opens up new possibilities. But the business case isn't built on ROI.

What You have Realized Improvements in the Responsiveness of Your Business?

Rottenberg: Yes. Because we have integrated financial, customer, marketing and general ledger data, we can implement more projects faster and also respond to business changes more quickly. Having access to all that information gives us much more flexibility and ensures figures from our profitability system are accurate.

What's an Example of How You use the Data?

Rottenberg: When the bank comes up with a new plan—for example for a virtual branch—we have to reflect those changes in the profitability system. That shows us whether we need to make changes to the organizational structure to support those changes. We're also implementing a new project to calculate profitability data for derivatives, which are complicated, volatile financial instruments. Detailed profitability data from every contract

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will provide a better way to analyze derivatives and their interrelation with other profit centers for better decision making.

How is the Solution Used Across the Entire Organization?

Rottenberg: Every month the management team gets a presentation on all the profitability centers of the bank, and that's based on the data. That's ultimately how they see profit and loss. Marketing uses the data to put customers into relevant profit segments. It's impressive that the profitability system is so detailed that it's even used widely in all compensation programs at the bank. Branch managers, customer relationship managers and their teams are compensated based on data, including profitability data.

Who Uses the Data?

Rottenberg: More than 1,000 users can directly access profitability reports, and the data is also presented to all executives and managers. It's used by everyone: CEO, CFO, all the management division managers use the profitability data. Each division in the bank makes plans based on management targets, which are based on this data.

Why Did You Choose to Upgrade your Ability to Capture and Analyze Profitability Data?

Rottenberg: As Israel's largest bank, we have a commitment to be a leader in every aspect of our business. Deeper analytics help us better understand business costs and profitability drivers, and make better decisions. Teradata Value Analyzer lets us leverage the detailed data in our warehouse to provide accurate profitability data that is used across our entire business.

2.3 Classification of Costs

Costs can be classified according to: general classification and technical classification.

2.3.1 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 labor, 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.

Caution The product costs of direct materials, direct labor, and manufacturing overhead are also "inventoriable" costs, since these are the necessary costs of manufacturing the products.

The purpose is to emphasize 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 labor might be incurred during one period but not treated as an expense until a following period when the completed product is sold.

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Notes Manufacturing overhead is also referred to as factory overhead, indirect manufacturing costs, and burden.

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.

Example: 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.

Example: (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, 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 articles and so on.

   Indirect costs are those costs that can not 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.

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

   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 Labor (DL) and Manufacturing Overhead (MOH, OH)

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

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

Notes MOH = All indirect manufacturing costs, including

1. Indirect materials
2. Indirect labor — supervision, maintenance, janitorial, 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).

2.3.2 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

Let us understand each of them one by one.

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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.

Example:

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.

Example:

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 are 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 ready made garments.

   (b) *Labour cost for production:* Labour cost is the cost of the entire labour who 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:*

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

   (b) *Indirect labour:*

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Example: Salary paid to the supervisor.

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 cost which do 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 hours. The variable portion is the overtime pay they receive when they exceed their regular hours.

By Controllability: These costs are classified into two categories in accordance with controllability, as follows:

1. ***Controllable costs:*** Cost which can be controlled through some measures known as controllable costs. All variable cost 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 maybe 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.

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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.

For 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 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.

Example: 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: 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.

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

Caselet

Patent Valuation

A pharmaceutical company has spent ₹ 5 Million in R&D of a niche product (A sachet named Sharkara) to be used in diabetes as a substitute for insulin injections. The company has taken a patent for the same for 5 years after the first sachet is sold. It has spent further 100 Million in a plant which can produce 50000 packets (each packet has 100 sachets) of Sharkara per year. The plant is having a useful life of 10 years and the salvage value of 10% of the initial investment. Each sachet for the first five years could be priced at ₹ 10/. The variable cost is ₹ 3/sachet. After the expiry of the patent period, the technology would be freely available to the competitors who may jump into the market. The product price (rounded off to the nearest integer rupee value) would be determined by the market forces once the market is opened.

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The cost of setting up such a plant (Having similar capacity and similar life) after five years would increase to ₹ 120 Million, variable cost of the product and the salvage value of the plant remaining the same as above.

The appropriate rate of discounting for the projects of this risk class is 15%. Since this is related to such a vide spread disease, the Government of India in order to promote such products has the policy of not taxing such projects for the entire life of the project. The product has huge demand and all the production of this company as well the competitors is likely to be sold in the market. Assume all the cash inflows at the end of the year and the compounding frequency is annual.

Self Assessment

Fill in the blanks:

6. …… 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.
7. …… are product costs consisting of Direct Material (DM), Direct Labor (DL) and Manufacturing Overhead.
8. The major components of …… are known as administrative cost of operations and selling and distribution cost of operations.
9. A …… is detailed plan of operation for some specific future period. It is an estimate prepared in advance of the period to which it applies.

2.4 Summary

- Cost denominates the use of resources only in terms of monetary terms.
- In brief, cost is nothing but total of all expenses incurred for manufacturing a product or attributable to given thing.
- 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.
- A budget is 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.
- Under costing, the role of unit costing is inevitable 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.
- Direct labour is the cost of the labour which is directly involved in the production of either a product or service.
- 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.

Notes

2.5 Keywords

Cost: Expense incurred at the either cost centre or service centre.

Cost Centre: The location at where the cost of the activity is ascertained.

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.

Product Centre: It is the location at where the cost is ascertained through which the product is passed through.

Profit Centre: It is responsibility centre not only for the cost and revenues but also for profits for the activity.

2.6 Review Questions

1. The cost accounting system is directly concerned with control of inventories, plant assets and funds expanded on functional activities. Discuss.
2. Is there any difference between cost accounting and financial accounting?
3. How will you visualize the costs of poor product quality, rework, repair, etc.?
4. Illustrate indirect and direct expenses with the help of suitable examples.
5. Once standard costs are established, what conditions would require the standards to be revised? Give your opinion.
6. What is cost classification? Classify it in detail.
7. Illustrate the different types of costs with suitable examples.
8. Briefly write a note on key elements of cost.
9. How will you determine the scope of cost accounting?
10. Critically evaluate the relationship between cost accounting and financial accounting.

Answers: Self Assessment

1.	Cost Centre	2.	Process
3.	Production	4.	False
5.	True	6.	Period costs
7.	Manufacturing costs	8.	Commercial costs
9.	budget		

2.7 Further Readings

Books

I.M. Pandey, *Financial Management*, Vikas Publishing, New Delhi.

Khan and Jain, *Management Accounting*.

Nitin Balwani, *Accounting & Finance for Managers*, Excel Books, New Delhi.

Prasanna Chandra, *Financial Management - Theory and Practice*, Tata McGraw Hill, New Delhi (1994).

R.L. Gupta and Radhaswamy, *Advanced Accountancy*.

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V.K. Goyal, *Financial Accounting*, Excel Books, New Delhi.

Notes

Online links

www.futureaccountant.com

www.rbi.com

Notes

Unit 3: Cost Sheet and Unit Costing

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Objectives

After studying this unit, you will be able to:

- Explain the unit costing;
- Understand the cost sheet;
- Identify the direct cost classification;
- Identify the indirect cost classification;
- Describe the preparation of cost sheet.

Introduction

Under costing, the role of unit costing is an inevitable 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.

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. Period covered by a cost sheet may be a year, a month or a week, etc. Cost sheet serves the following purposes:

- It discloses various elements of cost,
- It discloses the per unit cost as well as total cost of production,
- It facilitates preparation of tender price, and
- It facilitates comparison of total cost.

Notes

3.1 Cost Sheet - Definition

"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 alongwith break up of costs."

Did u know? **How to find a total cost of the product or service?**

To find the total cost of the product or service, the costs incurred are grouped under various categories.

Unit or output costing is one of the important objectives of Cost Accounting. For this, it is essential to classify cost into certain constituents or categories. These are known as elements of cost. Elements of cost are:

(i) Direct Material

(ii) Direct Labour

(iii) Direct Expenses, and

(iv) Factory Overheads

(v) Office and Administrative Overheads

(vi) Selling and Distribution Overheads

Caution To find out the unit cost of the product, the statement of cost plays a pivotal role in determining the cost of production, cost of goods sold, cost of sales and selling price of the product at every stage.

During the preliminary stage of preparing the cost statement of the product, there are two things to be borne in our mind at the moment of classification.

1. Direct cost classification
2. Indirect cost classification

Self Assessment

Fill in the blanks:

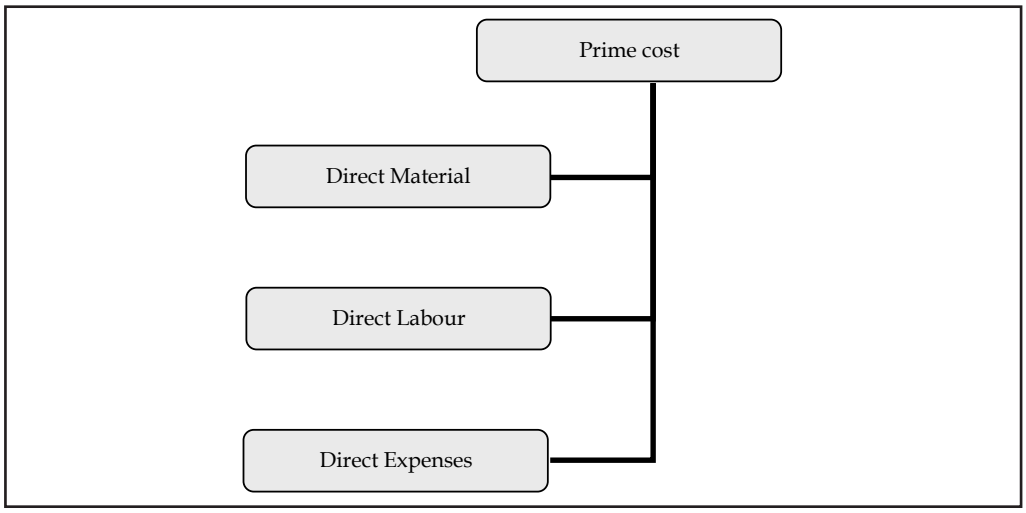
1. Cost sheet is a statement which is prepared periodically to provide detailed cost of a cost unit or ……
2. Unit or output costing is one of the important objectives of ……

3.2 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

Notes



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

Self Assessment

Choose the appropriate answer:

3. Direct cost is:
   - (a) Direct materials
   - (b) Direct labour
   - (c) Direct Expenses
   - (d) Prime cost
4. Prime cost is the summation of:
   - (a) Direct and indirect costs
   - (b) Product and administrative costs
   - (c) Cost of sales and profit margin
   - (d) Direct materials, direct labour and direct expenses

3.3 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.

Notes

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

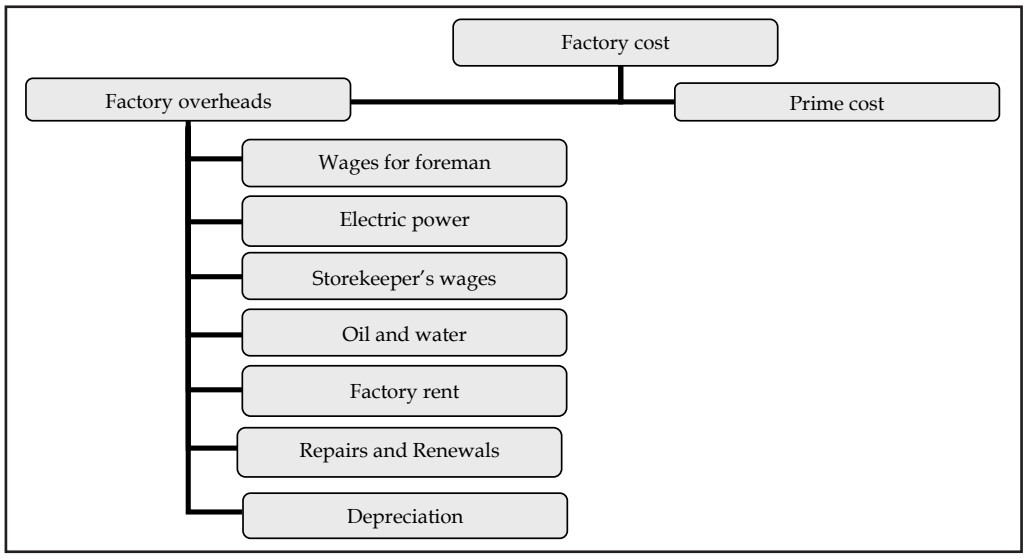
Factory Overheads = Wages of Foreman + Electric Power + Lighting of the Factory + Storekeeper's Wages + Oil and Water + Rent of the Factory + Depreciation in Plant + Consumable Store + Repairs and Renewal Plant

= 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



Notes

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.

Cost Production = Factory Cost + Administrative Overheads

Administrative overheads 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 Calculate Production Cost.	250

Solution:

Production Cost = Factory Cost + Administrative Cost

Factory Cost = ₹ 5,58,000 (from the previous example)

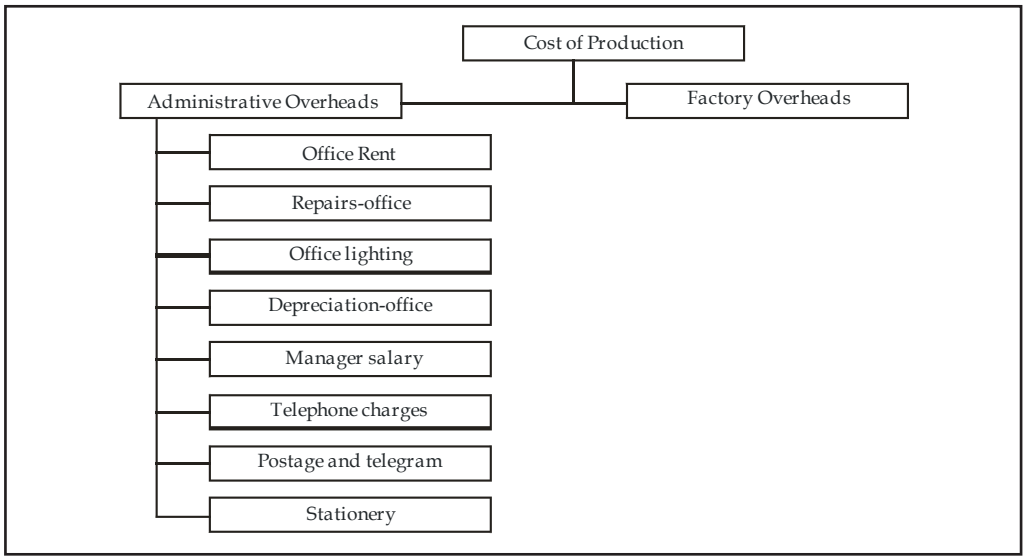
Administrative Cost = Office Rent + Office Lighting + Office Depreciation + Director's Fees + Manager's Salary + Office Stationery + Telephone Charges + Postage and Telegrams

= 6,000 + 1,250 + 3,500 + 2,500 + 10,000 + 1,000 + 500 + 250

= ₹ 25,000

Hence,Production Cost = 5,58,000 + 25,000

= ₹ 5,83,000



Notes

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.

Cost of Sales = Cost of Production + 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 Calculate the cost of sales.	1,000

Solution:

Cost of Sales = Cost of Production + Selling Overheads

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

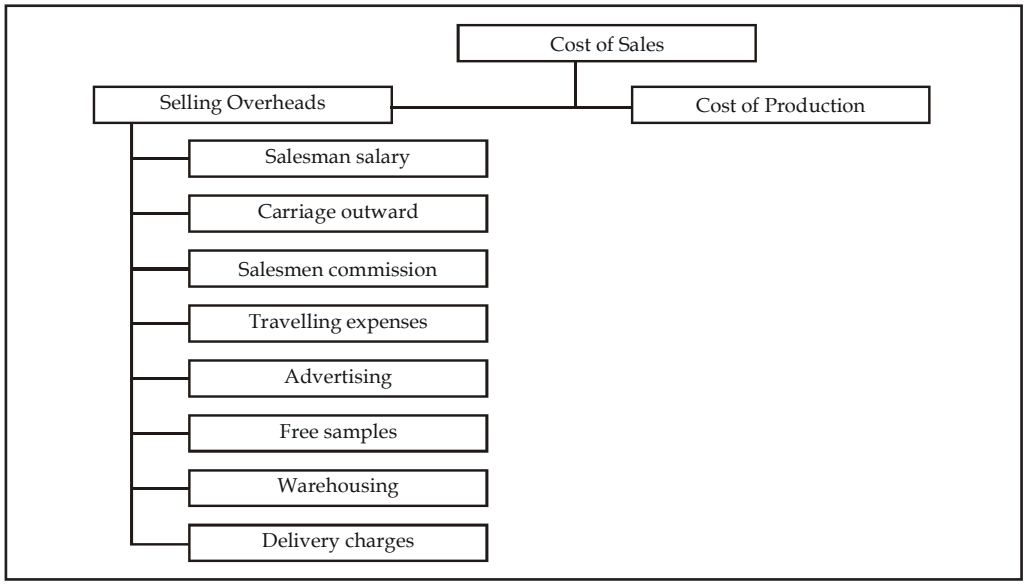
Selling Overheads = Salesman's Salary + Travelling Expenses + Carriage Outward + Advertising + Warehouse Charges

= 10,500 + 1,000 + 750 + 3,500 + 1,000

= ₹ 16,750

Hence, Cost of Sales = 5,83,000 + 16,750

= ₹ 5,99,750



Notes

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.

Sales = Cost of Sales + 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:

Sales = Cost of Sales + Margin of Profit

= 5,99,750 (from the previous example) + 48,900

= ₹ 6,48,650

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 form 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	2,500
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	1,000
Office	5,000	Advertising	2,500
Depreciation Plant	1,000	Warehouse charges	1,000
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:		

Contd…

Notes

Wages of foreman	5,000	
Electric power	1,000	
Lighting : Factory	3,000	
Storekeeper's wages	2,000	
Oil and water	1,000	
Rent: Factory	10,000	
Depreciation Plant	1,000	
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:		
Carriage outward	750	
Salesmen's salaries	2,500	
Travelling expenses	1,000	
Advertising	2,500	
Warehouse charges	1,000	
	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.

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**

Notes

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**

Stock of Finished Goods

The treatment of the stock of finished goods should 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	XXXXX
(+) Opening stock of finished goods	XXXXX
(–) Closing stock of finished goods	XXXXX
Cost of goods sold	**XXXXX**

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

	2005 1st Jan	**2005 31st 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:

Notes

Cost Sheet

Particulars	₹	₹
Opening stock of raw materials 1st Jan	60,000	
(+) Purchase of raw materials	9,00,000	
(-) Closing stock of raw materials 31st Jan	50,000	
Raw materials consumed during the year		9,10,000
(+) Wages paid		4,60,000
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 extracted from the records of the M/s Sundaram & Co.

The stock position of the firm is:

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.

Notes

Solution:

Cost Sheet

Particulars	₹	₹
Opening stock of raw materials on 1st April,1994	80,000	
(+)Purchase of raw materials	8,00,000	
(-)Closing stock of raw materials on 31st 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	
Electricity	60,000	
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

Notes 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.

Self Assessment

Fill in the blanks:

5. The factory overheads are nothing but the …… incurred at the factory site.
6. The total …… incurred in the factory could be derived by adding the both direct cost and indirect cost incurred during the factory process.
7. The …… is the combination of both the factory cost and administrative overheads.

Notes

8. The …… is the blend of both, selling overheads and cost of production.
9. The cost of the …… is nothing but the direct materials cost of the product.
10. The treatment of the stock of …… should carried over in between the opening stock and closing stock and adjusted among them before the finding the cost of goods sold.
11. 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.

Choose the appropriate answer:

12. Factory cost is the total of:
    (a) Direct and indirect costs (b) Product and administrative costs
    (c) Cost of sales (d) Profit margin
13. Selling price is the summation of:
    (a) Direct and indirect costs
    (b) Product and administrative costs
    (c) Cost of sales and profit margin
    (d) Direct materials, direct labour and direct expenses
14. Production cost is the summation of:
    (a) Direct and indirect costs (b) Product and administrative costs
    (c) Cost of sales and profit margin
    (d) Direct materials, direct labour and direct expenses
15. The statement prepared for the computation of a product/service cost is known as:
    (a) Standard Costing (b) Marginal Costing
    (c) Prime Costing (d) None of these

Task 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.

Notes

3.4 Summary

- 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 borne 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 carried over in between the opening stock and closing stock and adjusted among them before the finding the cost of goods sold.

3.5 Keywords

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.

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.

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

Indirect Cost: Cost incurred cannot be easily ascertained and measured for a product. The combination of various overheads.

Prime Cost: Combination of all direct costs viz direct materials, direct labour and direct expenses.

Selling Price or Sales: The summation of cost of sales and profit margin.

Notes

3.6 Review Questions

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 the 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	2,000
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 the cost accounts chief you 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 depots	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 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 reason.
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.

Notes

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 –factory building	6,000
Depreciation –plant	10,000
Factory cost of goods produced in 1993	2,80,000
Raw material consumed in 19x3	95,000
Cost of goods sold in 19x3	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.

Answers: Self Assessment

1. cost centre
2. Cost Accounting
3. Prime cost
4. Direct materials, direct labour and direct expenses
5. indirect costs
6. factory cost or works cost
7. cost of production
8. cost of sales
9. raw materials
10. finished goods
11. indirect expenses
12. Direct and indirect costs
13. Cost of sales and profit margin
14. Product and administrative costs
15. None of these

3.7 Further Readings

Notes

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Unit 4: Material Control

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Objectives

After studying this unit, you will be able to:

- Explain the meaning and definition of material control;
- Describe the methods and techniques of material control;
- Understand the material purchase and storage.

Introduction

Material is a very important factor of production in a manufacturing organization. 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 organizations.

The term 'material' generally used in manufacturing concerns, refers to raw materials used for production, sub-assemblies and fabricated parts. The terms 'materials' and 'stores' are sometimes used interchangeably. However, both the terms differ. 'Stores' is wider in meaning and comprises many other items besides raw materials, such as tools, equipments, maintenance and repair items, factory supplies, components, jigs and fixtures. Sometimes, finished goods and partly finished goods are also included within the scope of this item.

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 uninterruptedly, 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.

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4.1 Meaning and Definition of Material Control

The success of any industry or enterprise depends, to a greater extent, upon the successful control of material. 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.

The 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 minimize the loss of materials during the production period and to maximize the productivity.

Self Assessment

Fill in the blanks:

1. The basic purpose of inventory control is to maintain ……
2. Inventory control is generally exercised over raw materials and ……
3. The purchase department has to exercise utmost care to procure the quality materials at ……
4. By keeping only the required quantities of materials, excess employment of ….…… can be avoided.

4.2 Methods and Techniques of Material Control

Material control is a systematic control over the purchasing storing and using of material to minimizing the possible cost. In every manufacturing concern materials constitute an important factor of production. It is an important element of cost & covering 60-70 percent of the total cost of the production.

Material control may be defined as the level of material maintenance so as to ensure uninterrupted production and minimizing the investment of funds.

Thus material control is the proper control of material which reduces the cost of production, minimizing the investment of fund in the purchases of material & increases the profitability of the organisation.

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 store-keeper

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should have a complete idea about different stock levels. The various stock or inventory levels are as follows:

(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 the following formula:

Maximum Stock Level = (Re-order level – Re-order quantity) – (Minimum consumption × Minimum re-ordering period)

OR

Maximum Stock Level = (Re-order level – Minimum consumption) + 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:

Minimum Stock Level = Re-order level – (Normal consumption per unit of time × Average lead time)

OR

Minimum Stock Level = Re-order level – (Normal consumption × 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:

Danger Level = Minimum consumption per unit of time × Maximum lead time for emergency purchases

OR

Danger Level = Normal consumption × 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 store-keeper 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:

Re-order Level = Maximum consumption per unit of time × Maximum lead time

OR

Re-order Level = Maximum consumption × 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:

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

Notes

Example: Two components, A and B, are used as follows:

Normal usage	100 units/week
Maximum usage	150 units/week
Minimum usage	50 units/week
Reorder quantity	A 600, B 1000
Reorder period	A 4 to 6 weeks
	B 2 to 4 weeks

Calculate for cash component

1. Reorder level
2. Minimum level
3. Maximum level
4. Average Stock level

Solution:

1. Reorder level =Maximum usage/week × Maximum delivery period

Reorder level for A =150 units × 6 = 900 units

Reorder level for B =150 units × 4 = 600 units

2. Minimum level =Reorder level – (Normal usage × Avg. period)

Minimum level for A =900 units – 50 units × 5

=900 units – 250 units = 650 units

Minimum level for B =600 units – 50 units × = 450 units

3. Maximum level =Reorder level + Reorder Qty – (Min. consumption × Min. reorder period)

Maximum level for A =(900+600) – (50 units × 4 weeks)

=1500 – 200 = 1300 units

Maximum level for B =(600+1000) – (50units × 2) = 1500 units

4. Average stock level =½ (minimum + maximum stock level) Average stock for component A = ½ (650 + 1300) = 975

Average stock for component B =½ (450 + 1500) = 975

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

Notes

Solution:

Re-order Level = Maximum usage × Maximum re-order period

= 420 units × 15 days = 6,300 units

Minimum Level = Re-order level – Normal consumption × Normal re-order period

= 6,300 – (300 units per day × 12 days)

= 6,300 – 3,600 = 2,700 units

Maximum Level = (Re-order level + Re-order quantity) – (Minimum consumption × Minimum re-order period)

= (6,300 + 3,600) – (240 × 10)

= 9,900 – 2,400 = 7,500 units

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:

Re-order Level = Maximum usage × Maximum lead time

= 300 Units × 6 months

= 1,800 Units

Maximum Level = [ROL – (Minimum usage × Minimum lead time)] + ROQ

= [1,800 – (200 × 2)] + 750

= 2,150 Units

Minimum Level = ROL – (Average usage × Average lead time)

= 1,800 – (225 × (6 + 2) ÷ 2

= 1,800 – (225 × 4)

= 900 Units

Therefore, Average Level = (Maximum level + Minimum level) ÷ 2

= (2,150 + 900) ÷ 2

= 1,525 Units

Example: Calculate Re-order level, Minimum level, Maximum level and Average stock level from the following data:

Normal usage 300 units per week

Notes

Maximum usage	450 units per week
Minimum usage	150 units per week
Re-order period	4 to 6 weeks
Re-order quantity	2,400 units

Solution:

Re-order Level = Maximum usage × Maximum re-order period

= 450 × 6

= 2,700 units per week

Minimum Level = Re-order level – (Normal usage × Normal re-order period)

= 2,700 – (300x5)

= 2,700 – 1500

= 1,200 units per week

Maximum Level = (Re-order level + Re-order quantity) – (Minimum usage × Minimum re-order period)

= (2,700 + 2,400) – (150 × 4)

= 5,100 – 600

= 4,500 units per week

Average Level = Minimum level + ½ (Re-order quantity)

= 1,200 + ½ × 2,400

= 1,200 + 1,200

= 2,400 units per week

Example: Calculate the following levels from the following information:

Re-ordering level, Maximum level, Minimum level, Danger level, Average stock level, and Re-ordering quantity.

- Number of units to be purchased during the year is 5,000.
- Total costs of purchasing relating to the order are ₹ 20.
- Purchase price per unit including transportation costs is ₹ 50.
- Annual cost of storage of one unit is ₹ 5.

Lead times:	Average	10 days
	Maximum	15 days
	Minimum	6 days
	Maximum for emergency purchases	4 days
Rate of consumption:	Average	15 units per day
	Maximum	20 units per day
	Minimum	10 units per day

Notes

Solution:

ROL = (Maximum consumption) × (Maximum lead time)

= 20 units per day × 15 days

= 300 units

Maximum Level = ROL – (Minimum consumption × Minimum lead time) + Re-ordering quantity

= 300 – (10 units per day × 6 days) + 200 (1)

= 500 – 60

= 440 units

(1) (Re-order Quantity = ROQ = EOQ = $\sqrt{\frac{2UA}{PC}}$

$= \sqrt{\frac{2 \times 5000 \times 20}{5}} = \sqrt{40000}$ = 200 Units)

Minimum Level = ROL – (Average consumption × Average lead time)

= 300 – (15 units per day × 10 days)

= 300 – 150 = 150 units

Danger Level = (Minimum consumption) × (Maximum lead time for emergency purchase)

= 10 units × 4 days

= 40 units

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

$= \frac{150+440}{2}$

= 295 Units

Economic Ordering Quantity

The ordering of materials is usually tagged with three different components of costs viz:

- Acquisition cost of materials
- Ordering cost of materials and
- Carrying cost of materials

The ordering quantity of materials may be either larger or lesser in volume, which carries its own advantages and disadvantages.

If the quantity ordered is larger in volume, the following are some of the important advantages:

- The bulk purchase order reduces the ordering cost of the materials.
- The greater the size of the order leads to reduce the number of the orders in procuring the materials.

Quantity discounts: The discount can be classified into two categories viz trade discount and cash discount.

Notes

Did u know? **What is trade discount?**

Trade discount is the discount granted by the supplier to the buyer of materials at the moment of bulk purchase. This % of discount is greatly possible only during the periods of greater volume of purchase, which reduces the overall cost of the acquisition.

If the quantity is procured in lesser volume, the following are construed as advantages:

- The carrying cost will come down in the case of lesser inventories.
- The cost of storage is lesser as far as the lesser quantities of materials.
- Loss due to deterioration, obsolescence, wastage will be minimum.
- Insurance cost is less due to lesser volume of materials.

Tabular Method

When there are quantity discounts offered by the supplier at different lot sizes purchased i.e. purchase price of material varies at different quantity levels, the tabular method is used to determine Economic Order Quantity. It is illustrated in the below example:

Example: The supplier of Material 'ABC' has given the below quantity discount offer

Price per unit ($)	Units
120	Less than 250 units
118	250 and less than 800 units
116	800 and less than 2,000 units
114	2,000 and less than 4,000 units
11	4,000 units and above

Inventory carrying costs are 10% p.a. Order placing cost per order is $ 600. Annual consumption of the material is 4,000 units.

Compute the Economic Order Quantity

Solution: Follow the below steps to find out EOQ under Tabular method:

1. Pick up one lot size from each of the tiers. It is recommended to pick up a lot size that is an exact fraction of Annual Consumption
2. Compute the total inventory cost for each lot size picked
3. The lot size where the total cost is lowest would be the EOQ

Lot Size (U)	Price Per Unit (P)	Purchase Cost (X = C x P)	# of orders (N = C/U)	Ordering Cost (Y = N x O)	Storage cost p.u (S = P x 10%)	Storage Cost (Z = U/2 x S)	Total Cost (X + Y + Z)
200	$ 120	$ 480,000	20	$ 12,000	$ 12.00	$ 1,200	$ 493,200
250	$ 118	$ 472,000	16	$ 9,600	$ 11.80	$ 1,475	$ 483,075
800	$ 116	$ 464,000	5	$ 3,000	$ 11.60	$ 4,640	$ 471,640
2000	$ 114	$ 456,000	2	$ 1,200	$ 11.40	$ 11,400	**$ 468,600**
4000	$ 112	$ 448,000	1	$ 600	$ 11.20	$ 22,400	$ 471,000

C = Annual Consumption of Material = 4,000 units

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O = Ordering cost per order = $ 60

Sine the total cost at 2,000 units lot size is lowest, it is the optimal quantity to buy.

Example:

Calculate EOQ

Annual requirement	1600 units
Cost of materials per unit	₹40
Cost placing and receiving	₹50
Annual carrying cost of inventory	10% on value

Solution:

$$\text{Economic Ordering Quanitity (EOQ)} = \sqrt{\frac{2AO}{I}}$$

$$\text{EOQ} = \sqrt{\frac{2 \times 1600 \times ₹50}{10\% \text{ on } ₹40}} = 200 \text{ units}$$

Example:

Calculate EOQ

Consumption during the year	600 units
Ordering cost	₹ 12 per order
Carrying cost	20% on price
Price per unit	₹ 20

Solution:

$$\text{Economic Ordering Quantity (EOQ)} = \sqrt{\frac{2AO}{I}}$$

$$\text{EOQ} = \sqrt{\frac{2 \times 600 \times ₹12}{20\% \text{ on } ₹20}} = 60 \text{ units}$$

Example: The following data given to you from the accounts of a company for the year 2008:

Cost of opening stock of material = ₹ 40,000

Cost of closing stock of material = ₹ 80,000

Purchase of material during 2008 = ₹ 5,00,000

From the above, compute:

(i) Cost of average stock of material,

(ii) Materials or stock turnover ratio, and

(iii) Average inventory holding.

Notes

Solution:

(i) Cost of Average Stock of Material $= \dfrac{₹40,000 + ₹80,00}{2} = ₹\ 60,000$

(ii) Materials/Stock Turnover Ratio $= \dfrac{₹40,000 + ₹5,00,000 - ₹80,000}{₹60,000}$

$= \dfrac{₹4,60,00}{₹60,000} = 7\frac{2}{3}$ times

(iii) Average Inventory Holding $= \dfrac{365 \text{ days}}{7\frac{2}{3} \text{ times}}$

= 47.61 days

Example: From the following data, calculate the inventory turnover ratio:

Minimum stock level	₹1,000
Maximum stock level	₹3,000
Issues during the year	₹10,000

Solution:

$$\text{Inventory Turnover Ratio} = \frac{\text{Cost of materials consumed during the period}}{\frac{1}{2}\ (\text{Max. level} + \text{Min. level})}$$

$$= \frac{10,000}{\frac{1}{2}\ (3,000 + 1,000)}$$

$$= \frac{10,000}{2,000}$$

= 5 times

Task Given the annual consumption of material is 1,800 units, ordering costs are ₹2 per order, price per unit of material is 32 paise and storage costs are 25% per annum of stock value. Find the economic order quantity.

Just In Time (JIT) System

Just In Time (JIT) is a production and inventory control system in which materials are purchased and units are produced only as needed to meet actual customer demand.

When Companies use Just in Time (JIT) manufacturing and inventory control system, they purchase materials and produce units only as needed to meet actual customers demand. In just in time manufacturing system inventories are reduced to the minimum and in some cases are zero. JIT approach can be used in both manufacturing and merchandising companies. It has the most profound effects, however, on the operations of manufacturing companies which maintain three class of inventories – raw material, Work in process, and finished goods. Traditionally, manufacturing companies have maintained large amounts of all three types of inventories to act

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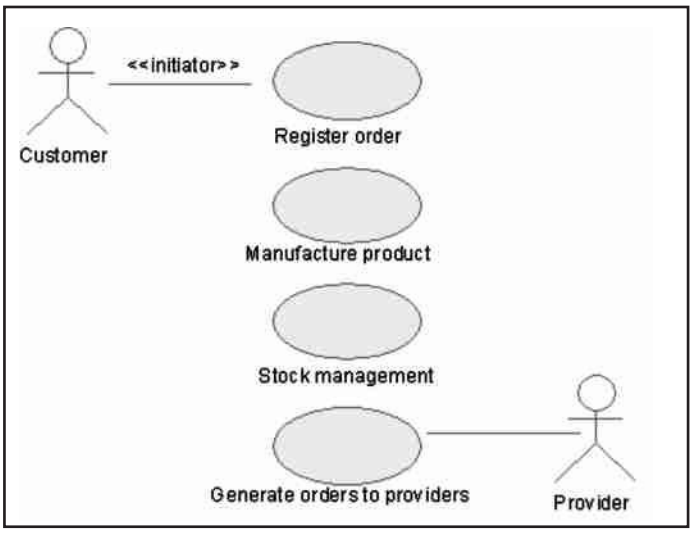
as buffers so that operations can proceed smoothly even if there are unanticipated disruptions. Raw materials inventories provide insurance in case suppliers are late with deliveries. Work in process inventories are maintained in case a work station is unable to operate due to a breakdown or other reason. Finished goods inventories are maintained to accommodate unanticipated fluctuations in demand. While these inventories provide buffers against unforeseen events, they have a cost. In addition to the money tied up in the inventories, expert argue that the presence of inventories encourages inefficient and sloppy work, results in too many defects, and dramatically increase the amount of time required to complete a product.

Under ideal conditions a company operating at JIT manufacturing system would purchase only enough materials each day to meet that days needs. Moreover, the company would have no goods still in process at the end of the day, and all goods completed during the day would have been shipped immediately to customers. As this sequence suggests, "just-in-time" means that raw materials are received just in time to go into production, manufacturing parts are completed just in time to be assembled into products, and products are completed just in time to be shipped to customers. Although few companies have been able to reach this ideal, many companies have been able to reduce inventories only to a fraction of their previous level. The result has been a substantial reduction in ordering and warehousing costs, and much more efficient and effective operations. In a just in time environment, the flow of goods is controlled by a pull approach. The pull approach can be explained as follows. At the final assembly stage a signal is sent to the preceding work station as to the exact amount of parts and materials that would be needed over the next few hours to assemble products to fill customer orders, and only that amount of materials and parts is provided. The same signal is sent back to each preceding workstation so a smooth flow of parts and materials is maintained with no appreciable inventory buildup at any point. Thus all workstations respond to the pull exerted by the final assembly stage, which in turn respond to customer orders. As one worker explained, "Under just in time system you don't produce anything, anywhere, for anybody unless they ask for it somewhere downstream. Inventories are evil that we are taught to avoid".



The **pull approach** described above can be contrasted to the push approach used in conventional manufacturing system. In conventional system, when a workstation completes its work, the partially completed goods are pushed forward to the next work station regardless of whether that workstation is ready to receive them. The result is an unintentional stockpiling of partially completed goods that may not be completed for days or even weeks. This ties up funds and also results in operating inefficiencies. For one thing, it becomes very difficult to keep track of where everything is when so much is scattered all over the factory floor.

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Another characteristics of *conventional manufacturing system* is an emphasize on "keeping every one busy" as an end on itself. This inevitably leads to excess inventories particularly work in process inventories. In Just in time manufacturing, the traditional emphasize of keeping everyone busy is abandoned in favor of producing only what customers actually want. Even if that means some workers are idle.

The main benefits of just in time manufacturing system are the following:

1. Funds that were tied up in inventories can be used elsewhere.
2. Areas previously used, to store inventories can be used for other more productive uses.
3. Throughput time is reduced, resulting in greater potential output and quicker response to customers.
4. Defect rates are reduced, resulting in less waste and greater customer satisfaction.

As a result of advantages such as those cited above, more companies are embracing just in time manufacturing system each year. Most companies find, however, that simply reducing inventories is not enough. To remain competitive in an ever changing and ever competitive business environment, must strive for continuous improvement.

Real Business Examples – PCs Just in Time Management

Del Computer Corporation has finally tuned its Just-in-Time system so that an order for a customized personal computer that comes in over the internet at 9 AM can be on a delivery truck to the customer by 9 P.M. In addition, Dell's low cost production system allows it to under price its rivals by 10% to 15%. This combination has made Dell the envy of the personal computer industry and has enabled the company to grow at five times the industry rate. How does the company's just in time system deliver lower costs? "While machines from Compaq and IBM can languish on dealer shelves for two months Dell does not start ordering components and assembling computers until an order is booked. That may sound like no biggie, but the price of PC parts can fall rapidly in just a few months. By ordering right before assembly, Dell figures its parts, on average, are 60 days newer than those in an IBM or Compaq machine sold at the same time. That can translate into a 6% profit advantage in components alone."

Source: *Gray McWilliams, "Whirlwind on the web, "Business Week, April 7, 1997.*

ABC Analysis

Normally the materials are classified on the basis of the following covenants viz:

- Volume and
- Value

Based on the above basis, the materials are classified into three categories:

- Lesser percentage in volume and greater percentage in value – Category A
- Greater percentage in volume and lesser percentage in value – Category B and
- Percentage in volume and percentage in value are more or less similar – Category C

Example: A store has 4,000 items of consumption and a monthly consumption of ₹ 20,00,000. 320 items will have a consumption of ₹ 15,00,000. 500 items will account for ₹ 4,00,000 and 2,680 items consume material worth ₹ 1,00,000 only.

Notes

Table of Items and Value

Group	No. of Items	% of Items	Value ₹	% of Value
A	320	8%	15,00,000	75%
B	1,000	25%	4,00,000	20%
C	2,680	67%	1,00,000	5%
Total	4,000	100%	20,00,000	

The importance of the analysis is exercising the control on the inventory.

Did u know? **How is the control of the inventory being exercised?**

- Group A items are high valued items among the other items of the enterprise, requiring greater monitoring and controlling.
- Group B items are comparatively lesser in value among the three items given next to the Group A, require less rigid control and monitoring.
- Group C items are the major volume of items among the 4,000 items of the enterprise which are least in value, need very little control and monitoring.

Example: The following shows the control of inventory on A, B and C items of the enterprise:

Group	No. of Items	Level of Control	% of Items	Value ₹	% of Value
A	320	Rigid Control	8%	15,00,000	75%
B	1,000	Moderate Control	25%	4,00,000	20%
C	2,680	Very little Control	67%	1,00,000	5%

From the above table, it is obviously seen that the items which have greater percentage (75%) in the total value require rigid control than any other quantity of materials. The Group C items bear 67% of total consumption amount to 5% of total value of the items procured by the enterprise.

The unique features of the ABC analysis:

Nature	A Group of Items	B Group of Items	C Group of Items
Level of Control	Rigid control	Moderate control	Very little control
Order frequency	Frequency of ordering-weeks, fortnights	Once in 2 months	Once in 6 months
Lead time problem	To be cut off drastically	To be reduced moderately	Lead time problem due to clerical should be cut off
Safety stock level	Due to greater value least volume of safety stock is to be maintained	Due to moderate value-lesser safety stock is required	Due to lower value higher safety stock is required
System of Purchase	Higher value demands centralized system of procurement	Moderate value requires centralized and decentralized system of purchase	Lower value needs decentralized system of purchase
Supervision	By Senior officers	By Middle level managers	By clerical staff

Advantages

1. It guides the management to exercise the control based on the value of goods to the total composition.

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2. Systematic inventory control can be exercised through this analysis on the basis of value of the materials. The high value materials of Group A are rigidly controlled which finally led to lesser investments.
3. Scientific system helps to lessen the storage cost of the inventory.

Self Assessment

State whether the following statements are true or false:

5. As per ABC analysis the A category of inventory includes the inventory of lesser percentage in volume and Greater percentage in Value.
6. Cash discount is the discount granted by the supplier to the buyer of materials at the moment of bulk purchase.
7. The bulk purchase order increases the ordering cost of the materials.
8. The greater the size of the order leads to reduce the number of the orders in procuring the materials.

Caselet

Pennila & Co. is a direct exporter as well as market leader in the domestic market among acute competition. The firm is expected to have an opening stock of 2000 kg of raw materials at the rate of ₹ 4 per kg. The firm should have to price the issue of materials in two different ways, one for the domestic market and another one for the export order which was already obtained.

Date	Receipts Qty kg	Rate per kg ₹	Issue Qty kg
Jan6			400
Jan10	800	4.40	
Jan15	600	4.80	
Jan20			1000
Jan21			400
Jan 24	1000	5.20	
Jan 25			600
Jan 28			400

Use of Perpetual Inventory Records and Continuous Stock Verification

Perpetual inventory represents a system of records maintained by the stores department. It comprises Bin Cards and Stores Ledger.

Bin cards maintain quantitative records of receipts, issues and closing balances of each item of stores. Separate bin cards are maintained for each item. Each card is filled up with the physical movement of goods i.e., on its receipt and issue. Like bin cards, the stores ledger is maintained to record all receipts and issue transaction in respect of materials. It is filled up with the help of goods received note and material issue requisitions.

A perpetual inventory is usually checked by a programme of continuous stock taking. Continuous stocktaking means the physical checking of these records (which are maintained under perpetual

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inventory) with actual stock. Perpetual inventory is essential for material control. It helps continuous stocktaking.

Stock verification may be periodical or continuous. Annual stock taking has certain inherent shortcomings e.g., all the items have to be covered in a given number of days, either the production dept. has to be shut down during these days to enable thorough checking of stock, or else the verification has to be of limited character. On the other hand, the system of continuous stocktaking consists of counting and verifying the number of items daily throughout the year, so that during the year all the items of stores are covered three or four time. The stock verifiers are independent of stores and stores staff has no knowledge as to the particular items that are being checked on a particular date.

Techniques

Material Turnover Ratio: Material 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:

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

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

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

(i) Materials consumed,

(ii) Average inventory held, and

(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

Notes

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

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

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

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

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

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

Perpetual Inventory System

The perpetual inventory system is intended as an aid to material control. It is a system of stock control followed by stores department. The system follows a method of recording stores by which information about each receipt, issue and current balance of stock is always available.

The Institute of Cost and Management Accountants of England and Wales, defines perpetual inventory as "A system of records maintained by the controlling department, which reflects the physical movement of stocks and their current balances."

According to Weldon, "Perpetual inventory system is a method of recordings stores balances after every receipt and issue, to facilitate regular checking and obviate closing down of work for stock-taking."

Thus, it is a system of ascertaining current balance after recording every receipt and issue of materials through stock records. An important point which should be kept in mind is that the perpetual inventory is usually checked by a programme of continuous stock-taking. Perpetual inventory means the system of it cords whereas continuous stock-taking means the physical checking of those records with actual stocks.

Perpetual inventory system comprises:

1. Comparison of Bin Cards (quantitative perpetual inventory) and Stores Ledger Accounts (quantitative-cum-valued perpetual inventory),
2. Continuous Stock-Taking (Physical perpetual inventory)

1. ***Comparison of Bind Cards and Stores Ledger Account:*** Bin card is maintained by the store-keeper and stores ledger account is maintained by stores accountant. Each item of stores is recorded at these places simultaneously. Normally the balances shown by the two records tally. However, there may arise some differences between these two records due to the following reasons:
   (a) Omission of an item of store in bin card or stores ledger account.
   (b) Wrong posting of an item of store either in bin card or in stores ledger account.
   (c) Arithmetical error in working out their balances. Therefore, the balances of the two records should be reconciled at frequent intervals and correct balances should be drawn.
2. ***Physical Stock Verification:*** The perpetual inventory system is not complete without a systematic procedure for physical verification of stores. The correctness of balances as

Notes

shown in the bin card or stores ledger account should be verified by means of physical stock verification. Physical stock verification may be conducted in the following two ways:

(a) *Periodic stock verification:* It refers to a system where physical stock verification is normally done periodically, i.e., once or twice in a year. Under this method, value of stock is determined by physical counting of the stock on a particular date, usually at the end of the year.

It is a simple and economical method of stock-taking and is adopted in small concerns. This type of verification is good only for the items which do not find place in the perpetual inventory records, e.g., works-in-progress, components and consumable stores at site etc. But there are many limitations of this method. Stores may' be closed down for a few days to facilitate stock-taking. There is possibility of fraud] discrepancy, etc.

(b) *Continuous stock verification:* This system comprises counting and verifying in number of items at random daily throughout the year so that all items of stores are verified several times during the year. Notice of the particular stock to be verified each day is given to the store-keeper only on the date of actual verification.

As there is an element of surprise check in this system of stock-taking, effective control over the items of stores can be exercised. The system does not necessitate the closing down of the stores to facilitate stock-taking. There is also less possibility of fraud and discrepancy, but the method is expensive and is adopted by big concerns only.

The actual stock of material should not differ from the recorded stock under normal circumstances. But sometimes differences arise due to the following reasons:

(i) Breakage and wastage of materials due to improper handling.

(ii) Shrinkage and evaporation.

(iii) Losses due to accident, fire, etc.

(iv) Losses arising out of breaking up bulk materials.

(v) Losses due to theft.

(vi) Misrouting in bin card or stores ledger account.

(vii) Over or short-issue.

Advantages

Advantages of Perpetual Inventory System are as follows:

(i) ***Easy detection of errors:*** Errors and frauds can be easily detected at an early date. It helps in preventing their occurrence.

(ii) ***Better control over stores:*** The system exercises better control over all receipts and issues in such a manner so as to give a complete picture of both quantities and values of stock in hand at all times.

(iii) ***No interruption of production process:*** Production process is not interrupted as the physical verification of stock is made on a planned and regular basis.

(iv) ***Acts as internal check:*** Under the system, records are made simultaneously in the bin cards and stores ledger accounts which acts as a system of internal check for detection of errors as and when they are committed.

Notes

(v) ***Investment in materials kept under control:*** The investment in materials is kept at a minimum level as the actual stock is continuously compared with the maximum level and minimum level.

(vi) ***Early detection of loss of stock:*** Loss of stock due to shrinkage, evaporation, accident, fire, theft, etc. can be easily detected.

(vii) ***Accurate and up-to-date accounting records:*** Due to continuous stock-taking, the store-keeper and stores accountant become more vigilant in their works and they maintain accurate and up-to-date records.

(viii) ***Easy to prepare interim accounts:*** It is possible to prepare periodical profit and loss account and balance sheet without physical stock-taking being made.

(ix) ***Availability of correct stock data:*** Correct stock data is readily available for settlement of insurance claims.

Disadvantages of excessive Stock are as follows:

(a) Loss of interest on capital locked up in stock.

(b) Loss through deterioration.

(c) Risk of obsolescence.

(x) ***Employment of specialized staff:*** Since the work is spread throughout year, whole time specialised staff can be engaged for the purpose.

(xi) ***Moral check on employees:*** The system acts as a moral check on the employees working in the stores which increases their efficiency.

Such losses increase the cost of production. These losses may be in the form of wastage scrap, defective and spoilage. The problems of waste, scrap, spoilage or defectives materials must arise in almost all manufacturing industries. There is no uniformity the meaning and accounting treatment of waste, scrap, spoilage and defective However, steps should be taken to minimize the discrepancy so that efficiency can increased and proper material control is ensured.

FNSD Analysis

Age of inventory indicates duration of inventory in organization. It shows moving position of inventory during the year. If age of inventory is minimum it means, the turnover position of that particular item of inventory is satisfactory. If the age of any particular item of inventory, it indicates the slow moving of stock which may be due to lower demand for the product, inefficiency in shocking policy, excessive stocking etc. The excessive investment in stocks means, high investment is locked-up in inventory leads to lower profitability of the firm due to excess carrying costs.

FNSD analysis divides the items into four categories in the descending order of their usage rate as follows:

'F' stands for fast moving items and stocks of such items are consumed in short span of time. Stocks of fast moving items must be observed constantly and replenishment orders be placed in time to avoid stock-out situations.

'N' means normal moving items and such items are exhausted over a period of a war or so. The order levels and quantities for such items should be on the basis of a new estimate of future demand to minimize the risks of a surplus stock.

Notes

'S'indicates slow moving items, existing stock of which would last for two years or more at the current rate of usage but it is still expected to be used up. Slow moving stock must be reviewed very carefully before any replenishment orders are placed.

'D'stands for dead stock and for its existing stock no further demand can before seen. Dead stock figures in the inventory represents money spent that cannot be realized but it occupies useful space. Hence, once such items are identified, efforts must be made to find all alternative uses for it. Otherwise, it must be disposed off.

VED Analysis

This analysis divides items into three categories in the descending order of their criticality as follows:

'V' stands for vital items and their stock analysis requires more attention. The reason is that if these items are not available, the resulting stock outs will cause heavy losses due to stoppage of production. Thus these items are required to be stored adequately to ensure smooth operation of the plant.

'E' means essential items. Such items are considered essential for efficient running but without these items, the system will not fail. Care must be taken to see that they are always in stock.

'D' stands for desirable items, which do not affect production immediately but availability of these items will lead to more efficiency and less fatigue.

Thus VED analysis can be very useful to capital intensive process industries. As it analyses items based on their importance and it can be used for those special raw materials which are difficult to procure.

ABC & VED Analysis (Matrix Module: Criticality vs Cost)

It is possible to conduct a two dimensional analysis taking into consideration cost on one hand , i.e. A,B,C categories, and VED on the other. Findings of ABC and VED analysis can be coupled and further grouping can be done to evolve a priority system of management of stores:

Coupling Matrix Model

	Cat I	Cat II	Cat III
	V	E	D
A	Av	Ae	Ad
B	Bv	Be	Bd
C	Cv	Ce	Cd

An example for the coupling matrix model for equipment between criticality and cost

	V	E	D
H	Defibrillator 1	X-ray machine 2	Air-curtains 3
M	Ventilator 4	Electric cautery 5	Ultrasonic wash machine 6
L	Oxygen regulator 7	Patient trolley 8	Electronic BP machine 9

Notes

Cell 1 contains vital and high cost items like defibrillator. It must be noted that a material manager has to comprehensively supervise category 1 items since an item may be a low cost one but critical for patient care. (oxygen regulator)

Category I items: These items are the most important ones and require control by the administrator himself.

Category II items: These items are of intermediate importance and should be under control of the officer in charge of the stores.

Category III items: These items are of least importance which can be left under the control of the store-keeper.

The grouping will essentially depend upon the strategy of management and the environment of functioning. However these simple techniques can be effective in material management system.

Items with high criticality (V), but required in small quantity (A) should receive highest priority. Items with low criticality (D) and which are required in big quantity should receive least priority.

4.3 Material Purchase and Storage

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 quality 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.

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 (Indenting for Materials):*** The purchase department initiates actions for the purchase of materials only after the receipt of purchase requisitions from the store-keeper. 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, store-keeper 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 store-keeper will prepare the purchase requisition.

On the basis of the stock levels and/or bills of materials, the store-keeper 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.

Notes

The format of the purchase requisition is shown below:

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

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

(ii) ***Selection of Suppliers (Choosing the 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 is mentioned below:

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

Notes

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.

The format of purchase order is shown below:

Kartik Company Limited
Purchase Order

To, Purchase Reg. No. : …….
The Supplier, Date : …….
……. Quotation No. : …….
……. Purchase Order No. : …….

Dear Supplier,

Your Quotation No. ……. dated ……. 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 : …….
Terms of Payment : …….
Packing Charges : …….
Excise Duty : …….
Other Conditions : …….

For Kartik Company Limited
Signature of Purchase Manager

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

(iv) ***Receiving and Inspecting of Materials:*** In large organization, 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 storekeeper. 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.

Notes

The format for receiving materials is show below:

Kartik Company Limited
Materials Received Note

From: Purchase Order No. & Date : ……...
The Supplier Delivery Note No. & Date : ……...
…… Date : ……...
……

Item No.	Description of Materials	Code No.	Quantity			Remarks (If any)
			Ordered	Received	Diff.	

Received by: ……... Checked by : ……...

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 store-keeper of the purchase department. Receiving department will prepare five copies of the materials received note-one each to purchase department, accounts department, store-keeper, 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 : ……...

Notes

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.

ABC Company
Invoice

To,

The Purchase Manager	Purch. Ord. No .: …….	Delivery Note No. : ……..
Kartik Company Ltd.,	Date: ……..	Date of Dispatch :……..
	Invoice No. : …….	Date : ……..……

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: …….	Details of Debit or Credit Note No.: ……..
G.R.No. & Date : …….	Delivery Note No. : ….…….
Ins. Rep. No. & Date : …….	Passed for Payment of ₹ : ……....…….
Checked by : ……...	

Signature of Purchase Manager

Stores department can play a very important role in controlling the material cost. Because, by requisitioning only the required materials in required quantities at the right time and by preventing all types of losses of materials in the stores department, the stores department can contribute heavily to the control of the costs. The stores department should, therefore, be headed by a person who is honest, regular, punctual, efficient, and dedicated.

Besides, the efficient working of the stores department depends upon even the location of the stores department in the organization. Because, it should be located, as far as possible, at a place which is near to the receiving department of organization so that the transportation costs can be minimized?

Notes

Functions of Stores Department

The important functions of the stores department are to:

(i) Receive and accept materials after properly verifying the documents,

(ii) Maintain materials in a orderly manner,

(iii) Carry out a reconciliation of stores balance as per bin card,

(iv) Prevent unauthorized persons from entering the store,

(v) Maintain the materials properly in good condition,

(vi) Ensure that records relating to receipt, issue and balance are up to date, and

(vii) Issue materials only against duly authorized material requisition.

Documents Used in Stores Procedure

Although the procedure followed for the purchase and storing of materials varies from industry to industry and organization to organization, never the less there are certain routines which are common to them. The following documents are generally used in stores procedure:

(i) ***Bin Card:*** This document is prepared by the stores department. On the receipt of materials, the store-keeper places them in appropriate bins and makes necessary entries in a document called bin card. This bin card is kept and maintained by the store-keeper to assist him in the control of stock. Hence, it will be in the direct control of the store-keeper. It, therefore, records the movement of materials from the stores and to the stores. It shows the quantity of specified materials available in the bin at any point of time. Further, it may be noted here that for each type of material, a separate bin card will be prepared. As soon as the materials are received or issued, the store-keeper will make an entry in the bin card. Another important aspect of bin card is that it keeps an account of only physical flow of materials.

Specimen of the bin card is presented below:

Kartik Company Limited
Bin Card

Description : ..... Inventory Level : .....

Material Code : ..... Maximum Level : .....

Stores Ledger Folio No. : ..... Minimum Level : .....

Date	Receipts		Issues		Balance of Quantity	Materials on order	Audit	
	GRN No.	Qty.	SR No.	Qty.			Date	Remarks & Signature

(ii) ***Stores Requisition Note:*** As is known, the materials are stored in the stores department for the purpose of issue to the production and other departments as and when required. Hence, the store-keeper has to issue the materials to the production and other departments but only on the production of an authorized letter called stores requisition note. When material is issued, it will be recorded by the store-keeper in the issue column of the bin card and the balance will be adjusted according to accounting procedure.

Notes

A specimen of the stores requisition note is shown as follows:

Kartik Company Limited
Stores Requisition Note

Work No : …… No. : ……

Department : …… Date : ……

The Store-keeper,

Kartik Company Limited,

Dear Sir,

Please issue the materials to…… department for work/job No. ……....

Description of Materials	Material Code No.	Quantity	For Cost Office		Remarks (If any)
			Rate	Amount (₹)	

Bin No : …….. Issued by : ……...

SL. No. : …….. Received by : ……...

Prepared by : …….. Approved by : ……...

(iii) ***Material Return Note:*** This document is prepared by the production or other departments. This shows the materials returned to the stores department. The material return note shows the material code, material description, material quantity and material rate or price. When the materials issued to production or other departments are no longer required, a material return note is prepared by the concerned department and the material is returned to the stores department along with the material return note.

A format of material return note is shown below:

Kartik Company Limited
Material Return Note

From: Date : …….

Department Name : ……..

Job No. : ……..

Order No. : ……..

Description of Materials	Code No.	Quantity	Rate	Amount (₹)	Remarks (If any)

Prepared by : ……. Authorized Signatory : ……

(iv) ***Material Transfer Note:*** When materials are transferred from one department to another department, the transferor department raises a material transfer note. This document is

Notes

prepared by the production department or other departments. The material transfer note shows description, code, quantity, rate and amount of materials returned. Copies of this note shall be sent to the cost office, stores department and transferee department for appropriate adjustments in the amounts of both the transferor and transferee departments.

A format of this note is presented herein as Material Transfer Note:

Kartik Company Limited
Material Transfer Note

No. : …… Transferor Department : ……...

Date : …… Transferee Department : ……...

Description of Materials	Code No.	Quantity	Rate	Amount (₹)	Remarks (If any)

Prepared by : …….

Received by : ……. Authorized Signatory : …….

(v) ***Stores Ledger Account:*** This is an important running record of movement of materials such as receipts, issues, balance, etc. The stores ledger is a record which is maintained by the costing department or accounts department. For each item of material, a separate ledger is maintained. It is usually a loose-leaf or card type. The most important feature of stores ledger is that it records not only the physical movement of materials but also their monetary value.

A specimen of stores ledger account is presented below.

Kartik Company Limited
Stores Ledger Account

Folio No. : ……. Reorder Level : ……...

Material Code : ……. Minimum Level : ……...

Description : ……. Maximum Level : ……...

Specification : …….

Date	Receipts				Issues				Balance		
	GRN	Quantity	Rate	Amount (₹)	MRN	Quantity	Rate	Amount (₹)	Quantity	Rate	Amount (₹)

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

Notes

Difference between Stores Ledger and Bin Card

There are some important differences between stores ledger and bin card. They are identified below:

Stores Ledger	Bin Card
(a) Entry will normally be made after the transaction takes place.	(a) Entry will normally be made just before or after the transaction takes place.
(b) Transactions may be summarized and then entry may be made.	(b) Each transaction is recorded individually.
(c) It records both the quantity and amount of material received, issued and balance.	(c) It records only the quantity of materials received, issued and the balance.
(d) It is kept in the costing department and therefore, entries in this record will be made by the officials in the costing department or accounts department.	(d) This record is kept in the stores departments, and therefore, entries in bin card are made by the store-keeper.

Classification and Codification of Materials

One of the important functions of the store-keeper 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. Following are the main methods of codification of materials:

(i) ***Numerical Method:*** Under this method, materials are codified with the help of the number 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, decimal are used to codify the different types of materials.

Plastic Material X_1 : 101.1

Plastic Material X_2 : 101.2

Plastic Material X_3 : 101.3

Self Assessment

Fill in the blanks:

9. …… shows the materials returned to the stores department.

10. In …… entry is normally be made after the transaction takes place.

Notes

11. Document prepared by the stores department is …… .
12. The …… is in the form of an agreement with the suppliers which binds both the purchaser and supplier.
13. …… is similar to numerical method.
14. …… is periodical or continuous.
15. …… represents a system of records maintained by the stores department.

4.4 Summary

- 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.
- 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.
- The ordering of materials is usually tagged with three different components of costs viz:
  - Acquisition cost of materials
  - Ordering cost of materials and
  - Carrying cost of materials
- A system of classifying materials and supplies according to value is known as ABC Analysis.

4.5 Keywords

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

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

E.O.Q: Economic Order Quantity of materials to be ordered/procured.

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

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

4.6 Review Questions

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. What is a Purchase Order? Explain the terms and conditions that are to be clearly mentioned in the purchase order. Also give a specimen form of purchase order with imaginary details.
3. What is a purchase requisition? Prepare a purchase requisition for material A with imaginary figures.

Notes

4. Discuss the importance of good stores keeping in an organization. What are the duties of a store-keeper?
5. Write short notes on the following :
   (a) Bin Card (b) Material Transfer Note
   (c) Stores Requisition (d) Material Return Note
6. What is meant by Bill of Materials? Explain in detail.
7. What are the major differences between Bin Card and Stores Ledger? Illustrate your answer with specimen forms of each of the stores records.
8. Why is it necessary to fix various levels for materials?
9. Define re-ordering level and explain its relation to maximum and minimum stock levels. What factors must be considered in fixing re-ordering level and quantities?
10. Define and explain how do you compute the following :
    (a) Maximum Level (b) Minimum Level
    (c) Re-order Level (d) Average Level
11. What are the methods of pricing of material issues? When do you advocate pricing the issues at the highest purchase price?
12. Critically evaluate the roles of carrying costs and ordering costs on the economic order quantity.
13. Write short notes on the followings:
    (a) FIFO Method (b) Simple Average Cost Method
    (c) LIFO Method (d) Weighted Average Cost Method
14. Write a note on inventory turnover ratio in detail.
15. Explain the role of stock verification in inventory control.
16. Briefly explain the ABC Analysis system of stores control.
17. Briefly explain the Standard cost method/Market price method of pricing the issues.
18. Write short notes on the following:
    (a) Stores ledger account (b) Inventory control
    (c) Purchase order (d) Economic order quantity
19. Describe briefly the perpetual inventory system of inventory control. What are its advantages and disadvantages?
20. Explain briefly the functions of the purchase department and outline the procedure for receiving and recording materials that are purchased.
21. Outline the steps in the purchasing procedure from the time a need for material is determined until the material is stored and paid for.
22. Explain fully the duties and responsibilities of the storekeeper of a large manufacturing concern.
23. "Control of materials cost through stores ledger is essential costing system". Discuss.
24. "An adequate system of store accounting is an essential feature of many cost accounting systems". Discuss in detail.

Notes

25. 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.
26. Explain the different methods of materials issue and show their relative merits and demerits.
27. Select a manufacturing concern and outline a system of materials control for it. Give specimen of various forms you will require.

Answers: Self Assessment

1.	optimum level of inventory	2.	work in progress
3.	lower prices	4.	capital on materials
5.	True	6.	False
7.	False	8.	True
9.	Material Return Note	10.	Stores Ledger Account
11.	Bin Card	12.	purchase order
13.	Decimal method	14.	Stock verification
15.	Perpetual inventory		

4.7 Further Readings

Book

Richard G. Schroeder, Myrtle W. Clark, Myrtle W. Clark, Jack M. Cathey, *Financial Accounting Theory and Analysis: Text Readings and Cases,* John Wiley & Sons Inc

Online links

www.futureaccountant.com

www.managementstudyguide.com

Unit 5: Methods of Valuing Material Issues

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Objectives

After studying this unit, you will be able to:

- Identify the various pricing methods;
- Understand the weighted Average Method;
- Know about the replacement and market price method.

Introduction

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 5.1. Some of the more commonly used methods of pricing material issues are discussed below:

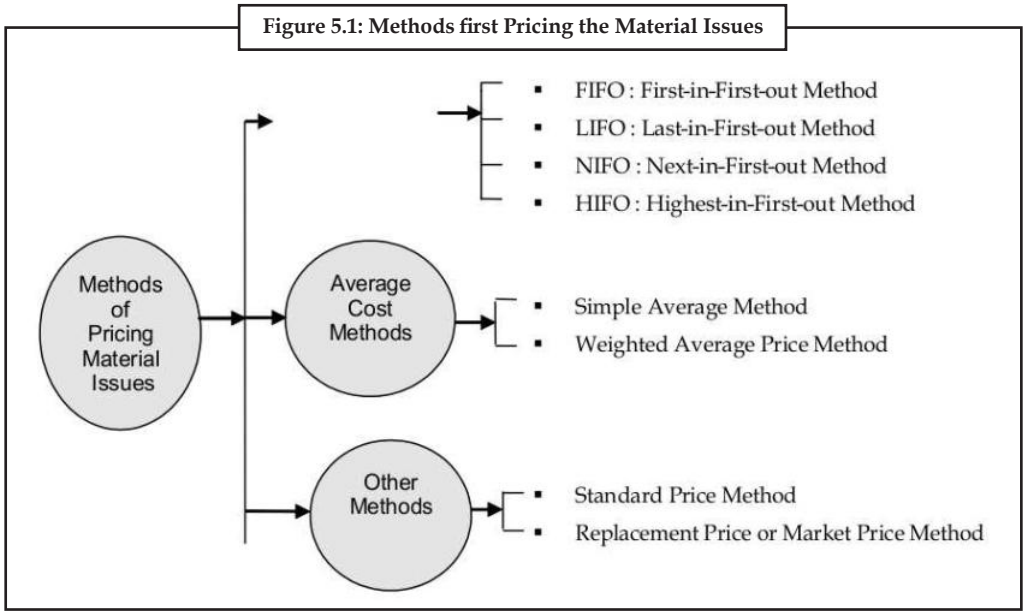
5.1 First-in-First-out Method (FIFO)

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.

Notes

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.

Figure 5.1: Methods first Pricing the Material Issues



Advantages of FIFO Method

The following are the advantages of FIFO method:

(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, and

(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:

- Where inventories turn over rapidly, and
- Where the inventory is not a major factor in the profit or current asset situation.

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

This is the reverse of the FIFO method. 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 unlike FIFO.

Notes

Caution 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 is 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" 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:

- The method can result in many batches being only partially 'written off '.
- 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

This method has the following advantages:

(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, and

(c) It keeps value of issues close to current economic values.

Disadvantages of LIFO Method

This method has the following disadvantages:

(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, and

(c) This method can be used satisfactorily where following conditions exist:

- Price fluctuations are considerable for most of the materials, and
- 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.

Issue there from 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) Fist-in-First-out method, and

(b) Last-in-First-out method.

Notes

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	3.0	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	50.00
							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 (₹)
4th July 2007	20	15.00
17th July 2007	30	14.00
2nd August, 2007	40	14.50
30th August, 2007	30	13.00

The issues were:

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

Notes

On 28th August 2 pipes issued on 20th July were received back. One 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	–	20	300.00	–	300.00	15.00
July 17	Iron Pipes purchased	30	–	50	420.00	–	720.0	14.00
July 20	Iron Pipes issued	–	25	25	–	370.00	350.00	–
Aug. 2	Iron Pipes purchased	40	–	65	580.00	–	930.00	14.50
Aug. 5	Iron Pipes issued	–	40	25	–	567.00	362.00	–
Aug. 28	Iron Pipes transfer	2	–	27	28.00	–	390.00	14.00
Aug. 29	Iron Pipe damages	–	1	26	–	14.00	376.00	14.00
Aug. 30	Iron Pipes purchased	30	–	56	390.00	–	766.00	13.00
Aug. 31	Iron Pipes issued	–	45	11	–	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	–	20	300.00	–	300.00	15.00
July 17	Iron Pipes purchased	30	–	50	420.00	–	720.0	14.00
July 20	Iron Pipes issued	–	25	25	–	350.00	370.00	14.00
Aug. 2	Iron Pipes purchased	40	–	65	580.00	–-	950.00	14.50
Aug. 5	Iron Pipes issued	–	40	25	–	580.00	370.00	14.50
Aug. 28	Iron Pipes transfer	2	–	27	28.00	–	398.00	14.00

Contd…

Notes

Aug. 29	Iron Pipes damaged	–	1	26	–	14.00	384.00	14.00
Aug. 30	Iron Pipes purchased	30	–	56	390.00	–	774.00	13.00
Aug. 31	Iron Pipes issued	–	45	11	–	609.00	165.00	15.00

5.3 Highest-in-First-out (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.

Did u know? 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.

5.4 Next-in-First-out (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.

5.5 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 are mentioned below:

(a) It is comparatively easy to compute the issue price, and

(b) This method smoothens out fluctuations in price provided the price fluctuations are within narrow limits.

Disadvantages of simple average method are given below:

(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,

Notes

(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			
				200	50	10,000	300	50	
							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

Notes

(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			
				200	50	10,000	300	50	1 5,000
							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

5.6 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. It is, therefore, necessary, under this method, 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:

(a) This method is simple and easy to operate as the computation of issue price,

(b) Value of closing stock is not distorted under this method,

(c) This method evens out even the wide fluctuations in the price, and

(d) It reduces the clerical work as the computation of new issue price.

Disadvantage of Weighted Average Price Method:

(a) If the material is purchased again and again at short intervals, the calculation work increases, and

(b) As the material is issued at average price, the production cost cannot be correctly estimated.

Notes

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

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 1 6,000 kgs

10 Issue 24,000 kgs

11 Purchase 10,000 kgs @ ₹ 7,800 per tonne

16 Issue 24,000 kgs

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

25 Issue 30,000 kgs

31 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	–	–	–	–	–	–	24,000	1,80,000[(a)]
2	44,000	7.60	3,34,440	–	–		68,000	5,14,400
2	–	–	–	10,000	7.5647[(b)]	75,647	58,000	4,38,753
4	–	–	–	16,000	7.5647	1,21,035	42,000	3,17,718
10	–	–	–	24,000	7.5647	1,81,553	18,000	1,36,165
11	10,000	7.80	78,000	–	–	–	28,000	2,14,165
16	–	–	–	24,000	7.64875[(c)]	1,83,570	4,000	30,595
20	50,000	8.00	4,00,000	–	–	–	54,000	4,30,595
25	–	–	–	30,000	7.97398 [(d)]	2,39,219	24,000	1,91,376
31	–	–	–	22,000	7.974	1,75,428	2,000	15,948

Working notes:

(a) 24000 × 7.5

(b) 5,14,400 ÷ 68,000

(c) 2,14,165 ÷ 28,000

(d) 4,30,595 ÷ 54,000

(vii) ***Standard Price Method:*** "Standard Price is predetermined price fixed on the basis of a specification of all the factors affecting that price". Firms which follow standard costing will record all the receipts and issues of materials at the standard price which will be fixed in advance. In this case, both the receipts and issues will by costed at a standard rate. Hence it is a predetermined price.

Notes

Notes As all the issues are priced at the standard price, some difference (called, variance) is normally found between the actual cost price and the standard issue price.

Advantages of Standard Price Method

The main advantages of this method are:

(a) This method facilitates the control of material cost,

(b) It is simple and easy to work,

(c) This method reduces the clerical work pertaining to the computation of issue price, and

(d) It is a tool for measuring the purchase efficiency.

Disadvantages of Standard Price Method

This method suffers from the following disadvantages:

(a) The use of standard price for material issues results in material profit or loss, and

(b) This method deviates from the costing principle, in the sense that the issue is not valued at the cost price.

Example: Set up a Store Ledger Account form and enter the following transactions adopting the Weighted Average Method of pricing issues:

2005 July,

2 Opening balance: 50 units @ ₹ 3 per unit.

3 Issued to production: 2 units

6 Purchased 48 units @ ₹ 4 per unit

10 Issued out 20 units to production

17 Purchased 76 units @ ₹ 3 per unit

22 Received back into stores 19 units out of 20 units issued on 10th July, 2005

25 Issued to production: 10 units.

Solution:

Stores Ledger Account

Date	Received			Issues			Balance		
	Qty. Units	Rate (₹)	Amount (₹)	Qty. Units	Rate (₹)	Amount (₹)	Qty. Units	Rate (₹)	Amount (₹)
July 2005, 2	–	–	–	–	–	–	50	3.00	150.00
3	–	–	–	2	3.00	6.00	48	3.00	144.00
6	48	4.00	192.00	–	–	–	96	3.50	336.00
10	–	–	–	20	3.50	70.00	76	3.50	266.00

Contd…

Notes

17	76	3.00	228.00	–	–	–	152	3.25	494.00
22	19	3.50	66.50	–	–	–	171	3.28	560.50
25	–	–	–	10	3.28	32.78	161	3.28	528.08

Example: The purchases and issues of materials A in the month of March, 2008 is as follows:

March 2008,

3 Purchase 800 units @ ₹ 20 per unit.

8 Purchase 700 units @ ₹ 18 per unit.

9 Issue 600 units.

11 Issue 800 units.

17 Purchase 800 units @ ₹ 20 per unit.

25 Purchase 500 units @ ₹ 25 per unit.

31 Issue 1,000 units.

The standard price of per unit of material is ₹ 20 fixed for the year 2008. Show the Stores Ledger Account with the help of standard price method for the month of March, 2008.

The closing stock of 400 units of ₹ 9,100 should be valued at the standard price of ₹ 20 per unit. Therefore, the value of the stock should be (400×20) = ₹ 8,000. Material price variance = Actual Price – Standard Price or ₹ 9,100 – ₹ 8,000 = ₹ 1,100 (Adverse). This would be charged to costing P&L Account.

Solution:

Stores Ledger Account for the Month of March, 2008

Date	Receipts			Issues			Balance	
	Qty. Units	Rate (₹)	Amount (₹)	Qty. Units	Rate (₹)	Amount (₹)	Qty. Units	Amount (₹)
Mar. 2008, 3	800	20	16,000	–	–	–	800	16,000
8	700	18	12,600	–	–	–	1,500	28,600
9	–	–	–	600	20	12,000	900	16,600
11	–	–	–	800	20	16,000	100	600
17	800	20	16,000	–	–	–	900	16,600
25	500	25	12,500	–	–	–	1,400	29,100
31	–	–	–	1,000	20	20,000	400	9,100

Inflated Price Method

This method is used to cover material losses on account of obsolescence, deterioration, and materials handling expenses. Under this method cost of materials issue, such losses and expenses are directly charged to material cost. Therefore, when the issue of materials is made, the price is to inflated to cover all the losses and expenses.

Notes

Specific Price Method

Specific Price Method is one of the methods of actual price method. In this method adopted where the materials are purchased for particular job or operation and the issue is charged with the actual cost price. This method is suitable only in the case of special purpose materials are purchased for a particular job. This method has been widely used in job order industries which carry out individual jobs or contract against specific orders. This method is simple and easy to operate and useful where the job costing is in operation.

Base Stock Method

Under this method pricing is determined on the basis of assumption made here is that a certain minimum quantity of materials maintained in stock. This minimum quantity is known as Base Stock or Safety Stock. This quantity cannot be used unless an emergency arises. The minimum stock is in the nature of fixed assets because it is created out of the first lot of the material purchased. Therefore it always valued at the actual cost price of the first lot and is carried forward as fixed assets. This method is usually applied with FIFO or LIFO.

Realization Value Method

Realization value method is a method of evaluating asset's worth when held in inventory. It is part of the Generally Accepted Accounting Principles and International Financial Reporting Standards (IFRS) that apply to valuing inventory, so as to not overstate or understate the value of inventory goods. Realizable value is generally equal to the selling price of the inventory goods less the selling costs (completion and disposal).

Following is the formula to calculate realization value:

Inventory sales value – estimated cost of completion and disposal = realizable value

Companies need to record the cost of their Ending Inventory at the lower of cost and RV, to ensure that their inventory and income statement are not overstated.

For example at a company's year end, if an unfinished good that already cost $25 is expected to sell for $100 to a customer, but it will take an additional $20 to complete and $10 to advertise to the customer, its RV will be $100 – $20 – $10 = $70. In this year's income statement, since the cost of the good ($25) is less than it's RV ($70), the cost of the good will get recorded as the cost of inventory. In next year's income statement after the good was sold, this company will record a revenue of $100, Cost of Goods Sold of $25, and Cost of Completion and Disposal of $20 + $10 = $30. This leads to a profit of $100 – $25 – $30 = $45 on this transaction.

Difference between Simple and Weighted Average Method

Simple Moving Average

A simple moving average is calculated by adding all prices within the chosen time period, divided by that time period. This way, each data value has the same weight in the average result.

Weighted Moving Average

A weighted moving average puts more weight on recent data and less weight on older data.

A weighted moving average is calculated by multiplying each data with a factor from day "1" till day "n" for the oldest to the most recent data; the result is divided by the total of all multiplying factors.

E.g. Let's say you have 3 observations: 4, 7, 12

Notes

The arithmetic mean is (4+7+12) / 3 = 23/3 = 7.67

Now let's assume that you want to weight the first observation by a factor of 10, the second observation by a factor of 5 and the third observation by a factor of 2:

The weighted mean is (4x10+7x5+12x3) / (10+5+2) = 111/17 = 6.53

5.7 Replacement or Market Price Method

Under this method, material is issued at the price at which, on the date of the issue of materials, the identical material can be purchased from the market. In other words, the materials are issued at the market prices of the same type of materials on the date of the issue. This method is used when it is designed to reflect current prices in cost. It is must suitable for business that buys large quantities of materials well in advance of requirements.

Advantages of Replacement or Market Price Method

Following are the main advantages of this method:

(a) The material cost of the product reflects the current market price, and

(b) It is simple and easy to operate as no calculations are required to be made of the issue prices as is done in average, FIFO, LIFO methods, etc.

Disadvantages of Replacement or Market Price Method

Market price method suffers from the following disadvantages:

(a) It deviates from the costing concept, in the sense that issues are not prices at actual cost,

(b) In this method, inventory valuation is not at current prices, and

(c) It involves considerable work of finding out the replacement price at the time of each issue. Some times replacement price is not easily available or not available at all.

Example: From the following particulars, prepare a stores ledger account by Market Price Method of issue of materials purchased.

Purchases:

May 2 1,000 units @ ₹ 1 per unit

May 10 1,500 units @ ₹ 1 per unit

Issues:

June 8 500 units @ ₹ 1.10 per unit

July 20 1,000 units @ ₹ 1.25 per unit.

Solution:

Stores Ledger Account with the Help of Market Price Method

Date	Receipts			Issues			Balance		
	Qty. Units	Rate (₹)	Amount (₹)	Qty. Units	Rate (₹)	Amount (₹)	Qty. Units	Rate (₹)	Amount (₹)
May 2	1,000	1.00	1,000	–	–	–	1,000	1.00	1,000
May 10	1,500	1.00	1,500	–	–	–	2,500	1.00	2,500

Contd…

Notes

June 8	–	–	–	500	1.10	550	2,000		1,950
July 20	–	–	–	1,000	1.25	1,250	1,000		700
	2,500		2,500	1,500		1,800	1,000		700

Example: Two materials, A and B, are used as follows:

Minimum usage	50 units each per week.
Maximum usage	150 units each per week.
Normal usage	100 units each per week.
Ordering quantities :	A - 600 units, and B - 100 units.
Delivery Period:	A - 4 to 6 weeks, B - 2 to 4 weeks.

Calculate for each material:

(a) Minimum level,

(b) Maximum level, and

(c) Ordering level.

Solution:

Material A:

Ordering level = Maximum usage × Minimum delivery

= 150 × 6 = 900 units

Minimum level = Ordering level – (Normal usage × Normal delivery period)

= 900 – (100 × 5) = 400 units

Maximum level = (Ordering level + Ordering quantity) – (Minimum usage × Minimum delivery period)

= (900 + 600) – (50 × 4)

= 1,500 – 200 = 1,300 units

Material B:

Ordering level = Maximum usage × Minimum delivery

= 150 × 6 = 900 units

Minimum level = Ordering level – (Normal usage × Normal delivery period)

= 900 – (100 × 3) = 300 units

Maximum level = (Ordering level + Ordering quantity) – (Minimum usage × Minimum delivery period)

= (600 + 1,000) – (50 × 2)

= 1,600 – 100 = 1,500 units

Notes It is assumed that normal period of delivery means the average delivery period, i.e., 5 weeks in the case of material A and 3 weeks in the case of material B.

Notes

Task Two materials X and Y are used as follows:

Normal usage 50 per week each

Maximum usage 75 per week each

Minimum usage 25 per week each

Reorder quantity: X = 300; Y = 500

Reorder period : X = 4 to 6 weeks, Y = 2 to 4 weeks

Calculate for each material:

(a) Reordering Price,

(b) Minimum level,

(c) Maximum level, and

(d) Average stock levels.

Self Assessment

State whether the following statements are true or false:

1. The basic purpose of inventory control is to maintain optimum level of inventory.
2. FIFO method is based on the assumption that the units which are acquired first are issued first.
3. FIFO uses the price of the last batch received for all issues until all units from this batch have been issued.
4. Issues are always priced at lower prices and the closing stock is, therefore, valued at the lowest possible price.
5. LIFO is the reverse of the FIFO method.
6. FIFO is cumbersome and shows out of date figures in the balance sheet.
7. Under NIFO method, issues are priced at the price at which order for material has been placed but not yet received.
8. LIFO is very suitable in fluctuating market.
9. Simple Average method does not attach any importance to the quantity in each consignment.
10. Simple Average Method is comparatively difficult to compute the issue price.
11. After all the units in the highest priced lot of material are issued, the next highest priced batch of material in stock is issued.

Fill in the blanks:

12. Under …… issues are made out of highest priced batch of material.
13. Any number of issues can be priced at the …… until the receipt of a new consignment which necessitates the calculation of issue price afresh.

Notes

14. …… is based on the assumption that the price of the next consignment is known before it is received.

15. …… involves considerable work of finding out the replacement price at the time of each issue.

Case Study

Activity Based Costing Implementation – Sun Life Insurance

by Jim Gurowka

Background

Sun Life Insurance is an international insurance company, providing individual and corporate life insurance, group retirement services and benefit management services. The Canadian operations have offices located throughout Canada, with the head office in Toronto.

The Group Claims division provides drug and dental claim management and claim adjudication to companies in Canada through its four main centres in Toronto, Ottawa, Edmonton and Montreal. Clients include the Federal Government, City of Toronto, Royal Bank of Canada and Magna International.

Business Issues

Several issues have led Sun Life to undertake the implementation of an Activity Based Costing (ABC) analysis. Increased competition, the introduction of new computing technology, and increasing client demands have caused margins to decrease and costs to rise. The increased costs and decreased per unit revenue have pressured management to seek to reduce costs significantly to maintain profitable operating results.

Competition and customer demands have forced the organization to dramatically reduce the length of time to process a claim, while also increasing the due diligence performed on each claim. Each processing center performs tasks using different operational processes, and standards with greatly differing processing times for various types of claims. The organization needs to identify the best practice for each process, and institutionalize that best practice across all their operations.

To make management and strategic decisions, senior management decided that a better set of decision-making tools were needed in the group claims division. This includes better costing information and better performance data.

Approach

Focused Management Information was engaged to assist the Group Claims division implement and internalize an Activity Based Costing system, and then tie it in to best practice analysis, process improvement and budgeting.

A cross-functional team of eight Sun Life employees representing all locations, including group finance, was formed and guided through the implementation process and the data collection with the ongoing assistance of FMI. After a thorough training on ABC concepts and implementation methodology, the team conducted activity analysis on all positions in the group claims area and then created a consolidated activity dictionary and Cost Flow Diagram, which represents all activities and processes within the area, as well as maps

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Notes

the flow of activities throughout the area. "One of the things we've discovered through our work with Focused Management is the simple act of examining what activities occur in which department has yielded valuable insights and caused us to change the way we perform what we do", explains Henry Kowal, senior analyst at Sun Life.

The team, with the assistance of the systems department, collected resource and activity driver information and entered all the information into their ABC software. Activity, process and unit activity costs were obtained and validated by the team and then by senior division management.

Results

The results of the ABC analysis provided a great deal of insight for the Sun Life senior management team, as well as confirmed quantitatively what many managers assumed, but could never prove. Significant differences in activity cost, process cost, cycle time, transaction volumes and unit costs were found both within locations and between the different locations. In some cases, unit costs for the same activity varied by over 300%. These unit cost results varied by type of claim, as well as the experience of the claims adjudicator.

When the team looked at cycle time or FTE required to perform a given volume of claims, large differences were found in the efficiency of the four processing centers as well as in the call centers. Some locations could process a similar amount of claims, with a lot less personnel, than other locations. This has led to a review of the activities, tasks and work flow in each location, with a view towards standardizing process steps as much as possible, as well as learning from the most efficient areas.

When compared with industry standards, outsource partners and the different claims processing centers, Sun Life has been able to perform extensive benchmarking analysis. The benchmark or best practice data has allowed them to determine how efficient and effective they are, compared with where they can be, and has shown management where to concentrate the process improvement initiatives.

The activity cost and performance results have also allowed operations management to assess the "value" or utility of all the activities performed within group claims. Some activities are performed which do not add any value to the process and are being eliminated. Other activities have been found to be value adding, but are performed too often or cost too much every time they are performed. These activities are in the process of being redesigned, so they will be performed at the right time and cost.

Action Steps

Faced with all this great new information, Sun Life, like all organizations, had to determine how best to use the information and analysis to make changes in the way they run the business. The first step was to present the analysis to operations management in each of the four processing locations, as well as to senior management. This was accomplished through a full-day management briefing and workshop. The workshop provided managers an opportunity to "dive" into the analysis and become comfortable with the results. Once they were comfortable with the results, the ABC project leader then led the managers through an analysis of where further detail is required and what data the managers need to see on a go-forward basis. Management then brainstormed all the uses of the ABC results and prioritized which uses were most immediate. They then assigned responsibilities and resources, to make sure the actions were achieved. We have found that the management workshop is a critical component in obtaining management buy-in, as well as getting management to internalize the next steps with regard to the ABC analysis.

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Notes

Following the ABC management workshop, the ABC team and the operations management set about on several action steps. The first priority was to conduct best practice analysis on their operations. Process and work steps were shared amongst the various locations, and best practices were implemented across the locations. This is an ongoing piece of a larger process redesign and improvement project.

Ongoing education has been a key component in the overall strategy to ensure managers understand the data and know how to use the information properly to make decision. The continuous training and working with management has helped management understand the results and has promoted buy-in on a continuous basis.

The ABC results have focused management's attention on the importance of measurement and the management of those measures. The time, quality, quantity and financial data provided by the ABC analysis has reinforced the concept of management through measurement within Sun Life. Decisions are now beginning to be made within an overall measurement and management framework.

A major focus for all managers within group claims is now the management of unit costs across all the activities. With claims volume increasing at a steady rate, a reduction of the unit cost of processing claims should result in an overall cost reduction for the division, and an increase in profitability. By using the ABC data, managers have been able to significantly reduce the absolute activity cost, as well as the unit cost of the major claims processing activities. "As a result of the ABC analysis, we have seen over a 10x reduction in expenses compared with the implementation costs of ABC", explains Luc Chouinard, Manager, Expense Management.

In order to evaluate the progress being made with all these action steps, the ABC results have been updated several times, and trend analysis has been undertaken to monitor the results on an activity basis. These updates are being completed quarterly.

Next Steps

As a result of the initial ABC analysis, several next steps are in the process of implementation. These include the roll out of ABC within other divisions of Sun Life, the integration of the ABC results with ongoing NQI and ISO initiatives, and the ongoing use in process redesign initiatives.

The current ABC analysis concentrated on activities by position and their associated cost, quantity, quality, cycle time and unit cost calculations. As the ABC analysis becomes further refined, individual customer profitability will be analyzed. There is a recognition that customers have different profitability characteristics that have an impact on service pricing and profitability. As a next step, activities will be costed at the unique customer level to determine customer profitability.

Summary

The ABC system implemented within Sun Life Group Claims has helped to realize significant reductions in operational costs within the claims processing areas. The ability to compare the activities performed in different locations has allowed operations management to install best practices observed at each location throughout all the centers. The ABC information has acted as an important driver in implementing a measurement based management system, as well as helped realize concrete results. ABC has been a catalyst for change within Sun Life.

5.8 Summary

- Proper estimation of inventory requirements-quantity, quality, specifications of inventory, etc. This will help the purchase manager to quality and quantity of materials.

Notes

- The purchase department has to exercise utmost care to procure the quality materials at lower prices.
- 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.
- It is the production departments which are capable of extracting the maximum output from each unit of materials thereby contributing heavily to minimize the loss of materials during the production period and to maximize the productivity.

5.9 Keywords

Simple Average: Moving average that equals weight to price

Standard Price: Constant price

Stock Balance: Inventory of raw material, work in progress and finished goods.

5.10 Review Questions

1. Write short notes on the followings:
   (a) FIFO Method,
   (b) LIFO Method,
   (c) Simple Average Cost Method, and
   (d) Weighted Average Cost Method.
2. 'Of all the method of pricing material issue the FIFO method is the best and the simplest'. Explain this statement.
3. Indicate and briefly explain the two different methods usually followed in pricing stores other than the 'Last-In First-Out' method.
4. Indicate different methods used for pricing our materials.
5. Select a manufacturing concern and outline a system of materials control for it. Give specimen of various forms you will require.
6. Prepare a stores ledger account from the following information's 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.

Notes

26 Issues 115 tonnes.

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

28 Received from supplier 100 tonnes @ ₹ 200.

7. The receipt side of the Stores ledger account shows the following particulars:

July	01	Opening balance 500 units @ ₹ 4 per unit.
″	05	Received 200 units @ ₹ 4.25 per unit.
″	12	Received 150 units @ ₹ 4.10 per unit.
″	20	Received 300 units @ ₹ 4.50 per unit.
″	25	Received 400 units @ ₹ 4.00 per unit.

Issue of the materials are as follows :

July	04	Issued 200 units.
″	10	Issued 400 units.
″	15	Issued 100 units.
″	19	Issued 100 units.
″	26	Issued 200 units.
″	30	Issued 250 units.

Write out Stores ledger account pricing the issues on the principle of FIFO and LIFO.

8. The stock in hand of a material as on 1-9-2002 was 500 units at ₹ 1 per unit. The following purchases and issues were subsequently made. Prepare the stores ledger account showing how the value of the issues would be recorded under (a) FIFO and (b) LIFO method.

	Purchased		Issued
6-9-2002	100 units @ ₹ 1.20	9-9-2002	500 units
20-9-2002	700 units @ ₹ 1.20	22-9-2002	500 units
27-9-2002	400 units @ ₹ 1.30	30-9-2002	500 units
13-10-2002	1,000 units @ ₹ 1.40	15-10-2002	500 units
20-10-2002	500 units @ ₹ 1.50	22-10-2002	500 units
17-11-2002	400 units @ ₹ 1.60	11-11-2002	500 units

9. 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.

Notes

10. With the half of the following information, prepare the stores ledger account based on the weighted average method of pricing issues:

March	1	Opening Balance 24,000 kg. @ ₹ 7,500 per tonne.
″	1	Purchase 44,000 kg. @ ₹ 7,600 per tonne.
″	1	Issue 1,000 kg.
″	5	Issue 16,000 kg.
″	12	Issue 24,000 kg.

Answers: Self Assessment

1.	True	2.	True
3.	True	4.	False
5.	True	6.	False
7.	True	8.	False
9.	True	10.	False
11.	True	12.	HIFO method
13.	same rate	14.	NIFO
15.	Market Price		

5.11 Further Readings

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Notes

Unit 6: Labour Cost

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Objectives

After studying this unit, you will be able to:

- Define the labour turnover;
- Understand the labour cost management;
- Describe the job analysis;
- Define the job evaluation;
- Examine the merit rating;
- Learn about the time keeping;
- Identify the idle time.

Introduction

Labour is the most sensitive element in any manufacturing activity. The performance of labour has a direct bearing on all other elements of cost too.

Labour may be classified as direct when (a) there is a direct relationship of the labour to a particular production unit or process, (b) the labour cost is measurable in terms of such production unit or process, and (c) the labour cost is sufficiently significant in amount and easily identifiable with particular production unit or process. Indirect labour costs are those costs which are necessary for production purposes but are not identifiable with a particular production unit. Such costs consist of (a) labour costs in service departments, such as, purchasing, engineering, time-keeping, etc. (b) labour cost of certain works of production departments, viz, salaries of foremen, helpers, clerical assistants, and (c) labour costs connected with general factory services, viz, salaries of works manager, chief inspector, factory office staff, etc.

Notes

Notes The classification of indirect labour depends upon the manufacturing methods and pattern of the organisation and there cannot be any universally acceptable set of classification for indirect labour.

6.1 Labour Turnover

It denotes the percentage change in the labour force of an organisation. It is a common occurrence that the workers do change their jobs. Either they leave their jobs for better prospects or better environments or they are forced to leave an employment. Such mobility is quite normal and known as labour turnover.

Cost of labour turnover is treated as an overhead expense and should not be charged direct to any work order.

1. Labour turnover according to separation method

   = Number of employees left during a period/Average number of employees during a period × 100

2. Labour turnover according to flux method

   = Number of addition + separations during a period/Average number of employees during a period × 100.

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 of Labour Turnover:*** The various avoidable causes are:

   (i) Lower wages being paid in the organisation,

   (ii) Lack of planning of higher management,

   (iii) Unsatisfactory working conditions in the factory,

   (iv) Lack of job satisfaction,

   (v) Lack of medical and transport facilities,

   (vi) Discrimination between one worker and another worker,

   (vii) Bad relationship with supervisors and management,

   (viii) Lack of proper adjustment with workers,

   (ix) Unauthorized long absence from duty,

   (x) Migratory character of Indian industrial workers, and

   (xi) Lack of safety measures.

(b) ***Unavoidable Causes of Labour Turnover:*** The various unavoidable causes responsible for labour turnover are:

   (i) Death, retirement disablement of the worker,

   (ii) Domestic disputes of the workers,

Notes

(iii) Illness or accidents making the worker permanently handicapped,

(iv) Discharge due to unsuitability,

(v) Marriage and pregnancy in case of female workers,

(vi) Inefficiency of the workers,

(vii) Other reasons such as lack of housing and transport facilities, and

(viii) Immoral character of worker.

Effects of Labour Turnover

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

(i) Cost of replacing workers, i.e., cost of selection,

(ii) Cost of training for new workers,

(iii) Loss arising out of defective work and increased wastage in production process,

(iv) Newly employed workers are likely to mishandle of machines and equipments, and

(v) With frequent changes, production planning cannot be properly executed and as a result, there is loss in production.

Methods to Calculate Labour Turnover

There are various methods to measure labour turnover. Although the different methods give emphasis on different aspects, it is important to point out that once a particular method has been adopted it should be used consistently in order to facilitate comparison. Labour turnover may be measured with the help of the following methods:

(a) ***Separation Method:*** Under separation method, labour turnover for any given period is ascertained by dividing the total number of separations by the average number of workers on the roll and multiplying by 100. The formula for calculation of labour turnover is:

$$\text{Labour Turnover} = \frac{\text{Number of separations during a period}}{\text{Average number of workers during the period}} \times 100$$

(b) ***Replacement Method:*** This method takes into consideration only the actual replacement of labour during a period irrespective of the number of workers leaving. The important point to be noted is that only the replacements made to fill the vacancies caused by the separations are to be considered for measuring labour turnover under replacement method. The means, the new employees appointed during the same period for expansion purpose should be excluded for computing the number of replacement. However, they will be considered for computing the average number of employees.

Formula for labour turnover is:

$$\text{Labour Turnover} = \frac{\text{Number of workers replaced in a period}}{\text{Average number of workers in the period}} \times 100$$

(c) ***Flux Method :*** Flux method takes into consideration both the separations and replacements. Hence, labour turnover is computed by dividing the aggregate of number of separations and replacements during a period by the average number of employees.

Formula for labour turnover is:

$$\text{Labour Turnover} = \frac{\text{Number of Separations + Number of Replacements}}{\text{Average number of workers during the period}} \times 100$$

Notes

Example: The personnel department of a 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 $= \frac{\text{Number of separations during a period}}{\text{Average number of workers during the period}} \times 100$

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

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

(ii) Replacement Method $= \frac{\text{Number of workers replaced in a period}}{\text{Average number of workers during the period}} \times 100$

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

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

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

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

Example: From the following data given by the personnel department, calculate the labour turnover rate by applying:

(a) Separation Method,

(b) Replacement Method, and

(c) Flux Method.

Number of workers on the payroll:

At the beginning of the month 900

At the end of the month 1,100

During the month 10 workers left, 40 persons were discharged and 150 workers were recruited. Of these, 25 workers were recruited in the vacancies of those leaving, while the rest were engaged for an expansion scheme.

Solution:

$$\text{Average Number of Workers} = \frac{\text{No. of workers in beginning + No. of workers at the end}}{2}$$

Notes

$$= \frac{900+1100}{2} = 1,000$$

Labour Turnover Rate by:

(a) $$\text{Separation Method} = \frac{\text{Number of separations during a period}}{\text{Average number of workers during the period}} \times 100$$

$$\text{LTR} = \frac{10+40}{1000} \times 100$$

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

(b) $$\text{Replacement Method} = \frac{\text{Number of workers replaced in a period}}{\text{Average number of workers during the period}} \times 100$$

$$\text{LTR} = \frac{25}{1000} \times 100$$

$$\text{LTR} = 2.5\%$$

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

$$\text{LTR} = \frac{50+25}{1000} \times 100$$

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

Working note: Workers engaged on an expansion plan are not included in the number of replacement.

Example: There were 10,000 workers in a factory on 1st January 2008. New entrants in service during the year 500 and leavers were 250. Calculate labour turnover rate.

Solution:

No. of workers in the beginning = 10,000

No. of workers at the end = 10,000 + 500 – 250 = 10,250

$$\text{Average number of workers} = \frac{10,000+10,250}{2} = 10,125$$

Labour Turnover Rate by :

(i) $$\text{Separation Method} = \frac{250}{10,125} \times 100 = 2.47\%$$

(ii) $$\text{Replacement Method} = \frac{500}{10,125} \times 100 = 4.94\%$$

(iii) $$\text{Flux Method} = \frac{250+500}{10,125} \times 100 = 7.41\%$$

Example: The cost accountant of a company has computed labour turnover rates for the year ending 31-12-07 as 10%, 5% and 3% respectively under Flux Method, Replacement Method and Separation Method. If the number of workers replaced during that year is 30, find out number of (i) workers recruited and joined, and (ii) workers left and discharged.

Solution:

Replacement Method:

$$\text{Labour Turnover Rate} = \frac{\text{No. of replacements}}{\text{Average No. of workers on roll}} \times 100$$

$$\text{Average No. of Workers} = 30 \times \frac{100}{5} = 600$$

Separation Method:

Notes

$$\text{Labour Turnover Rate} = \frac{\text{No. of separations}}{\text{Average No. of workers}} \times 100$$

$$\frac{3}{100} = \frac{\text{No. of separations}}{600}$$

$$= \frac{600 \times 3}{100}$$

$$\text{No. of Separations} = 18$$

Thus number of workers left and discharged = 18

Flux Method:

$$\text{Labour Turnover Rate} = \frac{\text{No. of separations + No. of workers joined}}{\text{Average No. of workers}} \times 100$$

$$\frac{10}{100} = \frac{18 + \text{No. of workers joined}}{600}$$

$$600 \times 10 = 100\ (18 + \text{No. of replacement})$$

$$6{,}000 = 1800 + 100 \text{ No. of replacement}$$

$$6{,}000 - 1{,}800 = 100 \text{ No. of replacement}$$

$$\text{No. of Replacement} = \frac{4200}{100} = 42$$

Thus number of workers recruited and joined = 42

Cost of Labour Turnover

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

(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:

(i) Cost of personnel administration,

(ii) Cost of medical services,

(iii) 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,

Notes

(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.

6.2 Labour Cost Management

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

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 organization. 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, and

(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 organization, recruitment procedures are likely to be informal and may often be executed by the top management of the industry or organization 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, and

(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.

Time Keeping

Time-keeping is concerned with recording of worker's 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. Following are the main features of time keeping:

(i) Employees' attendance in and out of a particular department, and

(ii) Employees' attendance in and out of the factory gate.

Notes

Time-keeping will serve the following objectives:

(i) Ascertainment of labour cost of a job,

(ii) Preparation of payrolls,

(iii) Determining productivity and control of labour cost,

(iv) Meeting for statutory requirements, and

(v) Apportionment of overhead costs.

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

Methods of Time-keeping

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 being 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:

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

(b) *Disc Method:* This method is generally used in a small organization 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 on 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

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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 this method are stated below:

- Avoids the necessity of recopying attendance time in the payroll, and
- Allows greater accuracy and avoids much loss of time.

The disadvantages of dial time recorders method are:

- Capacity is limited of the machine, and
- 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.

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 organizations or factories keep time-recording clocks for maintaining records of time spent on each work, job or operation but in small organizations, this may be done manually. The nature of documents maintained for this purpose will vary depending upon the size of the factory or organization.

The following documents are generally in use:

(i) ***Daily Time Sheets:*** Each worker is given a daily time sheet in which he 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:

- Name of worker,
- Worker clock card number,
- Name of the department,
- Date of work done,
- Machine number,
- Type of job or Work order,
- Starting and finishing time of the job or work,
- Signature of foreman, etc.

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Specimen of the Daily Time Sheet

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 :		

(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 can be 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 :		

(iii) ***Job Cards or Job Tickets:*** Under job card method a card is used 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.

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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 :						

Motion Study: 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 equipments, etc., to be used.

Advantages of Motion Study: The advantages of motion study are as follows:

(i) It improves methods of performing a work or job by reducing all unnecessary elements involved,

(ii) It aims at better utilization of available resources in the factor, and

(iii) As a result of reduction of wasteful elements, highest level of activity can be achieved all round.

Time Study: The concept of time study was introduced by F.W. Talyor. 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.

Advantages of Time Study: The advantages of time study are as follows:

(i) Exercising cost control through proper planning,

(ii) Assessing the labour requirements correctly,

(iii) Fixation of wage rates and introduction of incentive schemes, and

(iv) Standardizing jobs, equipments, etc., by giving guidance as to the best method of operating in the time allowed.

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6.3 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 program 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 and 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. 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 5.5")

Social specification: Member of social organizations

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

2. ***Organization Audit:*** Job information obtained by job analysis often reveals instances of poor organization in terms of the factors affecting job design. The analysis process, therefore, constitutes a kind of organization audit.

3. ***Training and Development Program:*** Needs of training and developing are identified with the help of job description. Further the training programs 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.

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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.

Caselet

Job Analysis at Motorola

When Motorola decided to shift its focus from simply filling customer orders to world class quality, managers analyzed the nature of factory jobs under the new strategy. They found that factory jobs demanded employees who could read at the ninth grade level and who possessed elementary statistical knowledge. This analysis helped Motorola incorporate this information into its HRP process. Sadly, many of Motorola's current employees were under qualified. Managers had to decide whether to train existing employees and prepare them fully to meet job demands or to whether to let them go and replace them with more capable employees who could handle the new quality control systems and procedures. Finally Motorola decided to train existing employees so that they can handle their jobs well.

Task 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.

6.4 Job Evaluation

In the organisation or industry, there are different types of jobs, each jobs having its own features. As such, the various jobs in an industry or organisation are required to reviewed and analysed. Job evaluation helps in the determination of correct grade of labour for each job or operation. It is the ranking and grading of essential work characteristics of all jobs or job classes in some systematic way to ascertain the labour worth of each job or job class relative to all others.

Objectives of Job Evaluation

The main objectives of job evaluation are:

(i) To establish a sound wage structure,

(ii) To provide a sound wage for incentive and bonus plan,

(iii) To eliminate wage inequalities,

(iv) To facilitate maintenance of a consistent wage policy, and

(v) To establish sound wage differentials among the jobs.

Advantages of Job Evaluation

Job evaluation is a very useful method. It helps in preventing and removing inter-plant inequities as well as in reducing inter-plant inequities. It is the basis of scientific system of job rating as well as developing a sound and satisfactory wage structure. There is a common saying in business organisations or industries that "we pay for jobs and not for men" are quite true. As

a matter of fact, job-evaluation seeks to provide for a fair and equitable wage structure based on the assumption that each job should be paid according to its contribution to the value of the finished product and to the long-term success and progress of the organisation. In brief, the main advantages of job evaluation are as follows:

(i) It helps in avoiding the inconsistencies and inequalities of wages. It is a logical plan for job grading as well as for their mutual comparison.

(ii) Job evaluation brings uniformity and justice in wage rates. Hence, it lessens the disputes arising from wages. It provides such wage rates which are easily acceptable to the employees.

(iii) Good wage payment plans, well-administered, have a salutary effect on the entire industrial organisation. Employees are happier in their work, morale is higher output is up and quality of production is better. Job evaluation helps a lot in this process.

(iv) For job evaluation, the work of job analysis is done and job descriptions are prepared. Hence, the informations collected at that time are useful for the comparable studies of jobs, selection, transfer and promotions.

(v) This method helps to settle the wages for new jobs under present framework and rules.

Methods of Job Evaluation

There are different methods of evaluation of jobs. The following are the important methods of job evaluation:

(i) ***Ranking Method:*** Under ranking method, jobs are graded from lowest to highest according to relative requirements and responsibilities. Each job is valued in terms of the other and a wage rate is fixed depending upon the rates prevailing in the locality.

(ii) ***Grading Method:*** According to grading method, a number of grades are fixed and arranged in order of importance, e.g., unskilled, semi-skilled, skilled, supervisory and administrative. Jobs are reviewed and then placed in the corresponding grades according to requirements. Pay scales are fixed for each grade.

(iii) ***Points Value Method:*** According to Point's value method, each job factor is given a relative weightage and is allotted a number of points. While assigning points, various factors for performing a job are taken into account. The jobs are ranked in the order of points scored and are placed in a number of arbitrary grades. The scale of wage is fixed for each of these grades. This method is slightly difficult to understand and operate and this is costly but it is accurate.

6.5 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. Following are the main factors of merit rating:

(i) Quality of work,

(ii) Sense of responsibility,

(iii) Quantity of work,

(iv) Initiative and effort,

(v) Discipline,

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(vi) Co-operation, honesty and integrity,

(vii) Sense of judgment,

(viii) Experience, skill, knowledge and aptitude for work or job,

(ix) Extraordinary personal features, and

(x) 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 Scot, Clotheir and Spriegal, "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 Allford 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's persons are compared but they are not compared with other groups if this is possible any how, 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 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 person 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 market 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 (–) sign. Or at times 'yes' or '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.

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Disadvantages of Merit Rating

Following are the disadvantages of merit rating:

(i) Judgment 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.

6.6 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, and

(b) Abnormal idle time

Normal Idle Time

This represents the time wastage 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 is 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.

As it is unavoidable cost and as such should be included in cost of production.

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.

Idle Time Measurement

Machine breaks down; materials shortages, power failure, and the like result in idle time. The costs incurred during idle time are ordinarily treated as manufacturing overhead cost rather than as a direct labor cost. Most managers feel that such costs should be spread over all the

production of a period rather than just the jobs that happen to be in process when breakdown or other disruptions occur.

Example: To give an example of how the cost of idle time is handled, assume that a press operator earns $12 per hour. If the press operator is paid for a normal 40-hour workweek but is idle for 3 hours during a given week due to breakdowns, labor cost would be allocated as follows.

Direct labor $12 per hour × 37 hours)	$444
Manufacturing overhead (idle time: $12 per hour × 3 hours)	36
Total cost for the week	-------
	$480
	=====

Overtime Measurement

The overtime paid to all factory workers (direct labor as well as indirect labor) is usually considered to be part of manufacturing overhead and is not assigned to any particular order. At first glance this may seem strange, since overtime is always spent working on some particular order. Why not charge that order for the overtime cost? The reason is that it would be considered unfair and arbitrary to charge an overtime against a particular order simply because the order happened to fall on the tail end of the daily production schedule.

Example: Assume that a press operator in a plant earns $12 per hour. She is paid time and half for over time (time in excess of 40 hours a week). During a given week, she worked 45 hours and has no idle time. Her labor cost would be allocated as follows:

Observe from this computation that only the overtime premium of $6 per hour is charged to overhead account -- not the entire $18 earned for each hour of overtime work ($12 regular rate × 1.5 = $18)

Direct labor ($12 × 45 hours)	$540
Manufacturing overhead (overtime premium: $6 per hour × 5 hours)	30
Total Cost for the week	-----
	$570
	====

Caution 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. The wages paid for abnormal idle time should be debited to costing Profit & Loss Account.

Self Assessment

Fill in the blanks:

1. …… denotes the percentage change in the labour force of an organisation.
2. Cost of labour turnover is treated as an …… and should not be charged direct to any work order.
3. …… is that time for which the employer pays, but from which he obtains no production.

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4. …… represents the time wastage that cannot be avoided and, therefore, the employer must bear the labour cost of this time.
5. The …… includes the time wasted on account of the failure of the power supply.
6. The wages paid for abnormal idle time should be debited to costing ……
7. Labour turnover according to ……

   = Number of employees left during a period/Average number of employees during a period × 100
8. In …… Employees are divided into groups on the basis of certain tests.
9. …… represents the time wastage that cannot be avoided.
10. To establish a sound wage structure is the objective of ……
11. …… avoids the necessity of recopying attendance time in the payroll.
12. Under …… a card is made for recording the time spent by workers on various jobs instead of sheets of paper.
13. …… method is generally used in a small organization or factory which has limited financial resources.

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. 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.

Departments for Labour Control

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

- Personnel and Administrative Department,
- Engineering and Works Department,
- Time-keeping Department,
- Purchase Department,
- Production and Maintenance Department,
- Payroll Department, and
- Accounting and Finance Department.

Scope of Control

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

(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 increase 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.

Self Assessment

State whether the following statements are true or false:

14. Labour cost is a significant part of cost of production.
15. Recruitment not an important function for ultimate success in attainment of labour cost control.

6.7 Summary

- Labour may be classified as direct when (a) there is a direct relationship of the labour to a particular production unit or process (b) the labour cost is measurable in terms of such production unit or process and (c) the labour cost is sufficiently significant in amount and easily identifiable with particular production unit or process.
- Indirect labour costs are those costs which are necessary for production purposes but are not identifiable with a particular production unit.
- Indirect labour costs consist of (a) labour costs in service departments, such as, purchasing, engineering, time-keeping, etc. (b) labour cost of certain works of production departments, viz, salaries of foremen, helpers, clerical assistants, and (c) labour costs connected with general factory services, viz, salaries of works manager, chief inspector, factory office staff, etc.
- Labour turnover denotes the percentage change in the labour force of an organisation. It is a common occurrence that the workers do change their jobs.
- Idle time is that time for which the employer pays, but from which he obtains no production.
    - Idle time is of two types:
    - Normal idle time, and
    - Abnormal idle time
- Remuneration and incentive systems, according to their characteristics, fall under the following broad categories:
    - Time rates
    - Piece rates

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- Bonus system
- Indirect monetary incentives and
- Non-monetary incentives

- Under Differential Piece Rate 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 objective of encouraging less efficient workers or a trainee to improve.
- The object of a premium plan is to increase the production by providing an inducement to the workers in the form of higher wages for less time worked.

6.8 Keywords

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.

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

Labour Turnover: It denotes the percentage change in the labour force of an organisation.

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

6.9 Review Questions

1. Cost of labour turnover is treated as an overhead expense and should not be charged direct to any work order. Why?
2. Do you think that there is a direct relationship of the labour to a particular production unit or process?
3. Idle time is that time for which the employer pays, but from which he obtains no production. Discuss.
4. 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
5. 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.

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6. Critically evaluate the rate system and bonus system of wages payment.
7. 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?
8. Do you think idle time can be reduced by implementing some effective strategies? Discuss.
9. What factors would you take into consideration in introducing an incentive scheme?
10. 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?

Answers: Self Assessment

1.	labour turnover	2.	overhead expense
3.	Idle time	4.	Normal idle time
5.	Abnormal idle time	6.	profit & Loss Account
7.	separation method	8.	Force Choice Description Method
9.	Normal Idle time	10.	Job evaluation
11.	Time recording clocks	12.	job card method
13.	Disc	14.	True
15.	False		

6.10 Further Readings

Books

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Richard G. Schroeder, Myrtle W. Clark, Myrtle W. Clark, Jack M. Cathey, *Financial Accounting Theory and Analysis: Text Readings and Cases,* John Wiley & Sons Inc.

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Online links

www.futureaccountant.com

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Notes

Unit 7: Remuneration and Incentives

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Objectives

After studying this unit, you will be able to:

- Know the types of wages;
- Understand the methods of remuneration;
- Describe the prevention of fraud.

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.

Did u know? Remuneration for labour is wages as remuneration for capital is interest, for land is rent and for organization 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.

7.1 Types of Wages

Wages may be of different types such as real wages, minimum wages, living wages, and fair wages. Their brief description is as follows:

(i) ***Real Wages:*** The term 'real wages' refers to the purchasing power of money wages. Real wages represent the actual exchange value of wage rates or of earning. In the most common

usage in which wage rates or earnings for different periods are compared, real wages reflect adjustment to changes in the price level.

(ii) ***Minimum Wages:*** According to fair wage committee, the minimum wages must also provide for some measure of education and medical, requirements and other amenities. The concept of minimum wage connotes different standards in different countries. In Indian reference, minimum wages means that minimum amount which the labour or workers thinks necessary for the base sustenance of life but for the preservation of the efficiency of the worker.

(iii) ***The Living Wages:*** The living wages, according to the committee on fair wages, represented the highest level of the wages and naturally it would include all amenities which a citizen living in a modern civilized society was entitled to except when the economy of the country was sufficiently advanced and the employer was able to meet the expanding aspirations of his workers. After considering various observations made by Indian and foreign authorities, the committee observed that "the living wage should enable the male earner to provide for himself and his family not merely the bare essential of food, clothing and shelter but a measure of frugal comfort including education for the children, protection against ill-health, requirements of essential social needs and a measure of insurance against the more important misfortunes including old age".

(iv) ***Fair Wages:*** Fair wages is that wages which the labour gets for his work which is just near to minimum wages and living wages. Generally, current rate of wages, being paid in the organisation are known as fair wages. With a view to bring about improved relations between labour and management in modern age and effort has been made that labour should get a fair deal at the hands of managers of organisations. With this end in view, however, various proposals were under taken at the industries conference in 1947 as a resolution known as the industrial truce resolution was passed.

Notes The resolution is provided for the payment of fair wages to workers or labour and to implement this part of the resolution, the Indian government appointed a fair wages committee in 1948 to determine the principles on which fair wages should be based and to suggest the lines on which those principles should be applied.

Essential Features of an Effective Wage Plan

A wage system or plan will be treated as fair if it has the following features:

(i) There should be guaranteed minimum wages at a satisfactory level,

(ii) The system should be flexible to permit any necessary variations which may arise,

(iii) The system should aim at increasing the morale of the workers and reducing labour turnover,

(iv) The system should not be in violation of any local or national trade agreements,

(v) The method should be simple and capable for being understood by the workers,

(vi) The wages should be related to the effort put in by the employee. It should be fair to both the employees and employer,

(vii) The operating and administrative cost of the method should be minimize,

(viii) The system should keep in view the wage rate in the same area or organisation,

(ix) The system should be correlated to the capacity of the industry or organisation to pay, and

(x) The system should ensure equal wage for equal work or equal job.

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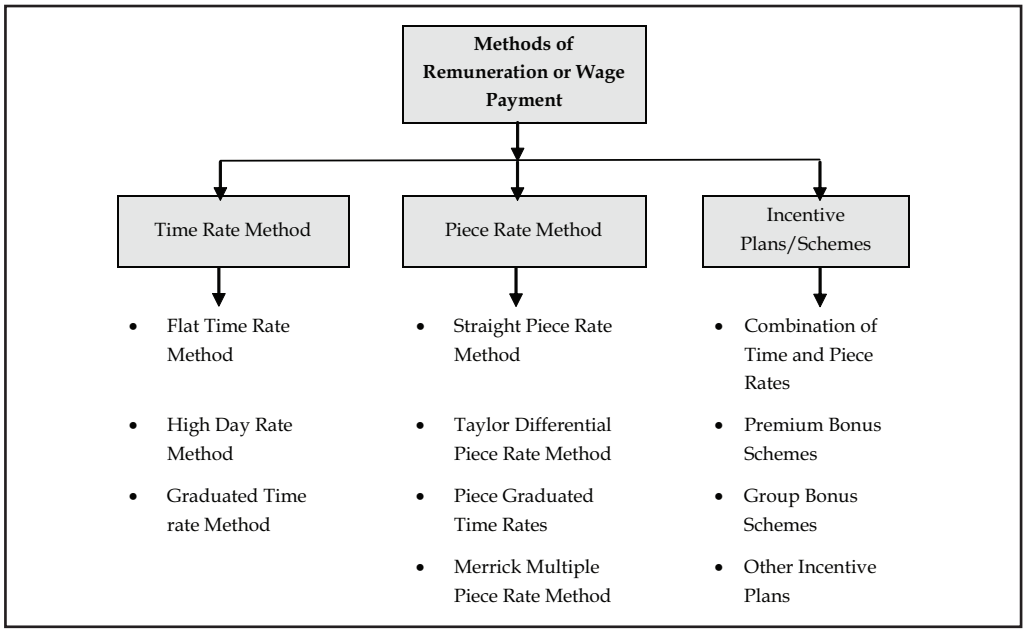
7.2 Methods of Remuneration or Wage Payment

There are three basic methods of wage payment or remuneration, i.e.:

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



7.2.1 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.

Caution The flat rate may be 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:

(i) ***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.

(ii) ***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.

(iii) ***Safety of Wages:*** The timely prescription of wages is very safe. Sickness, accident or less work has no effect on the wages.

(iv) ***Economy in Costs:*** As labourer and producer are is 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.

(v) ***Easy Counting:*** Workers can calculate their wages easily. Working for a certain period gives them knowledge as to what they have earned as wages.

(vi) ***Feeling of Unity:*** Workers engaged in the same kind of work with equal wages have the feeling of unity and makes the union strong.

(vii) ***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.

(viii) ***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 the following disadvantages also:

(i) ***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.

(ii) ***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.

(iii) ***Dissatisfaction Among Workers:*** Inefficient and efficient persons get equal wages, hence efficient workers lose their enthusiasm for work. They are dissatisfied because of less wages and he finds other outlets for working.

(iv) ***Employer's Complaint:*** Employer is unsatisfied with the work of workers even if he may do much work. He expects always more work from them.

(v) ***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.

(vi) ***Slow Production:*** Worker has no hurry to work hence, there is slow work and production slackens.

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7.2.2 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:

Wage = No. of units produced × Rate per unit

Types of Piece Rate Method

Following are the main types of piece rate method:

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:

Wages = Number of units × Rate per unit

Notes 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.

Taylor Differential Piece Rate Method: In the Taylor 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:

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

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:

- Guaranteed wages according to time rate plus a piece rate payment for units above a required minimum,
- Piece rate with a fixed dearness allowance or cost of living bonus, and
- 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.

Merrick 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.

Taylor's Differential Piece Rate System

Illustration: From the following particulars, calculate the earnings of workers X and Y and also comment on the labor cost.

Standard time allowed: 20 units per hour

Normal time rate: ₹ 30 per hour

Differential to be applied:

80% of piece rate when below standard

120% of piece rate at or above standard

In a particular day of 8 hours, X produces 140 units while Y produces 165 units

Solution:

Standard production per day is 20 units × 8 hours = 160 units

Worker X produces 140 units which means he is below standard and will get wages @ 80% of the normal piece rate.

X's earnings:

Normal piece rate = ₹ 30 per hour/20 units = ₹ 1.5 per unit

80% of the normal piece rate = ₹ 1.20 per unit

Earnings = ₹ 1.20 × 140 units = ₹ 168

Labor cost per unit = ₹ 168/140 units = ₹ 1.20

Y's Earnings: Y has produced more than the standard production of 160 units and hence he will get wages @ 120% of normal piece rate. His earnings will be as shown below.

Normal piece rate = ₹ 30 per hour/20 units = ₹ 1.50 per unit

120% of normal piece rate = ₹ 1.80 per unit

Earnings = ₹ 1.80 × 165 units = ₹ 297

Labor cost per unit = ₹ 1.80

Comment: Labor cost increases from ₹ 1.20 per unit to ₹ 1.80 per unit. Taylor's system is resisted on this ground as well as on the ground that it is very harsh on the workers.

Did u know? 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.

Advantages of Piece Rate Method

The following are the main advantages of piece rate method:

(i) Under this method, the reward is related to effort and this can be regarded as more equitable than the time rate method.

(ii) 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.

(iii) The workers always try to discover new method or technique for efficient production resulting in more production and more wages for them.

(iv) As the cost per unit can be known exactly the quotations can be made confidently and accurately.

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(v) 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 costs 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.

7.2.3 Incentive Plans/Schemes

Time rate method and piece rate method are discussed with advantages and disadvantages in this unit. 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. Following are main incentive plans and discussed are as follows:

Combination of Time and Piece Rates: Under this scheme the following methods are important for wage payment:

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

- Day wages are guaranteed,
- A standard time is fixed for each production or output,
- Below 66 2/3 per cent efficiency, the worker is paid his hourly rate and from 66 2/3 per cent upto 100 per cent efficiency, payments are made on the basis of step bonus rates, and
- 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:

Earnings = AT × R + (Percentage of Bonus × AT × 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:

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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:

- Day wages are guaranteed,
- Standards are set and bonus is paid if a work is completed within the standard time,
- Performance below standard is paid on the basis of time rate, and
- Performance above standard is paid at high piece rate. The workers may also receive bonus if the workers 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:

- Standard time is fixed for each work or operation,
- Time rate is guaranteed and the worker receives the guaranteed wages, and
- 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:

Bonus = 50% of (Time saved × Time rate)

Earnings = Time rate × Time taken + 50% of (Time saved × Time rate)

Notes

Example: Calculate total earnings from the following data:

Normal hourly rate	₹ 4
Time allowed for a job	20 hours
Time taken	16 hours

Solution:

Total earnings = Time rate × Time taken + 50% of (Time saved × Time rate)

= (16 × ₹ 4) + ½ (20 – 16) × ₹ 4

= ₹ 64 + 4

= ₹ 68

(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:

= (16 × ₹ 4) + 30/100 (20 – 16) × ₹ 2

= ₹ 64 + 2.40

= ₹ 66.40

(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. The formula for calculating wages is:

(i) Total Wages = Time wages + (Time wages × Bonus ratio)

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

$$\text{Bonus Ratio} = \frac{\text{Time saved}}{\text{Time allowed}}$$

Time Saved = Time allowed – Time taken

Illustration: X, Y and Z are three workers working in a manufacturing company and their output during a particular 40 hours week was, 96, 111 and 126 units respectively. The guaranteed rate per hour is ₹ 10 per hour, low piece rate is ₹ 4 per unit, high piece rate is ₹ 6 per unit. High task is 100 units per week.

Compute the total earnings and labor cost per unit under Taylor, Merrick and Gantt Task Bonus Plan.

Solution:

Taylor Plan: High task is 100 units:

- Worker X: 96 units × ₹ 4 = ₹ 384 [X will get the wages at low piece rate as his output is below the high task]
- Worker Y: 111 units × ₹ 6 = ₹ 666 [Y will get the wages at high piece rate as his output is above the high task i.e. standard]
- Worker Z: 126 units × ₹ 6 = ₹ 756 [Z will also get the wages at high piece rate as his output is above the high task, i.e. standard]

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Merrick Plan:

- Worker X = High task is 100 units, actual output is 96, this means that the efficiency level is 96%. As per Merrick Plan, wages of X will be 110% of normal piece rate which is ₹ 6.60 per unit = ₹ 6.60 × 96 = ₹ 633.6
- Worker Y = High task is 100 units, actual output is 111 units, efficiency level is 111%. Y will be entitled for wages @ 120% of normal piece rate i.e. @ ₹ 7.20 per unit. His wages will be, ₹ 7.20 X 111 = ₹ 799.2
- Worker Z = High task is 100 units, actual output is 126 units, efficiency level is 126%. Z will get at higher piece rate @ ₹ 7.20 per unit. His wages will be ₹ 7.20 × 126 units = ₹ 907.2

Gantt Task and Bonus Plan:

- Worker X = ₹ 10 × 40 hours = ₹ 400 [X will get guaranteed time rate as his output is below the high task]
- Worker Y = ₹ 6 × 111 units = ₹ 666 [High piece rate as output is above standard]
- Worker Z = ₹ 6 × ₹ 126 = ₹ 756 [High piece rate as output is above standard]

Illustrtation:

Calculate total earnings from the following data:

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

Solution:

Bonus ratio is

Total earnings by method (i)

= 8 hrs. × ₹ 2 + ₹ 16 × 1/5

= ₹ 16 + 3.20

= ₹ 19.20

Total earnings from method (ii)

= 8 hrs. × (₹ 2 + 2 × 1/5)

= 8 hrs. × ₹ 2.40

= ₹ 19.20

Advantages of Rowan Premium Scheme: Advantages of this method are as follows:

(i) It is suitable for learners and beginners,

(ii) The workers share the benefit with the employer, and

(iii) This scheme provides a safeguard against loose fixation of standard.

Disadvantages of Rowan Premium Scheme: The main disadvantages are:

(i) It is more complicated than the Halsey premium scheme,

(ii) The employers share the bonus earned by workers, and

(iii) Incentive is not as attractive as it is with his piece work rate.

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Group Bonus Schemes: In all the premium schemes discussed so far, the bonus payable to as 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, and

(c) It is required to reward not only the direct workers but also the indirect workers.

Types of Group Bonus Plans: Some of the group bonus plans 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 a 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:

(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, and

(iv) It eliminates excessive waste of time.

Disadvantages of Group Bonus Schemes: The disadvantages of group bonus schemes are:

(i) The effort of more efficient workers are not properly rewarded,

(ii) The production of a group should be independent of any other group, and

(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:

- *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.

- *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

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workers. Non-monetary plans may be entirely free by the industry or organisation. They are wide in number and may include:

- Canteen-free or subsidized basis,
- Entertainment facilities,
- Health and safety facilities,
- Club facilities,
- Housing facilities,
- Educational and training facilities, and
- Pension, Provident fund schemes facilities.

Comparison of Halsey and Rowan's plan:

Points of Similarity:

(a) The time rate is guaranteed in both the schemes.

(b) In both the schemes, the standard time for completing a job or operation is fixed.

(c) Bonus is dependent upon the time saved out of the allowed standard time.

(d) The benefits of saving in time are allowed to both the employer & employee.

(e) Higher output & lower rate of fixed overhead per unit is provided by both the schemes.

(f) When the worker takes ½ of the time allowed to finish the job, bonus hours in that case are same in both the schemes.

Points of Dissimilarity:

(a) If the time saved is less than ½ of the time allowed, better bonus is provided by the Rowan scheme than the Halsey scheme. On the other hand, if the time saved is more than ½ of the time allowed, the Halsey scheme provides better bonus than the Rowan scheme.

(b) The bonus hours, under the Halsey scheme, are equal to 50% of the time saved by the workers, whereas, under the Rowan scheme, the bonus hours are that proportion of time taken as the time saved bears to the time allowed.

(c) Under the Halsey scheme, more the time saved more will be the bonus; which is not true, under the Rowan scheme, if more than ½ of the time allowed is saved by the worker.

Example: The time allowed for a completing a job is 24 hours. The hourly rate is $. 4. For every 4 hours saved progressively, prepare a statement showing the bonus earned, earnings per hour & total earnings under Halsey system (50% to worker) & Rowan system of premium bonus & comment on comparative findings in the two systems.

Solution: Bonus under Halsey Scheme=1/2*(Time saved * Time rate)

Bonus under Rowan Scheme= (Time saved/Time allowed) * Time taken * Time rate

Comparative Statement of Wages									
Time Allowed Hours	Time Taken Hours	Time Saved Hours	Normal Time Wage $.	Bonus		Total Earnings		Earnings/hour	
				Halsey $.	Rowan $. $	Halsey $.	Rowan $.	Halsey $.	Rowan
24	24	-	96.00	-	-	96.00	96.00	4.00	4.00
24	20	4	80.00	8.00	13.33	88.00	93.33	4.44	4.67
24	16	8	64.00	16.00	21.33	80.00	85.33	5.00	5.33
24	12	12	48.00	24.00	24.00	72.00	72.00	6.00	6.00
24	8	16	32.00	32.00	21.33	64.00	53.33	8.00	6.67
24	4	20	16.00	40.00	13.33	56.00	29.33	14.00	7.33

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From the above prepared comparative statement, the following observations could be drawn:

(1) Under Halsey system, with the increase in efficiency the bonus increases steadily. On the other hand, under Rowan system, up to certain level of efficiency, i.e. where time saved is 50% of allotted time, bonus increases & then it begins to decline.

(2) More wages is earned by the worker under Rowan system than under Halsey system, where time saved is less than 50% of the standard time. On the other hand, more wages will be the earned by the worker under Halsey system than under Rowan system, when more than 50% of the standard time will be saved. Same bonus may be earned by the less efficient worker as well as by the more efficient one under Rowan system. Therefore, a safeguard is provided against a loose fixation of standards by the Rowan system.

(3) The worker, if he can save 2/3rd of the standard time, doubles his earnings per hour under Halsey system whereas earnings per hour can never be doubled under Rowan system.

(4) Under Halsey system, with a view to earning more bonuses, the quality of work may deteriorate which may arise due to over speed in work. On the other hand, as there is automatic check on the earnings under Rowan system, over speeding is arrested.

(5) Bonus under both the systems is the same, when the time saved is ½ of the standard time.

It may be concluded from the above observations that the Rowan scheme is better than the Halsey scheme, provided no loose fixation of standard is there.

There are other premium bonus schemes also, like (a) Barth scheme, (b) Accelerating premium bonus.

(a) Barth scheme: Time wage is not guaranteed under this scheme, i.e. wage is not provided to the worker on the basis of time worked by him. By multiplying the square root of the product of the time allowed & time taken by the hourly rate, his wages will be calculated. Under this scheme, with the increase in efficiency, there is a fall in the rate of increase in total earnings. The calculation of wages is not understandable by the ordinary workers; still the beginners & unskilled workers prefer the scheme.

(b) Accelerating Premium Bonus: There is generally no accepted formula under this scheme. Own formula is made by the employer for each individual.

Task A company pays its workers a guaranteed wage of ₹ 10.00 per hour. In addition, a bonus is paid for effective production and time saved @ ₹ 6.00 per hour. Calculate the amount of wages and bonus earned by each of the following workers:

Worker	Hours worked	Standard output	Actual output
A	40	80 units per hour	3,360 units
B	38	80 units per hour	3,648 units
C	40	80 units per hour	3,000 units

7.3 Prevention of Fraud in Wage Payment

One of the problems associated with wage payment is the possibility of fraud perpetuated by workers. The following types of frauds are more commonly seen in the industries:

(i) Inclusion of dummy workers in the payroll of the industry,

(ii) Use of wrong rate of pay in the payroll statement,

(iii) Deliberate absenteeism on the date of wage payment to claim fraudulent payment later,

(iv) Inclusion of wrong hours when payment is done on the basis of time of work done when payment is made on the basis of results, and

(v) Inclusion of overtime, bonus, etc. not entitled of the amount due.

To prevent fraud in payment of wages, a number of steps should be taken by the industry. These are:

(i) Attendance time should be reconciled with time booked and lost time. This will help in detecting attendance of dummy workers.

(ii) The rate of wages should be verified from relevant schedule of wage rates,

(iii) Unclaimed wages should be paid on particular dates under strict supervision. All payments in this respect should be made after proper scrutiny of the reason for not drawing wages on the payment day,

(iv) Outstation workers should be paid by the cash office,

(v) Payment of wages in a factory or company is to be made preferably at the same time and in all the departments in the presence of the departmental heads. All payments should be made only on proper identification of industry,

(vi) The exact amount of wages should be drawn from the bank and each individual should be paid his exact amount, and

(vii) There should be proper authorization in advance for overtime work. Actual hours worked should not exceed that authorized. Similarly, payment for idle time, scrap and defective production should be made only on proper authorization. Payment for incentives should be made only on the basis of a certificate issued by the departmental authority.

Task 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, and (d) Rowan Premium Plan.

Illustration: From the following particulars, find the amount of cash required for payment of wages in a factory for a particular month.

i. Wages for normal hours worked ₹ 20, 500

ii. Wages for overtime ₹ 2200

iii. Leave wages ₹ 1700

iv. Deduction of employees' share of State Insurance Corporation ₹ 500

v. Employees' contribution to Provident Fund ₹ 1600

vi. House rent is to be recovered from 30 employees at the rate of ₹ 10 per month.

Solution: The amount of cash required will be computed as shown below.

Notes

Particulars		Amount – ₹
Wages for normal hours worked		20,500
Wages for overtime		2,200
Leave wages		1,700
Total Requirement		24,400
Less: Deduction of employees' share of ESI:	₹ 500	
Employees' contribution to P.F.	₹ 1600	
House rent to be recovered from 30 employees @ ₹ 10 per month	₹ 300	
Total		2,400
Net requirement of cash		22,000

Illustration: Calculate the normal and overtime wages payable to a workman from the following data.

Days	Hours Worked
Monday	08
Tuesday	10
Wednesday	9
Thursday	11
Friday	9
Saturday	4
Total	51

Normal working hours – 8 hours per day

Normal rate per hour – ₹ 20.

Overtime rate: up to 9 hours in a day at single rate and over 9 hours at double rate or up to 48 hours in a week at single rate and over 48 hours at double rate whichever is more beneficial to the workman.

Solution:

(a) Up to 48 hours per week at single rate: ₹ 20 x 48 = ₹ 960 Over 48 hours, at double rate:

₹ 40 x 3 = ₹ 120

Total = ₹ 1080

(b) Up to 9 hours in a day at single rate and over 9 hours at double rate

Days	Number of Hours	Normal Wages ₹	Overtime Wages ₹	Total Wages ₹
Monday	8	8 x ₹ 20 = 160	_	160
Tuesday	10	9 x ₹ 20 =180	1 x ₹ 40 =40	220

Contd…

Notes

Wednesday	9	9 x ₹ 20 =180	_	180
Thursday	11	9 x ₹ 20 =180	2 x ₹ 40 =80	260
Friday	9	9 x ₹ 20 =180	_	180
Saturday	4	4 x ₹ 20 = 80	_	80
Total	_	_	_	

Illustration: A worker takes 6 hours to complete a job under a scheme of payment by results. The standard time allowed for the job is 9 hours. His wage rate is ₹ 15 per hour. Material cost of the job is ₹ 120 and the overheads are recovered at 15% of the total direct wages. Calculate the factory cost of job under (a) Rowan and (b) Halsey system of incentive system.

Solution:

(a) Rowan Plan: H x R + [S – H /S] x H x R : 6 hrs x ₹ 15 + [9 – 6/9] x 6 x ₹ 15 : ₹ 90 + 1/3 x ₹ 90 : ₹ 120

(b) Halsey Plan: H x R + 50% [S – H] x R : 6 hrs x ₹ 15 + 50% [9 – 6] x ₹ 15 : ₹ 90 + ₹ 22.50 = ₹ 112.50

(c) Factory Cost:

Particulars	Rowan Plan	Halsey Plan
I. Material cost	₹ 120	₹ 120
II. Labor	₹ 120	₹ 112.50
III. Overheads 15% of direct wages	₹ 18	₹ 16.80
Total I + II + III	₹ 258	₹ 249.30

Illustration: Calculate the earnings of workers A, B and C under the Straight Piece Rate System and Merrick's Differential Piece Rate System from the following particulars.

Normal rate per hour: ₹ 5.40 Standard time per unit: 1 minute Output per day is as follows.

Worker A – 390 units

Worker B – 450 units

Worker C – 600 units.

Working hours per day are 8

Solution:

Firstly, the rate per unit will have to be calculated, as in the example, rate per hour is given. This is shown below.

Rate per hour: ₹ 5.40

Standard time per unit: 1 minute

Hence the standard time per hour is 60 units Normal piece rate per unit = ₹ 0.090

I. ***Wages under the Straight Piece Rate:***

Worker A: 390 units x ₹ 0.090 = ₹ 35.10

Worker B: 450 units x ₹ 0.090 = ₹ 40.50

Worker C: 600 units x ₹ 0.090 = ₹ 54.00

Notes

II. *Wages under Merrick's Differential Piece Rate System*

Worker A:

Efficiency level: Standard production = 8 hours x 60 units = 480 units

Actual production = 390 units

Efficiency level = 390 units/480 units x 100 = 81.25 %

A will get wages as per the normal piece rate as his efficiency level is 81.25% which is below 83%, hence his wages will be 390 units x ₹ 0.090 = ₹ 35.10

Worker B:

Efficiency level: Standard production = 8 hours × 60 units = 480 units

Actual production = 450 units

Efficiency level = 450/480 x 100 = 93.75%

B will get wages @ 110% of normal piece rate, i.e.₹ 0.099 per unit His wages = ₹ 0.09 x 450 units = ₹ 44.50

Worker C:

Efficiency level = 600 /480 x 100 = 125%

B will get wages @ 120% of normal piece rate i.e. ₹ 0.108 per unit His wages = ₹ 0.108 x 600 units = ₹ 64.80

Illustration: A company has its factories at two locations. Rowan plan is in use at location A and Halsey plan at location B. Standard time and basic rate of wages are same for a job which is similar and is carried out on similar machinery. Time allotted is 60 hours.

Job at location A is completed in 36 hours while at B, it has taken 48 hours. Conversion costs at respective places are ₹ 1224 and ₹ 1500. Overheads account for ₹ 20 per hour.

Required:

I. To find out the normal wage rate and,

II. To compare the respective conversion cost.

Solution: Let ₹ Y per hour be normal wage rate

So, wages at location A will be ₹ 36Y and at location B, ₹ 48Y

Time allowed is 60 hours

Hence, for time saved, bonus will be payable as under,

Location A

Bonus under Rowan Plan = Time saved/ Time allowed x Hours worked x Rate = 24/60 x 36 x Y = ₹ 14.4 Y

Total wages = ₹ 36Y + ₹ 14.4Y = ₹ 50.4Y

Overheads @ ₹ 20 per hour worked ₹ 720

Hence, total conversion cost is ₹ 50.4Y + 720 = ₹ 1224 [given in the example]

So, Y = ₹ 10

Location B

Bonus under Halsey Plan = 50% of time saved x Rate per hour = 50% of 12 x Y = ₹ 6Y

Notes

Total wages = ₹ 48Y + ₹ 6Y = ₹ 54Y

Overheads = ₹ 20 per hour = ₹ 960

Total conversion cost is ₹ 54Y + 960 = ₹ 1500

So Y = ₹ 10

Comparative Conversion Cost

Particulars	A [Rowan Plan]	B [Halsey Plan]
Wages @ ₹ 10 per hour	₹ 360	₹ 480
Bonus	₹ 144	₹ 60
Overheads	₹ 720	₹ 960
Total	₹ 1224	₹ 1500

Illustration: Calculate total monthly remuneration of three workers, A, B and C from the following data.

(a) Standard production per month per worker – 1000 units, actual production during the month, A – 850 units, B – 750 units and C – 950 units.

(b) Piecework rate ₹ 10 per unit [actual production]

(c) Additional production bonus is ₹ 10 for each percentage or actual production exceeding 80%

(d) Dearness pay fixed ₹ 50 per month.

Solution: Standard production = 1000 units per worker per month.

Actual production:

Worker A = 850 units, efficiency level = 850/1000 x 100 = 85%

Worker B = 750 units, efficiency level = 750/1000 x 100 = 75%

Worker C = 950 units, efficiency level = 950/1000 x100 = 95%

Statement showing total Remuneration of Workers

Particulars	Worker A ₹	Worker B ₹	Worker C ₹
Normal piece rate wages [₹ 10 per unit]	850 units x ₹ 10 per unit 8500	750 units x ₹ 10 per unit 7500	950 units x ₹ 10 per unit 9500
Bonus *	₹ 10 x 5 = 50	–	₹ 10 x 15 = 150
Dearness pay	50	50	50
Total	8600	7550	9700

*As per the example, bonus will be paid only if the efficiency exceeds 80%. For A and C the efficiency exceeds 80% and hence they will be entitled for a bonus of ₹ 10 per percentage exceeding 80%. B will not be entitled for any bonus as his production efficiency does not exceed 80%.

Illustration: In a factory bonus system, bonus hours are credited to the employees in the proportion of time taken which time saved bears to time allowed. Jobs are carried forward from one week to another. No overtime worked and payment is made in full for all units worked on, including those subsequently rejected. From the following information you are required to calculate for each employee –

(a) The bonus hours and amount of bonus earned.

Notes

(b) The total wage costs and

(c) The wages cost of each good unit produced.

Particulars	Worker A	Worker B	Worker C
Z	₹ 10	₹ 16	₹ 12
Units produced for production	2500	2200	3600
Time allowed for 100 units	2 hrs 35 minutes	3 hours	1 hour 30 minutes
Time taken	52 hours	75 hours	48 hours
Rejects	100 units	40 units	400 units

Solution: The computation is shown in the following table. Statement showing Bonus and Wage Cost Per Unit

Particulars	Worker A	Worker B	Worker C
Units produced	2500	2200	3600
Rejects	100 units	40 units	400 units
Good units	2600 units	2160 units	3200 units
Time allowed for 100 units	2 hrs 35 minutes	3 hours	1 hour 30 minutes
Total time allowed	65 hours	66 hours	54 hours
Time taken	52 hours	75 hours	48 hours
Time saved [Time allowed – Time taken]	13 hours	--	6 hours
Basic rate per hour	₹ 10	₹ 16	₹ 12

Statement showing Bonus and Wage Cost Per Unit [Continued from previous page]

Particulars	Worker A	Worker B	Worker C
Basic Wages	₹ 520	₹ 1200	₹ 576
Bonus *	₹ 104	--	₹ 64
Total wages cost	₹ 624	₹ 1200	₹ 640
Wages cost per unit of good units produced #	₹ 0.26	₹ 0.56	₹ 0.20

* Bonus is computed as follows.

It is given in the example, that the bonus is to be paid in the proportion of time taken which the time saved bears to the time allowed.

For A, the time saved is 13 hours while the time allowed is 65 hours. This means that the proportion of time saved to time allowed is 13/65 = 1/5 hours and hence the bonus is 1/5th of basic wages i.e. ₹ 104

For B, there is no time saved and hence he is not entitled for any bonus.

For C, time saved is 6 hours while time allowed is 54 hours, which means that the time saved is 1/9th of the time allowed. Hence the amount of bonus will be 1/9th of the basic wages i.e. ₹ 64

Wages cost per unit of good unit is computed by dividing the total wages cost by the good units.

Illustration: XYZ Ltd. has introduced a Scanlon plan of incentive bonus for its employees from the year 2006-07. The relevant information for three previous years is as follows.

Notes

Year	Sales Revenue ₹	Total Salaries and Wages ₹
2003-04	2,40,000	72,000
2004-05	2,50,000	70,000
2005-06	2,70,000	86,400

For the year 2006-07, the sales revenue has been ₹ 3,25,000 and the total salaries and wages paid ₹ 90,000. What is the amount due to employees under Scanlon Plan? If 50% is set-aside in the bonus equalization reserve fund, how much money is to be paid out for 2006-07 as Scanlon Bonus?

Solution:

- Average annual salaries and wages = [₹ 72,000 + ₹ 70,000 + ₹ 86,400]/3
- Average salaries and wages = ₹ 76,133
- Average annual sales revenue

  [₹ 2,40,000 + ₹ 2,50,000 + ₹ 2,70,000]/3 = ₹ 2,53,333
- Bonus percentage = ₹ 76,133 / ₹ 2,53,333 = 30.05%
- Salaries and wages on which bonus is applicable = ₹ 97,663 *[₹ 3,25,000 × 30.05%]
- Actual salaries and wages for 2006-07 = ₹ 90,000
- Bonus fund = ₹ 97,663 – ₹ 90,000 = ₹ 7,663
- Transfer to Bonus equalization reserve fund = ₹ 3,831
- Bonus available for disbursement = ₹ 3,832

Illustration: Your organization is experiencing a high labor turnover in recent years, and management would like you to submit a report on the loss suffered by the company due to such labor turnover. Following figures are available for your consideration.

Sales: ₹ 600 lakhs

Direct materials: ₹ 150 lakhs

Direct labor: ₹ 48 lakhs on 4,80,000 man hours

Other variable expenses: ₹ 60 lakhs

Fixed overheads: ₹ 80 lakhs

The direct man hours include 9000 man hours spent on trainees and replacements, only 50% of which were productive. Further, during the year 12,000 man-hours of potential work could not be availed of because of delayed replacement. The cost incurred due to separation and replacements amounted to ₹ 1 lakh.

On the basis of the above data, prepare a comparative statement showing actual profit vis-à-vis the profit which would have been realized had there been no labor turnover.

Solution:

I. Calculation of direct labor cost if there was no labor turnover:

   Actual direct labor cost per hour = ₹ 48,00,000/4,80,000 = ₹ 10 per direct labor hour

   Cost of man hours of potential work lost due to delayed replacement = 12,000 × ₹ 10 = ₹ 1, 20,000 Direct labor cost if there was no labor turnover = ₹ 48,00,000 + ₹ 1,20,000 = ₹ 49,20,000.

Notes

II. Calculation of potential total sales if there was no labor turnover

Particulars	Hours
Hours lost for delayed replacement	12,000
Unproductive hours 50% of 9000 hours	4,500
Total hours lost	16,500
Actual labor hours spent	4,80,000
Less: Unproductive hours	4,500
Productive labor hours worked	4,75,500

Sales related to 4, 75, 500 productive hours = ₹ 600 lakhs Potential sales lost due to loss of 16, 500 direct labor hours, ₹ 6, 00, 00, 000 / 4, 75, 500 [Direct labor hours] x 16, 500 D.L.H. = ₹ 20, 82, 019.

Total sales if there was no labor turnover = ₹ 6, 00, 00, 000 + ₹ 20, 82, 019 = ₹ 6, 20, 82, 019.

III. Variable expenses if there was no labor turnover: ₹ 2, 10, 00, 000 / 6, 00, 00, 000 x 6, 20, 82, 019 = ₹ 2, 17, 28, 707

Comparative Statement showing Actual Profit vis-à-vis Profit, Which would Have Been Realized If There Was No Labor Turnover

Particulars	Actual ₹	If No Labor Turnover ₹
Sales	6,00,00,000	6,20,82,019
Costs:		
Variable cost	2,10,00,000	2,17,28,707
Direct labor	48,00,000	49,20,000
Fixed costs	80,00,000	80,00,000
Separations replacement costs	1,00,000	–
Total costs	3,39,00,000	3,46,48,707
Profit [Sales – Total Costs]	2,61,00,000	2,74,33,312

Thus loss of profit due to labor turnover = ₹ 2, 74, 33, 312 – ₹ 2, 61, 00, 000 = ₹ 13, 33, 312

Illustration: A company uses an old method of machining a part manufactured for sale. The estimates of operating details for the year 2005-06 are given below.

Number of parts to be manufactured and sold: 30, 000 Raw materials required per part: 10 kg @ ₹ 2 per kg Average wage rate per worker: ₹ 40 per day of 8 hours Average labor efficiency: 60%

Standard time required to manufacture one part: 2 hours Overhead rate: ₹ 10 per clock hour

Material handling expenses: 2% of the value of raw material.

The company has a suggestion box scheme and an award equivalent to three months saving in labor cost is passed on to the employee whose suggestion is accepted. In response to this scheme suggestion has been received from an employee to use a special Jig in the manufacture of the aforesaid part. The cost of the Jig, which has life of one year is ₹ 30, 000 and the use of the Jig will reduce the standard time by 12 minutes.

Required:

(a) Compute the amount of award payable to the employee who has given the suggestion.

Notes

(b) Prepare a statement showing the annual cost of production before and after the implementation of the suggestion to use the Jig and indicate the annual saving.

(c) State the assumptions on which your calculations are based.

Solution:

(a) Computation of amount of Award payable to the employee who has given the suggestion: Standard time: 2 hours or 120 minutes

Efficiency: 60%

Direct labor hours required: 120 x 100/60 = 200 minutes

For 30, 000 components time required = 30, 000 x 200/60 = 1, 00, 000 hours Labor cost ₹ 5 per hour = ₹ 5, 00, 000

Standard time after suggestion = 120 minutes –12 minutes = 108 minutes Direct labor hour required = 108 x 100/60 = 180 minutes

Clock hours required for 30, 000 parts = 30, 000 x 180/60 = 90, 000 hours Time saved in a year = 1, 00, 000 – 90, 000 = 10, 000 hours

Cost of saving in time in a year = 10, 000 hours x ₹ 5 = ₹ 50, 000

Award equivalent to 3 months wage cost saving = ₹ 50, 000 x 3/12 = ₹ 12, 500

(b) Annual Cost of Production and Savings to the Company

Particulars	**Before Suggestion 1, 00, 000 hours**	**After Suggestion 90, 000 hours**
Raw materials: 30000 parts x 10 kg x ₹ 2	6,00,000	6,00,000
Direct wages: @ ₹ 5 per hour	5,00,000	4,50,000
Overheads @ ₹ 10 per hour	10,00,000	9,00,000
Material handling @ 2% of cost of raw material	12,000	12,000
Cost of Jig		3,000
Total cost	21,12,000	19,65,000

Gross Saving in cost = ₹ 1, 47, 000 Less: Award amount = ₹ 12, 500 Net savings in cost = ₹ 1, 34, 500

(c) ***Assumptions:*** There will be no change in efficiency. The labor hours saved and surplus capacity formed due to improvement are used profitably for other jobs.

Self Assessment

State whether the following statements are true or false:

1. Remuneration to workers is the most complex problem in a democratic country like India.
2. The term 'real wages' refers to the purchasing power of money wages.
3. Fair wages is that wages which the labour gets for his work.
4. Either direct or indirect labour employed in a factory or industry will have to be paid remuneration for the services.
5. Workers can calculate their wages easily.

Notes

6. The operating and administrative cost of the method of wages should be maximized.
7. There are five basic methods of wage payment or remuneration.
8. Under Piece graduated time rate method, workers are paid maximum wages on the basis of time rates.
9. The piece rate is usually fixed with the help of work study.
10. In the Taylor differential method, piece rates were determined by time and motion study.
11. The time and bonus rates are not fixed for each work in Gantt bonus scheme.

Fill in the blanks:

12. According to fair …… the minimum wages must also provide for some measure of education and medical, requirements and other amenities.
13. In India, the basic wage rates normally remain ……
14. Under …… method, the efficiency of workers has a tendency to increase.
15. Under Straight Piece rate method …… for each job is ascertained first.

Case Study

Example of Remuneration/Incentives of TCF Info

The Company

A medium sized mortgage broker with 10 sales staff and 4 administration staff - two of which handle complaints.

Current Practice

Currently the firm's consultants earn commission for reaching sales targets, and bonuses on top when certain milestones are passed. No other incentive system operates, but staff are required to follow FSA rules on complaint turnaround times.

The TCF Problem

As a result of the sales incentive programme, consultants are encouraged to complete as many sales as possible in a given timeframe. The risk to customers is that, in their eagerness to meet targets, advisers may be tempted to sell a suitable product with which they are familiar when there are others equally or more suitable available for the particular individual in question. As a result customer choice – and therefore fair treatment – may be compromised.

At the same time, opportunities to encourage other staff members to implement TCF are being lost. For example, as things stand staff who deal with customer complaints have no incentives to spot and report opportunities to improve service and reduce future complaints. Their only incentive is to turn complaints around within the FSA timeframes.

TCF Solution

Sales

To encourage a more balanced approach to sales, the firm could include risk and service performance targets in its rewards programme and make it known that it monitors sales of individual product type against each adviser.

Contd…

Notes

The additional targets might require the consultant to document the range of suitable products discussed with the client and the reason for the final choice out of these. Consultants would only qualify for commission on satisfactory completion of these details - which will be open to scrutiny during file checks and/or if sale statistics suggest undue emphasis of a broker selling one product type. By making consultants aware that MI will monitor sales of individual product by consultant the firm will further encourage them to consider a wider range of similar products and be ready to justify the final choices they make.

Complaints

On the complaints side, a simple reward programme to encourage staff to suggest ways to prevent complaints re-occurring would benefit both customers and the broker. The reward programme could include points for the number of recommendations made and a financial reward where a recommendation is implemented and shown through MI to reduce complaints and improve service in that area.

7.4 Summary

- 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.
- Fair wages is that wages which the labour gets for his work which is just near to minimum wages and living wages. Generally, current rate of wages, being paid in the organisation are known as fair wages.
- With a view to bring about improved relations between labour and management in modern age and effort has been made that labour should get a fair deal at the hands of managers of organisations.
- With this end in view, however, various proposals were under taken at the industries conference in 1947 as a resolution known as the industrial truce resolution was passed.
- And the three basic methods of wage payment or remuneration, i.e. time rate method, piece rate method and incentive plans or schemes explain well in detail the remuneration and incentives.

7.5 Keywords

Differential Rate: An amount added or deducted from base rate.

Group Bonus: An incentive wage divided among a number of workers.

Living Wages: A wage enough to maintain a normal standard of living.

Nominal Wages: Average wage.

Payroll Statement: Statement disclosing the details of the employees.

Real Wages: True values of wage.

7.6 Review Questions

1. Describe the methods of remunerating labour. State the merits and demerits of each method.
2. 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?

Notes

3. Explain the working of a method of remunerating production labour where production can be measured and incentive to high productivity is necessary. Exclude straight piece work method of pay.

4. "Increased productivity as a result of Premium Bonus Plans benefits both employer and the employees". Comment on this statement.

5. Define piece rates method,

6. Briefly distinguish among: straight piece rates, piece rates with guaranteed day rates and differential piece rates.

7. What are the advantages and disadvantages of piece rates, and define time rates and its advantages and disadvantages?

8. Explain the following by giving suitable examples:

   (a) Halsey Premium Plan, (b) Rowan Premium Plan,

   (c) Emerson Premium Plan, and (d) Gantt Difference Piece Rate Plan.

   (e) Taylor Differential Piece Rate, (f) Merric Differential Piece Rate,

   (g) Emerson Differential Time Rate, and (h) Halsey Weir Premium Plan.

9. The following particulars are available for a job:

   Normal time rate : ₹ 4 per hour

   High task (standard) unit per week : 60

   In a 45 hours week, the production of workers was as follows.

Workers	A	B	C	D	E
Units Production	45	50	60	66	72

   Calculate the earnings of the workers under (a) Piece rate, (b) Taylor method, (c) Merric method.

10. The following particulars are available for a job:

   Normal time rate : ₹ 5 per hour

   Standard units per week : 80

   In a 48 hours week, the production of workers was as follows:

Workers	A	B	C	D	E
Units Production	60	72	80	90	100

   Calculate the earnings of the workers under Emerson Plan if bonus at different levels of efficiency is paid as under:

Efficiency	75%	80%	90%	95%	100%
Bonus (%)	1.31%	3.27%	9.91%	14.53%	20.00%

11. Write short notes on the following :

   (a) Preventive costs, and (b) Replacement costs.

Answers: Self Assessment

1. True 2. True

3. True 4. False

Notes

5. True
6. False
7. False
8. False
9. True
10. True
11. False
12. Wage committee
13. Fixed
14. Merrik multiple piece rate
15. Standard time

7.7 Further Readings

Books

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Online links

www.futureaccountant.com

www.managementstudyguide.com

Notes

Unit 8: Overheads

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8.8 Further Readings

Objectives

After studying this unit, you will be able to:

- Understand the meaning and definition of overheads;
- Describe the classification of overheads;
- Identify the codification of overheads;
- Understand the overhead accounting.

Introduction

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.. The total cost is divided into: Prime Cost, Factory Cost and Administrative Cost. Overhead comprises of 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.

Caution A major part of the total cost is overheads.

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8.1 Meaning and Definition of Overhead

Meaning of overhead: The term has overhead has a wider meaning than the term indirect expenses. Overhead includes the cost of indirect material, indirect labour, and indirect expense. This is the aggregate sum of indirect material, indirect labour and indirect expense.

Overhead = Indirect material + indirect labour + indirect expenses

Definition of overheads: The indirect costs or fixed expenses of operating a business (that is, the costs not directly related to the manufacture of a product or delivery of a service) that range from rent to administrative costs to marketing costs.

8.2 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 basis of classification of overheads:

(i) Nature-wise Classification,

(ii) Function-wise Classification,

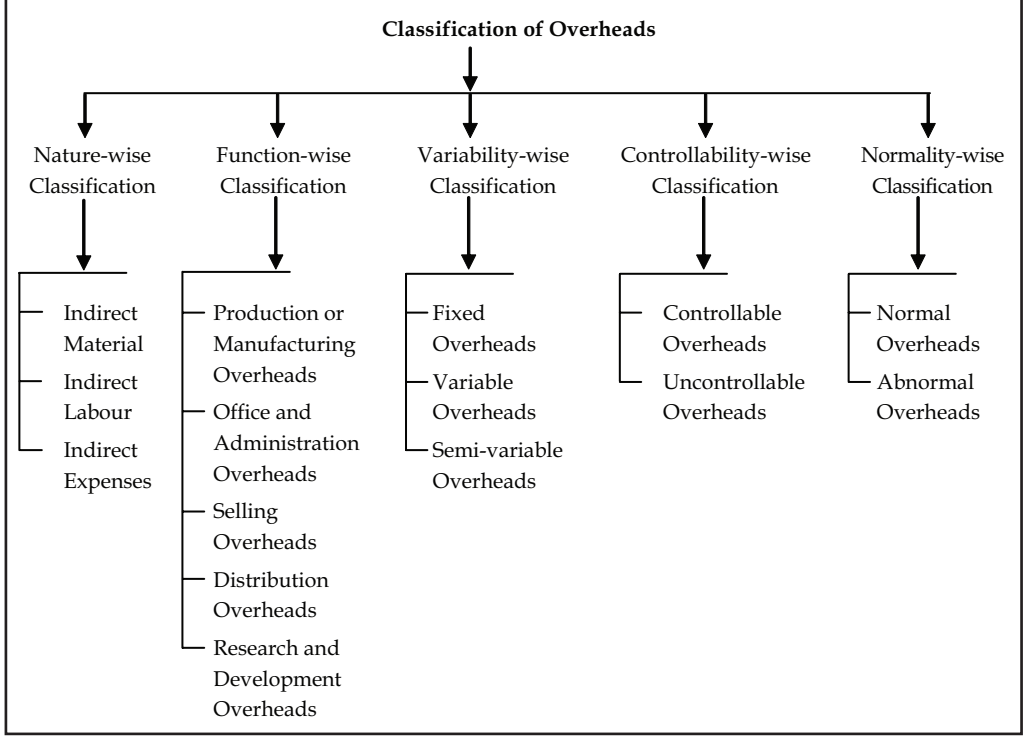
(iii) Variability-wise Classification,

(iv) Controllability-wise Classification, and

(v) Normality-wise Classification.

The following chart shows their classification at a glance:

Figure 8.1: Overheads – Classification



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(i) ***Nature-wise Classification:*** Under this classification, expenditures are classified into three categories:

(a) *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 centers or cost units. The examples of indirect materials are consumable stores, lubricating oil, loose tools, cotton waste, etc.

(b) *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.

(c) *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.

(ii) ***Function-wise Classification:*** Under this classification, the various functions performed by the industry or organization. In this classification overheads are classified as follows:

(a) *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 equipments, store-keeping expenses, cost of idle time, overtime, holiday pay, workers' training and welfare expenses, inspection, factory telephone and stationery expenses.

(b) *Office and Administration Overheads:* These are also known as general overheads. It is the indirect expenditure incurred in formulating the policy, directing the organization 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.

(c) *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.

(d) *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.

(e) *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

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the implementation of the decision to produce a new or improved method and ends with the commencement of formal production of the product.

(iii) ***Variability-wise Classification:*** The overheads can be classified according to variability into:

(a) *Fixed Overheads:*. 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.

Did u know? 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

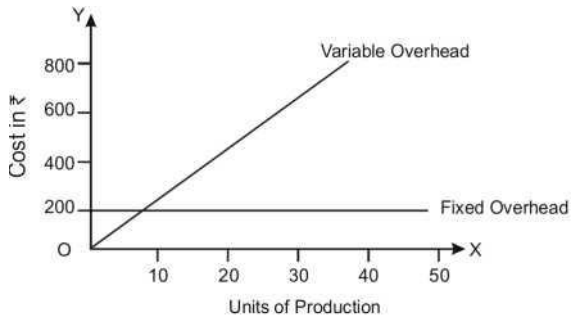
A feature of the fixed overhead is that the rate of output per unit reduces as the production increases and vice versa. For example, the fixed overhead cost is ₹ 4,000. If 100 units are produced, the cost per unit will be ₹ 40 and if the production increases to 200 units, the cost per-unit will go down to ₹ 20 per unit. The cost per unit changes but the total cost remains the same.

(b) *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, hearing, 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.

Notes 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.

Two figures are given, the first figure is related to Fixed overheads and second figure is showing Variable overheads.

Figure 8.2: Variable Overhead



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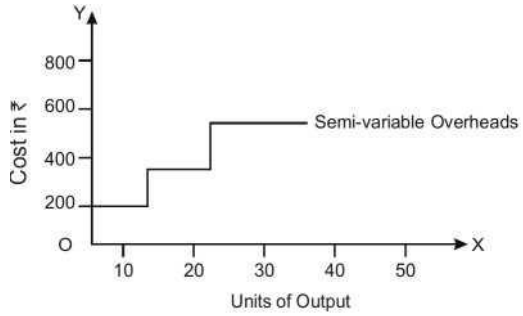
(c) *Semi-variable Overheads:* Semi-variable overheads are also known as Semi-fixed overheads. It is an overhead which is partly fixed and partly variable. There is hardly any difference between these two terms. However, if the-fixed part of the item of expense is more than the variable, it may be called 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 electric. The following figure shows the semi-variable overheads.

Figure 8.3: Semi-variable Overhead



Example: In a department of a factory, 2,000 units were produced and sold at a profit of 20% on cost price. What price would you quote for the supply of 3,000 units of the same type of product, if the rate of expenses remains unchanged and the same percentage of profit is desired?

The record of expenses for 2,000 units is as follows:

		₹
Material		10,000
Labour		12,000
Factory Expenses		
Fixed	₹ 5,000	
Variable	₹ 2,000	7,000
Administrative and Selling Expenses		
Fixed	₹ 2,000	
Variable	₹ 1,000	3,000
	Total Cost	32,000
Profit: 20% on Cost		6,400
	Selling Price	38,400

Solution:

Statement of Tender Price for 3,000 Units

(iv) ***Controllability-wise Classification:*** On the basis of controllability, overheads may be classified into two categories. They are:

(a) *Controllable Overheads:* Those overhead costs which can be controlled by managerial influence fall under this category. All variable costs are controllable.

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(b) *Uncontrollable Overhead:* The overhead costs which are beyond the control of managerial decisions are uncontrollable costs. All fixed overhead costs fall under this category.

(v) ***Normality-wise Classification:*** On the basis of normality, overheads may be classified into two categories. They are:

(a) *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.

(b) *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.

8.3 Codification of Overheads

Coding is a technique and method of intelligently describing in numbers or letters or a combination of overheads. Codification of overheads is useful in control of overheads. After the classification of overheads, the next step involved in cost accounting is to codify them.

Objectives of Codification of Overhead

The main objectives of codification of overheads are:

(i) To analyse overhead expenses for control purposes,

(ii) To account for all types of overheads,

(iii) To help the task of machine accounting system,

(iv) To facilitate control over them,

(v) To reduce the task of maintaining a huge number of accounts, and

(vi) To accumulate overheads systematically.

Methods of Codification

The overheads are collected from the different sources; they are grouped under different similar headings. It means that the overheads of similar nature and feature are placed under one group. Codification is the method of grouping of overheads by allotting various numbers, alphabets or other symbols to the overheads.

Codification is associated with the use of standing order numbers and cost account numbers. The numbers are provided to items of the overheads. Allotted numbers prove helpful in maintaining secrecy with simplification. There are three methods of codification as given below:

(i) ***Serial Number Method:*** Each head of expense is given a serial number.

S.No. 1	Material
S.No. 1.1	Direct Material
S.No. 1.2	Indirect Material
S.No. 2	Factory Overheads
S.No. 2.1	Rent on Factory Building
S.No. 2.2	Salary to Factory Manager

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(ii) ***Alphabets Method:*** The alphabet stands for the head of expense and the number shows further analysis of the expense. For example, "M" stands for Maintenance and it can be analysed as follows:

M = Maintenance

M_1 = Maintenance to Factory Building

M_2 = Maintenance to Power House

M_3 = Maintenance to Officer Building

M_4 = Maintenance to Warehouse Building

(iii) ***Numerical Codes Method:*** For mechanized accounting, the use of alphabets is restricted and this numerical code method is, adopted in the industry. For example:

Code	Particulars
100101	Depreciation on Plant
100102	Depreciation on Building
200101	Salary to Factory Manager
200102	Salary to Managerial

The main sources of collection of overheads are:

(i) ***Store Requisition:*** Store requisition prepared for the issue of indirect materials like cotton waste, lubricants, brushes, soap, etc., are helpful in collecting and ascertaining the overheads to be charged to the department which made use of such indirect material, etc.

(ii) ***Wages Analysis Book:*** This book gives information regarding indirect wages, overtime payment, etc., to be treated as overhead. The indirect wages paid to various employees are recorded in this book on the basis of time card.

(iii) ***Purchases Journal and Invoices:*** The Purchase Journal give information regarding the indirect materials and stores purchased. Invoices for materials are entered in the material control accounts and the invoices for stores purchases are recorded in the stores control accounts. The various invoices supporting the purchase of indirect materials by various departmental heads are entered in purchase journal meant for the purpose of collection of overheads.

(iv) ***Cash Book:*** All expenses incurred in cash may be collected from cash book. So, such overheads are paid in cash and not entered in any other books. And overheads can be collected from cash book. Sundry item of expenses are recorded in a petty cash book. The total of indirect expenses or overheads is collected from the petty cash book on the basis of standing order number and cost accounting number.

(v) ***Journal:*** This book gives information regarding the payments made in advance, besides depreciation, interest, notional rent and adjustments, etc. The total of these expenses are posted to the debit of factory overhead control account and credited to cost control ledger account.

(vi) ***Vouchers:*** Vouchers regarding indirect expenses give information of total overhead costs.

(vii) ***Various Registers and Reports:*** Information about depreciation can be had from the plant and machinery register. Reports regarding scrap, waste, spoiled material, idle time, idle machines and idle facilities, etc. are helpful in collecting the overheads.

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8.4 Overhead Accounting

Overhead accounting is the concept of cost accounting. In overhead accounting, we collects all overhead, then we classify it. Then we do its departmentalization. In end, we allocate and apportionment of overhead expenses.

Departmentalisation of Overhead

Departmentalisation of overhead refers to the process of administratively dividing the factory into different divisions or cost centre to which overheads are charged. Departmentalisation of overhead is considered necessary for ensuring greater accuracy in cost ascertainment and cost control. The departmental organization of a large manufacturing concern usually consists of production departments and service departments.

Production department are those in which manual and machine operations are performed on the products produced. The number of production departments in a industry depends upon the nature of industry and they type of production operations involved. For example, a cement industry usually has the following departments:

(a) Stone Crushing Department,

(b) Raw Grinding and Mixing Department,

(c) Coal Crushing and Pulverizing Department,

(d) Burning and Cooling Department,

(e) Finish, Grinding and Storing Department, etc.

Did u know? Division of overhead among different functional departments enables management to exercise greater control over overhead by fixing the responsibility for the incurrence of the related overhead expenses.

Thus, the indirect expenses relating to each production process undertaken by a distinguished department are collected under separate accounting heads classified on the basis of object of expenditure.

Service departments are those which are not directly engaged in manufacturing but render special type of services for the benefit of other departments. Depending upon the nature of industry and the type of services required, a large organization may have the following service departments:

(a) Planning and Estimating Department,

(b) Stores Department,

(c) Repairs and Maintenance Department,

(d) Plant Engineering Department,

(e) Inspection Department,

(f) Purchasing Department,

(g) Cost Accounting Department,

(h) Personnel Department,

(i) Pay-roll Department, and

(j) General Accounting Department, etc.

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Distribution of total overheads between production and service departments and the allocation of all service departments overhead to the production department is known as departmentalization of overhead costs. Departmentalisation of overheads not only helps in segregating the industry overheads among production and service departments but also in accurately ascertaining the cost of different products which pass through these departments. Departmentalisation of overhead costs enables the distribution of costs of service departments to various production departments or production units.

Objectives of Departmentalisation of Overheads

The following are the main objectives of departmentalisation:

(i) Forecasting, planning and decision-making,

(ii) Ascertaining the cost of various departments,

(iii) Effective control on overhead cost,

(iv) Valuation of work-in-progress, and

(v) Ensure greater accuracy in allocation and apportionment of overheads.

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.

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 expense such as rent, lighting and telephone charges, general managers 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.

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.

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(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 a 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.

Notes 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.

Basis of Apportionment of Factory Overheads

The following are the basis 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 and expenses of air, gas, steam and water.

- 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.
- Air, Gas, Steam and Water expenses can also be apportioned on technical basis in the ratio of meter readings.

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The following is a list of more conventional basis of apportionment commonly used in manufacturing organisations or industries:

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 Equipments.	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.

Reapportionment of Overheads

The process of assigning service department overheads to production departments is called reassignment or re-apportionment. Service departments are those departments which do not directly take part in the production of goods. Such department provides ancillary services. Examples of such departments are boiler house, canteen, stores, time office, dispensary, etc.

Methods used for the reapportionment of service department expenses over the production department:

A. ***Direct re-distribution method:*** Under this method service department costs are apportioned over the production departments only, ignoring the services rendered by one service department to the other.

B. ***Step Method or Non-reciprocal method:*** This method gives cognizance to the service rendered by service department to another service department. The sequence here begins with the department that renders service to the maximum number of other service departments.

C. ***Reciprocal Service Method:*** These methods are used when different service departments render services to each other, in addition to rendering services to production departments.

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In such cases various service departments have to share overheads of each other. The methods available for dealing with reciprocal services are

(i) Simultaneous equation method;

(ii) Repeated distribution method;

(iii) Trial and error method.

Simultaneous Equation Method

In this method, the following algebraic equations help in finding out cost of service departments.

Illustration: A company has three production departments and two service departments. Distribution summary of overheads is as follows:

Production Departments		Service Departments	
A	₹ 3,000	1.	₹ 234
B	₹ 2,000	2.	₹ 300
C	₹ 1,000		

The expenses of service departments are charged on a percentage basis which is as follows:

	A	B	C	1	2
1.	20%	40%	30%	-	10%
2.	40%	20%	20%	20%	-

Find out the total overheads of production departments using the following methods:

(A) Simultaneous Equations Method

(B) Repeated Distribution Method

Simultaneous Equations Method – Example

Let x denotes total overhead of service department 1

y denotes total overhead of service department 2

Therefore, $x = 234 + 0.2y$ …(1)

$y = 300 + 0.1x$ …(2)

$x - 0.2y = 234$ …(1)

$-0.1x + y = 300$ …(2)

To solve the equations, re-arrange these and multiply by 10 to eliminate decimals.

$10x - 2y = 2{,}340$ …(1)

$-x + 10y = 3{,}000$ …(2)

Multiplying second equation by 10 and adding

$10x - 2y = 2{,}340$

$-10x + 100y = 30{,}000$

$98y = 32{,}340$

$y = 32{,}340 \div 98$

$y = 330$

$x = 300$

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(a) Secondary Distribution Summary

Production Departments

	Total	A	B	C
Total as per primary summary	6,000	3,000	2,000	1,000
Service Dept. 1 (90% of 300)	270	60	120	90
Service Dept. 2 (80% of 330)	264	132	66	66
Total	**6534**	**3192**	**2186**	**1156**

(b) Repeated Distribution Method

	Production Departments			Service Departments	
Items	**A**	**B**	**C**	**X**	**Y**
Total as per primary summary	3,000	2,000	1,000	234	300
Service Dept.1	47	94	70	-234	23
Service Dept.2	129	65	65	64	-323
Service Dept.1	13	26	19	-64	6
Service Dept.2	**2**	**2**	**2**	**-**	**-**
Total	3,191	2,187	1,156	-	-

(c) Trial and Error Method

In this method the cost of first service department is apportioned to other service departments only in the given percentage. The cost of the second service departments then is apportioned to the first and other service departments. In this way, when the cost of all service departments has been apportioned, the process is repeated till the service departments costs are reduced to negligible amounts. In this way, the total cost of each service department is found out by trial and error.

Apportionment on Non-reciprocal basis (Step Ladder Method)

This method is used when a service department renders services to other service departments but does not receive services of the other service departments, i.e. when service departments are not inter-dependent.

In this method, the service departments are arranged in descending order of their serviceability. The service department which serves the next largest number of departments is taken up next and its cost is apportioned to other service and production departments excepting the first service department.

This process is continued till the cost of the last service department is apportioned.

Example: The Kartik Company is divided into four departments. A, B and C are producing 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

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Supervision	15,000
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
Dep. 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.

Example: A manufacturing company has 2 production departments A and B and three Service Departments name by Time-keeping, Stores and Maintenance. The departmental summary showed the following expenses for December, 2007.

	₹	₹
Production Departments		
A	16,000	
B	10,000	26,000
Service Departments:		
Time-keeping	4,000	
Stores	5,000	
Maintenance	3,000	12,000
	38,000	

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The other information are:

Particulars	Production Departments		Service Departments		
	A	B	Time- keeping	Stores	Maintenance
No. of Employees	40	30	20	16	10
No. of Stores Requisitions	24	20	–	–	6
Machine Hours	2,400	1,600	–	–	–

You are required to make departmental allocation and apportionment of expenses.

Solution:

Statement of Departmental Overhead Distribution

Items	Basis of Apportionment	Total (₹)	Production Department		Service Department		
			A	B	Time-keeping	Stores	Maintenance
Expenses	Allocation	38,000	16,000	10,000	4,000	5,000	3,000
Time-keeping Expenses Apportioned	No. of employees	4,000	1,667	1,250	– 4,000	667	416
						5667	
Stores Expenses Apportioned	No. of stores requisitions	5,667	2,720	2,267		–5,667	680
							4,096
Maintenance Expenses Apportioned	Machine Hours	4,096	2,458	1,638			– 4,096
Total		–	22,845	15,155	–	–	–

Working note: The total time-keeping expenses have been apportioned over different departments (other than time-keeping) in the ratio of number of employees in each department.

Example: Rajat company's production costs for the year ending June 30, 2007 are given below:

General Expenses:

Rent	₹ 12,500
Insurance	₹ 1,050
Depreciation	15% of value of machinery
Power	₹ 3,800
Light	₹ 1,250

You are required to prepare an overhead analysis statement for the departments showing the basis of apportionment, where necessary.

Solution:

Notes

Statement of Overhead Analysis for Year Ending June 30, 2007

Items	Basis of Apportionment	Production Departments			Service Departments			Total (₹)
		P1 (₹)	P2 (₹)	P3 (₹)	Office (₹)	Stores (₹)	Work-shop (₹)	
Indirect Materials	Direct	2,000	3,000	3,000	1,000	2,000	2,000	13,000
Indirect Wages	Direct	3,000	3,000	4,000	10,000	10,000	5,000	35,000
Rent	Area	2,000	2,500	3,000	1,500	1,000	2,500	12,500
Insurance	Value of Machine	300	350	250	–	–	150	1,050
Depreciation	Value of Machine	4,500	5,250	3,750	–	–	2,250	15,750
Power	H.P. of Machine	877	1,169	1,462	–	–	292	3,800
Light	Area	200	250	300	150	100	250	1,250
Total Overheads		12,877	15,519	15,762	12,650	13,100	12,442	82,350
Workshop Overhead Apportioned	Machine Hours	2,765	5,530	4,147	–	–	(–) 12,442	–
Stores Overhead Apportioned	Direct Materials	3,573	4,168	5,359	–	(–) 13,100	–	–
Office Overheads Apportioned	Direct Wages	3,373	4,217	5,060	(–) 12,650	–	–	–
Total Overheads of Production Departments		22,588	29,434	30,328	–	–	–	–

Task In a factory, the average annual charges for direct wages amount to ₹ 2,40,000. The following are some of the expenses (average figure for a year) incurred inside the factory:

- Works Manager's salary and other emoluments ₹ 25,000.
- Factory rent and rates ₹ 18,000. The total area of the factory is 45,000 sq.ft. of which the shops occupy 40,000 sq.ft.
- Wages of caretakers, sweepers, etc. ₹ 3,500.
- Other factory overhead charges ₹ 26,500.

A work order is executed in a shop occupying 3,000 sq.ft. and costs ₹ 5,000 in wages. If the total wages for all the work orders executed in this shop amount to ₹ 80,000. Calculate the total amount of factory overhead charges to be debited to the account of the work order in question.

Notes

Self Assessment

Fill in the blanks:

1. …… are those indirect costs which cannot be directly related to any product, job or process, because they cannot be directly attached to production activities.
2. The total cost is divided into: Prime Cost, …… and Administrative Cost.
3. Overhead comprises ……, indirect labour and indirect expenses.
4. …… are not affected by changes in output or sales.
5. Variable expenses change in the same proportion in which …… changes.
6. …… expenses are partly fixed and partly variable.
7. The …… depends upon the type and size of the business.
8. …… change in the same ratio in which the output changes.
9. …… is also known as factory overhead, works overhead or manufacturing overhead.
10. …… is the expenditure incurred in promoting sales and retaining customers
11. Variable costs change in the same ratio in which the …… changes.
12. …… is a technique and method of intelligently describing in numbers or letters or a combination of overheads.
13. …… cannot be allocated directly but which can be apportioned to or absorbed by cost centre or cost unit.
14. …… are those which are not directly engaged in manufacturing but render special type of services for the benefit of other departments.
15. The expenses pertaining to delivery of goods to the customers fall under this ……

8.5 Summary

- Cost pertaining to a cost centre or cost unit may be broadly, divided into two portions, direct and indirect.
- The indirect portion of the total cost constitutes "the overhead cost which is the aggregate of indirect material cost, indirect wages and indirect expenses". Broadly speaking, any expenditure over and above prime cost is known as 'overhead.'
- Overhead costs may be classified according to: (1) Functions, (2) Elements, and (3) Behaviour-wise classification.
- The fixed overhead rate serves as a measure of utilisation of the facilities while the extent of idle capacity is indicated by under absorption.
- The following are the main methods of absorbing factory overheads:
  - Percentage on direct material cost
  - Percentage on direct wages
  - Percentage on prime cost
  - Direct labour hour rate

Notes

- Machine hour rate
- Rate per unit of output

- The overheads are under absorbed if the actual overheads incurred are more than the overheads absorbed.
- The overheads are over absorbed if the actual overheads incurred are less than the overheads absorbed.

8.6 Keywords

Fixed Expenses: Expenses that are not affected by changes in output or sales such as rent, salaries, etc.

Overheads: 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.

Semi-variable Expenses: Expenses that change in the same proportion to which output (or sales) changes but not in the same ratio. Depreciation is not doubled if output is doubled it may be 50% more. Semi-variable expenses are partly fixed and partly variable.

Variable Expenses: expenses that change in the same proportion in which output (or sales) changes for example, power consumed, indirect materials, insurance in transit, carriage outwards, etc.

8.7 Review Questions

1. What are overheads? How are they classified? Discuss in detail with a chart.
2. Define fixed, variable and semi-variable expenses giving examples of each.
3. Describe the advantages of classification of factory overheads.
4. Write short notes on the following:

   (a) Codification of Overheads, and (b) Collection of Overheads.
5. Classify the Overheads according to Nature, Functions and Variability-wise and explain in detail.
6. Discuss the various methods of allocating the works overhead charges. Give the relative merits and demerits of each.
7. Name the different methods of 'absorption of factory overheads' and explain any four of them giving the merits and demerits of each.
8. What is the difference between apportionment of overheads and absorption of overheads?
9. Discuss the various methods of absorption of factory overheads. Under what conditions, it is said to be over-absorption of factory overheads?
10. Explain Absorption and Allocation of overheads. What are the main methods? Explain machine hour rate method.
11. Explain the system and basis of apportionment of factory overheads on machines.

Answers: Self Assessment

1. Overheads
2. Factory Cost
3. indirect material
4. Fixed expenses

Notes

5. output (or sales)
6. Semi-variable
7. overhead classification
8. Variable Overheads
9. Manufacturing overheads
10. Selling overheads
11. Output
12. Coding
13. Indirect Expenses
14. Service departments
15. distribution overhead.

8.8 Further Readings

Books

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Pandey, IM, *Management Accounting*, Excel Book, New Delhi, 2007.

Richard G. Schroeder, Myrtle W. Clark, Myrtle W. Clark, Jack M. Cathey, *Financial Accounting Theory and Analysis: Text Readings and Cases*, John Wiley & Sons Inc.

Shah Paresh, *Management Accounting*, Oxford University Press, New Delhi, 2009.

Online links

www.futureaccountant.com

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Notes

Unit 9: Absorption of Overheads

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Objectives

After studying this unit, you will be able to:

- Define the overhead absorption;
- Learn about the methods of absorption;
- Understand the under and over absorption.

Introduction

A managerial accounting cost method of expensing all costs associated with manufacturing a particular product. Absorption costing uses the total direct costs and overhead costs associated with manufacturing a product as the cost base. Generally accepted accounting principles (GAAP) require absorption costing for external reporting.

9.1 Definition of Overhead Absorption

According of ICMA, London, "Overhead absorption is the allotment of overhead to cost units". The apportionment of overhead expenses of the cost centres to cost units on some equitable basis is referred to as overhead absorption. Generally, all products, jobs, processes or services pass through one or more producing cost centre. The overhead expenses relating to a cost centre are ultimately to be charged to the products, jobs, etc., which pass through that centre. Thus, 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. This is known as Absorption of overheads.

9.2 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

Notes

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*** 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 for 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 is delay in finding out the costs of present production.

(ii) ***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 organizations 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 practical use in costing. Predetermined overhead rate calculated as follows:

$$\text{Predetermined Rate} = \frac{\text{Estimated or Budgeted overheads}}{\text{Estimated or Budgeted base}}$$

(iii) ***Standard rate*** is used in place of predetermined rate and calculated from the following formulas:

$$\text{Standard Rate} = \frac{\text{Standard overheads}}{\text{Standard base}}$$

9.3 Methods of Absorption

Different methods may be adopted for determination of absorption rates for fixed and variable overheads. The fixed overhead rate serves as a measure of utilisation of the facilities while the extent of idle capacity is indicated by under absorption.

Notes

The following are the main methods of absorbing factory overheads:

1. ***Percentage on Direct Material Cost:*** Under this method, the percentage of factory expenses to material is calculated on the basis of past records and the factory expenses in the current year are charged to the factory on the jobs according to that percentage. For example, the factory expenses in the previous year are ₹ 12,000 on a material of ₹ 48000. That means the percentage of factory overhead to direct material is 25%. Therefore, even in the current year, same percentage will be calculated.

2. ***Percentage on Direct Wages:*** Sometimes, on the basis of estimates, the percentage of factory expenses to direct wages is calculated and jobs are charged according to this percentage. This method of absorption can be adopted under the following circumstances:

   (a) Where production is uniform.

   (b) Where labour employed and type of work performed are uniform.

   (c) Where, the ratio of skilled and unskilled labour is constant.

   (d) Where there are no variations in the rates of pay.

3. ***Percentage on Prime Cost:*** It is argued that both materials and labour give rise to overhead expenses and therefore, both should be taken into consideration in determining the factory expenses.

4. ***Direct Labour Rate:*** This is a scientific method as most of the overhead expenses are related to the time factor. This method can be applied in those departments or factories where manual labour is predominant.

   The direct labour hour rate is obtained by dividing the total overhead of the department for a particular period by the total number of direct labour hours of that department for the same period. Each job is changed at this rate for the number of direct hours spent thereon. A serious defect of this method is that it fails to take into consideration expenses that are not dependent on labour hours such as power, depreciation, fire insurance, etc.

5. ***Machine Hour Rate:*** Machine hour rate is the cost of running a machine per hour. It is one of the methods of absorbing factory expenses to production. There are two methods of computing the machine hour rate. viz.

   (a) The ordinary machine hour rate, and

   (b) Composite machine hour rate.

   Dual Hour Rate: This is the combination of machine hour rate and direct labour rate. It is adopted in those departments where both manual and machine works are equal.

6. ***Rate Per Unit of Output:*** This method is simple and adopted where products of the same types are manufactured. The rate per unit is obtained by dividing the overheads by the number of units produced. Each unit is exchanged at this rate for the recovery of overhead.

Notes **Factors in Selecting Methods of Overhead Rate for a Factory**

1. ***Adequacy:*** The overhead should be such that overheads should be equally apportioned to the cost centres or cost units. The amount of overhead recovered should also be equivalent to the amount of overheads incurred.

2. ***Convenience:*** The overhead rate should be simple to calculate and easy to understand. It should be convenient in application. It should not require unnecessary or additional clerical work.

Contd…

Notes

3. ***Time factor:*** Overhead rate should have some relation to the time taken by various jobs for completion. Thus, if a job takes twice as much another job, the first job should be charged twice the amount charged to the second job. It is because of this reason that direct wages percentage rate is preferred over direct material cost percentage rate.

4. ***Manual or machine work:*** The work done by manual labour is to be distinguished from work done by machines and different overhead rates should be applied for manual and machine work.

5. ***Different overhead rates:*** Different overhead rates should be ascertained for different departments where the nature of work done by one department is different from the work done by other department or departments.

6. ***Information:*** The selection of most appropriate overhead rate depends on the extent of information available or recorded.

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

$$\text{Overhead Application Rate} = \frac{58,000}{1,34,600} = ₹\ 0.431$$

(b) Direct Labour Cost Method:

Estimated Factory Overheads	₹ 58,000

Notes

Estimated Labour Cost ₹ 97,800

$$\text{Overhead Application Rate} = \frac{58,000}{97,800} \times 100 = 59.3\%$$

(c) Machine Hour Rate Method:

Estimated Factory Overheads ₹ 58,000

Estimated Machine Hours ₹ 50,500

$$\text{Overhead Application Rate} = \frac{58,000}{50,500} = ₹\ 1.149$$

(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 production department of a factory furnishes the following information for the month of June, 2007.

Material	₹ 54,000
Director Wages	₹ 45,000
Labour-hours worked	36,000
Hours of machine operation	30,000
Overheads chargeable to the department	₹ 36,000

For an order executed by the department during the period, the relevant information was as under:

Material used	₹ 6,000
Direct wages	₹ 3,200
Labour hours worked	3,200
Hours of machine operation	2,400

Calculate the overhead charges chargeable to the job by the following methods: (a) Direct materials cost percentage rate, (b) Labour hour rate, and (c) Machine hour rate.

Solution:

(a) Direct Material Cost Percentage Rate:

$$= \frac{\text{Overhead expenses}}{\text{Direct material cost}} \times 100$$

$$= \frac{36,000}{54,000} \times 100 = 66.67\%$$

Notes

Overhead charges @ 66.67% chargeable to the job for which materials used accounted for ₹ 6,000.

$$= 6{,}000 \times \frac{66.67}{100} = 4{,}000$$

(b) Labour Hour Rate:

$$= \frac{\text{Overhead expenses}}{\text{Direct labour hours}}$$

$$= \frac{36{,}000}{36{,}000} = ₹\ 1$$

Overhead for the job @ ₹ 1 for 3,200 hours

= ₹ 3,200

(c) Machine Hour Rate:

$$= \frac{\text{Overhead expenses}}{\text{Machine hours}}$$

$$= \frac{36{,}000}{30{,}000} = ₹\ 1.20$$

Overhead for the job @ ₹ 1.20 for 2,400 hours

= ₹ 2,880

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 are ₹ 250 per month Sundry supplies, such as lubricants, jute and cotton waste, etc., for the shop Hire-purchase installment payable for the machines (including ₹ 300 as interest)	494
The machine uses 10 units of power per hour	1,200

Solution:

Notes

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)	90
	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

Notes 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

Notes

Example: From the data given below calculate the machine hour rate:

	Per Annum (₹)
Rent of the department (Space occupied by the Machine /5th of the department)	780
Lighting (number of the men in the department 12, two men are engaged on this machine)	288
Insurance of the machine	36
Cotton waste, oil, etc., for the machine	60
Salary of foreman (1/4th of the foreman's time is occupied by this machine)	6,000
The cost of the machine is ₹ 9,200 and it has an estimated scrap value of ₹ 200 after 10 years	

It is assumed from the past experience:

(a) that the machine will work for ₹ 1,800 hours per annum.

(b) that it will incur an expenditure of ₹ 1,125 in respect of repairs and maintenance during the working life of the machine.

(c) that it consumes 5 units of power per hour at the cost of 16 paise per unit.

(d) that the working life of the machine will be 18,000 hours.

Solution:

Computation of Machine Hour Rate

	Particulars	Amount (₹)
(A)	Standing Charges:	
	Rent of the department (1.5th of ₹ 780)	156
	Lighting (₹ 288 ÷ 12 men × 2 men)	48
	Insurance	36
	Cotton waste, oil, etc.	60
	Salary of foreman (1/4th of ₹ 6,000)	1,500
	Total Standing Charges	1,800
	Hourly Rate for Standing Charges	1.00
	(₹ 1,800 ÷ 1,800 hours) = 1.00	
(B)	Variable Charges:	
	Depreciation	0.50[1]
	Repairs and Maintenance	0.06[2]
	Power (5 units per hour @ ₹ 0.06 per unit)	0.30
	Machine Hour Rate	1.86

Working notes:

[1]Hourly rate of depreciation will be calculated as follows:

$$\text{Hourly Rate of Dep.} = \frac{\text{Cost of machine} - \text{Scrap value}}{\text{Hours of working life}}$$

$$= \frac{₹9,200 - ₹200}{18,000 \text{ Hours}} = ₹\,0.50$$

Notes

(2)Hourly Rate of Repair and Maintenance:

$$= \frac{\text{Cost of repairs and maintenance during the working life}}{\text{Total life} \times \text{Yearly normal working hours}}$$

$$= \frac{₹\ 1,125}{10 \times 1,800 \text{ hours}} = \frac{₹\ 1,125}{18,000 \text{ hours}} = ₹\ 0.06$$

Task From the data given below calculate the machine hour rate:

	Per Annum (₹)
Rent of the department (Space occupied by the Machine /5th of the department)	1200
Lighting (number of the men in the department 12, two men are engaged on this machine)	350
Insurance of the machine	45
Cotton waste, oil, etc., for the machine	75
Salary of foreman (1/4th of the foreman's time is occupied by this machine)	18000
The cost of the machine is ₹ 9,200 and it has an estimated scrap value of ₹ 200 after 10 years	

It is assumed from the past experience:

(a) that the machine will work for ₹ 2,500 hours per annum.

(b) that it will incur an expenditure of ₹ 1,425 in respect of repairs and maintenance during the working life of the machine.

(c) that it consumes 5 units of power per hour at the cost of 24 paise per unit.

(d) that the working life of the machine will be 20,000 hours.

Advantages of Percentage on Direct Material Cost

1. This method is simple to understand and easy to calculate.
2. This method is suitable when the prices of material do not fluctuate widely.
3. This is suitable when the products are uniform.

Disadvantages

1. This method ignores the time factor.
2. This method is not suitable when the material costs fluctuate widely.
3. It ignores the distinction between jobs done manually and jobs done by machine.

Advantages of Percentage on Direct Wages

1. This method is simple to understand and easy to calculate.
2. This method is suitable when the labour rates do not fluctuate widely.
3. This method is suitable when the labour is a major factor of production.

Notes

Disadvantages

1. It does not give satisfactory result when the piece rate system is followed.
2. It ignores the distinction between skilled and unskilled workers.
3. It is not suitable when the labour rates fluctuate widely.

Advantages Percentage on Prime Cost

1. This method is simple to understand and easy to operate.
2. It considers both direct material and direct labour to determine the overhead. Because the aggregate of both is quite significant and constitute major portion of the total cost.

Disadvantages

1. In common with the previous two systems, this method does not distinguish between jobs done by skilled and unskilled workers.
2. This method ignores the distinction between jobs done manually and jobs done by machine.

Direct Labour Hour Rate

Advantages

(i) It is simple to understand and easy to calculate.

(ii) It considers time factor.

(iii) It is suitable when manual labour is a dominant factor of production.

Disadvantages

(i) It ignores job done by skilled and unskilled workers.

(ii) It ignores the distinction between jobs done manually and those done by machines.

Rate Per Unit of Output

Advantages

(a) It is simple to understand and easy to calculate.

(b) It is suitable when the output is uniform.

Disadvantages

(a) It does not consider time factor.

(b) The distinction between skilled and unskilled worker is ignored.

(c) It also ignores the distinction between the manual labour and job done by machine.

Three different ways, the treatment of over or under-absorbed overhead may be done:

(a) To the next period's account, the amount may be carried forward.

Notes

(b) To costing profit & loss account, the amount may be written off.

(c) To the production, a supplementary rate may be worked out & applied.

Over and Under Absorption

Overheads are apportioned or allotted to cost units on an estimated basis. But it is quite natural that the overhead so estimated may be different from the amount of overhead actually incurred.

Hence the question of under or over absorption of overhead arises when there is a difference between the amount of overhead absorbed and the amount of overhead incurred.

Meaning of Under-absorption of Overheads

Under-absorption of overheads means that the amount of overheads absorbed in the production is less than the amount of actual overheads-Incurred. For example if the overheads absorbed on a predetermined basis are ₹ 1, 00,000 and the actual overheads incurred are ₹ 1, 20,000, there is under-absorption to the extent of ₹ 20, 000.

It represents under stating the costs as the overheads incurred are not fully recovered in the cost of jobs or processes, etc. Under-absorption is also termed as 'under recovery',

Meaning of Over-absorption of Overheads

Over-absorption of overheads means the excess of overheads absorbed over the actual amount of overheads incurred. In other words when the amount absorbed is more than the expenditure incurred due to expenses being less than the estimates it would mean over-absorption of overheads. Usually over-absorption inflates the cost. Over- absorption is also formed as 'over recovery'.

For example the overheads recovered are ₹ 3, 00,000 and the actual production overheads are ₹ 2, 75,000 then there will be over-absorption of ₹ 25, 000. (₹ 3, 00,000 – ₹ 2, 75,000).

Reasons of Under/Over-absorption of Overheads

The under or over-absorption of overheads may arise due to any one or more of the following reasons:

(i) Wrong estimation of overhead expenses: The actual overhead expenses may be substantially less or more than the estimated amount.

(ii) Wrong estimation of work done: The amount of work done may greatly exceed or may be substantially less than the estimated work. For example if actual work is 8,000 working hours against estimated working hours of 10,000, then the expenses charged to job will be 20% less.

(iii) Error in using method of absorption: Sometimes the method of absorption may not be suitable. If the percentage of direct material method is used, fluctuation in prices of material may lead to under or over-absorption of overheads.

(iv) Seasonal fluctuation in overhead: Due to seasonal nature of work, overhead may fluctuate from one period to another period.

(v) Under or over utilization of capacity: There may be under or over-absorption of overhead due to under or over utilization of productive capacity.

(vi) Wrong estimation of output: When the actual output substantially differs from the anticipated output, it leads to under or over-absorption of overheads.

Notes

Self Assessment

Fill in the blanks:

1. The …… serves as a measure of utilisation of the facilities.
2. The extent of idle capacity is indicated by ……
3. The direct labour hour rate is obtained by dividing the total overhead of the department for a particular period by the total number of …… of that department for the same period.
4. …… is the cost of running a machine per hour.
5. The rate per unit is obtained by dividing the overheads by the number of ……
6. …… is the cost of running a machine per hour.
7. Under …… method, the percentage of factory expenses to material is calculated on the basis of past records and the factory expenses in the current year.
8. …… is computed by dividing the budgeted overhead expenses by the budgeted base.
9. …… is the combination of machine hour rate and direct labour rate.
10. …… is the cost of running a machine per hour.

9.4 Under and Over Absorption of Overheads

The absorption of overheads is based on some pre-determined rates. The actual overheads incurred may or may not be equal to the overheads absorbed.

Did u know? **What are pre-determined rates?**

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 organizations following a budgetary control system.

$$= \frac{\text{Estimated factory overhead for the budgeted period}}{\text{Estimated direct material cost of production}} \times 100$$

Under Absorption of Overheads

The overheads are under absorbed if the actual overheads incurred are more than the overheads absorbed.

Did u know? **What is 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 for as possible, so that overheads may be directly charged to jobs, processes, operations, or products.

$$\text{Actual Rate} = \frac{\text{Actual overhead expenses incurred during a period}}{\text{Actual quantity or value of the base for the period}}$$

Under absorption of Overheads = Incurred overhead – Absorbed overhead

Example:

Dr. Cr.

Date	Particular	J/F	Amount (₹)	Date	Particular	J/F	Amount (₹)
01.	To SLCA a/c		210000	01.	By WIP a/c		390000
02.	To WLCA a/c		135000		By closing P/L a/c		
03.	To GLA a/c		65000				20000
			410000				410000

Caution The adjustment of under absorbed overhead would result in a loss in the form of increase in cost where the under absorption is normal and in the form of abnormal loss where it is abnormal.

Over Absorption of Overhead

The overheads are over absorbed if the actual overheads incurred are less than the overheads absorbed.

Over-absorbed overhead = Absorbed overhead – Incurred overhead

Example:

Dr. Cr.

Date	Particular	J/F	Amount (₹)	Date	Particular	J/F	Amount (₹)
01.	To SLCA a/c		200000	01.	By WIP a/c		460000
02.	To WLCA a/c		145000		By closing P/L a/c		
03.	To GLA a/c		65000				10000
04.	To Closing P/L a/c		50000				
			470000				470000

Caution The adjustment of over absorbed overhead would result in a gain in the form of reduction in cost where the over absorption is normal and in the form of abnormal profit where it is abnormal.

Self Assessment

State whether the following statements are true or false:

11. The overheads are under absorbed if the actual overheads incurred are less than the overheads absorbed.

Notes

12. 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.
13. Over-absorbed overhead = Absorbed overhead – Incurred overhead
14. Predetermined overhead rate is computed by dividing the budgeted overhead expenses by the budgeted base.

9.5 Summary

- Cost pertaining to a cost centre or cost unit may be broadly, divided into two portions, direct and indirect.
- The following are the main methods of absorbing factory overheads:
  - Percentage on direct material cost
  - Percentage on direct wages
  - Percentage on prime cost
  - Direct labour hour rate
  - Machine hour rate
  - Rate per unit of output
- The overheads are under absorbed if the actual overheads incurred are more than the overheads absorbed.
- The overheads are over absorbed if the actual overheads incurred are less than the overheads absorbed

9.6 Keywords

Actual Overhead: The amount of manufacturing overhead actually incurred during an accounting period.

Direct Wages: Wages from the primary form of employment.

Over Absorption of Overheads: The overheads are over absorbed if the actual overheads incurred are less than the overheads absorbed.

Predetermined Rate: Preset or planned rate.

Standard Cost: Factory cost to be accounted for the year.

Under Absorption of Overheads: The overheads are under absorbed if the actual overheads incurred are more than the overheads absorbed.

9.7 Review Questions

1. What is Machine Hour Rate method? Explain and describe its areas of application.
2. Calculate Machine-hour Rate for Machine No. 5 which is one of 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.

Notes

(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.

3. From the following information's, compute the Machine-hour Rate:

Cost of Machine	₹ 60,000
Expected Scrap Value	₹ 10,000
Working Life	10,000 hours
Working Hours in the month of March, 2007	200 hours
Repairs for the Whole Life of Machines	₹ 12,500
Standing Charges on Machines for the month of March, 2007	₹ 500

Power used by Machine: 10 units p.h. @ 20 paise p.h.

4. The following information relates to the activities of a production department of factory for a certain period:

	₹	
Materials used	36,000	
Direct wages	30,000	
Labour hours worked		24,000
Hours of machine operation		20,000
Overhead chargeable to the dept.	25,000	

On one order carried out in the department during the period the relevant data was:

Material used	₹ 2,000	Labour hours	1,650
Direct wages	₹ 1,650	Machine hours	1,200

Calculate by three different methods the overhead chargeable to the job.

5. What is the process of ascertaining machine hour rate? What factors do you keep in view while ascertaining the rate?

6. 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

Notes

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

7. From the following information, find out the Machine-hour Rate:

Cost of Machine	₹ 11,000
Scrap Value	₹ 680
Repairs for working life	₹ 1,500
Standing Expenses for 4 week-period	₹ 1,600
Effective working life	10,000 hours
Power 6 unit per hour @ 5 paise per unit	
Operating hours during 4 week period 120 hours	

There are 40 machines in number in the workshop, each bearing equal overhead charges.

8. 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.

9. Compute Machine-hour Rate from the following data:

Cost of Machine	₹ 7,500
Scrap Value	₹ 500
Total Life	14,000 hours
Repairs and Maintenance Charges for the total life	₹3,500
Standing Charges for Shop for a month of 25 working days	₹ 200
Working Hours per day	8
Total Machines	10
Power used per machine	₹ 50 p.m.
Machine Insurance 2% of depreciation	

Notes

10. From the under noted 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%	

11. Calculate Machine-hour Rate from the following information:

Cost of Machine	₹ 28,700
Establishment Charges	₹ 300
Break-up Value	₹ 500
Expected Life	10 years
Rent of Workshop (per annum)	₹ 6,000
Space occupied by Machine 10%	
Annual Insurance	₹ 450
Repairs and Maintenance 25%	₹ 2,000
Power Used (per annum)	₹ 800
20% of Total Production Expenses	₹ 5,000
Working days in a year	250
Working Hours per day	8 hours
Idle Time 20% of total time	

Hint: Total hours (250 × 8) = 2,000 – 400 (Idle Time 20%) = 1600 hours

Answers: Self Assessment

1.	fixed overhead rate	2.	under absorption
3.	direct labour hours	4.	Machine hour rate
5.	units produced	6.	Machine hour rate
7.	Percentage on direct material cost	8.	Predetermined overhead rate
9.	Dual hour rate	10.	Machine hour rate
11.	False	12.	True
13.	True	14.	True

Notes

9.8 Further Readings

Books

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Online links

www.futureaccountant.com

www.managementstudyguide.com

Notes

Unit 10: Job and Batch Costing

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Objectives

After studying this unit, you will be able to:

- Explain the meaning and definition of job costing;
- Understand the procedure of job costing;
- Know the batch costing;
- Explain the economic order quantity.

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.

Job costing is a method of costing whereby cost is compiled for a job or job order/work order. The production is against customer's orders and not for stock. The cost is not related to the unit of production but is a cost for the job, e.g., printing of 1,000 ledger sheets, repairs of 10 equipments, instead of printing one sheet or repair of one equipment. The elements of cost comprising prime cost viz. direct materials, direct labour and direct expresses are charged directly to the jobs concerned, the overhead/indirect expenses charged to a job is an apportioned portion of the departmental overhead.

10.1 Meaning and Definition 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.

Notes

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.

Did u know? Job costing is usually adopted by the concerns where a specific job is done for a stipulated price.

Features of Job Costing

(i) The production is generally against customer's order and not for stocks,

(ii) Under job costing method, production is intermittent and not continuous,

(iii) Each job has its own characteristics and needs special treatment,

(iv) Each job is treated as a cost unit under this method of costing,

(v) The work-in-progress differs from period to period according to the number of jobs is hand,

(vi) There is no uniformity in the flow of production from department to department,

(vii) The emphasis is on the between division the direct and indirect expenses is laid upon,

(viii) Job costing is adopted by manufacturing organizations as well as non-manufacturing organizations,

(ix) Under this method, the profit and loss can be ascertained in respect of each job, and

(x) Each job is distinctively identified by a production order throughout the production stage.

Objectives of Job Costing

(i) The important objective of job costing is to ascertain the cost as well as the profit or loss for each job,

(ii) It provides a basis for determining the cost of similar jobs undertaken in future. It thus helps in future production planning,

(iii) Job costing is to find out hose jobs which are more profitable and those which are not profitable or less profitable, and

(iv) It helps the management in controlling costs by comparing the actual costs with the budgeted costs.

Advantages and Disadvantages of Job Costing

The various advantages of job costing are as follows:

(i) Job costing is useful in quoting cost plus contract,

(ii) Job costing facilitates identification and control of spoilages and defectives,

Notes

(iii) Job costing facilitates estimation of cost of similar jobs,

(iv) It helps the management to know about the profitability of the jobs,

(v) Job costing is helpful to ascertain the cost as well as the profit or loss for each job separately,

(vi) The data of the job costing are quite helpful for the future planning, and

(vii) Job costing helps in making detailed analysis of cost of materials, labour, direct expenses and overheads.

Disadvantages

The disadvantages or weaknesses of job costing are as follows:

(i) It is expensive to operate as it requires considerable detailed official or clerical work,

(ii) With the increase in the official or clerical works the chances of errors or mistakes are increased,

(iii) Job costing does not facilitate control of cost unless it is used with standard or budgetary costing,

(iv) Job costing cannot be efficiently operated without highly developed production control system. The job costing method requires intricate factory organisation system,

(v) To get accurate results, job costing requires some pre-requisites. In its absence job costing will not give accurate results,

(vi) It is expensive as cost is accumulated and ascertained for each job separately, and

(vii) When drastic economic changes take place cost comparison becomes difficult.

10.2 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:

(i) ***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.

(ii) ***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 past 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.

(iii) ***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.

(iv) ***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.

(v) ***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:

Notes

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.	Deptt. No.	Operation		Quantity	
			No	Details	Produced	Rejected

Ordered by : ..... Checked by : ..... Approved by : .....

Notes 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.

(vi) ***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:

- *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, good received notes, material requisition notes, material returned, material transfer notes, etc.
- *Direct Labour Cost:* Direct labour costs are collected from operation schedule, job card or labour/wages analysis sheet, etc.
- *Direct Expenses:* Direct expenses are collected from various expenses vouchers and other records of job.
- *Overheads:* Overheads or indirect expenses are apportioned to the job in the usual manner.

(vii) ***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.

(viii) ***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.

10.3 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

Notes

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	Deptt.	MR No.	Amt. (₹)	Date	Deptt.	Time Ticket No.	Amt. (₹)	Date	Deptt.	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 : .....

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.

Notes

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

Example2:

The following informations have been obtained from the costing records of Kartik Metal is 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 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	1,260
		Prime Cost	6,460
Overheads :			
Variable :			
Department X	180 hrs. @ ₹ 2	360	
Department Y	120 hrs. @ ₹ 3	360	

Contd…

Notes

Department Z	60 hrs. @ ₹ 2	120	840
Fixed :	360 hours @ ₹ 3[2] per hr.		1,080
		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:

[1]Calculation of variable overheads:

Department 'X': Total Overheads ÷ Total Direct Labour Hours

₹ 10,000 ÷ 5,000 hrs. = ₹ 2 per hour

Department 'Y': ₹ 9,000 ÷ 3,000 hrs. = ₹ 3 per hour

Department 'Z': ₹ 4,000 ÷ 2,000 hrs. = ₹ 2 per hour

[2] Calculation of fixed overheads= $\frac{\text{Total fixed overheads}}{\text{Total direct hours}}$

= 30,000 ÷ 10,000 = ₹ 3 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 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[2]

Contd…

Notes

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:

$$\text{Department A} = \frac{\text{Overheads for department A}}{\text{Direct labour hours}} = \frac{10,000}{5,000} = ₹\ 2$$

$$\text{Department B} = \frac{\text{Overheads for department B}}{\text{Direct labour hours}} = \frac{4,500}{1,500} = ₹\ 3$$

$$\text{Department C} = \frac{\text{Overheads for department C}}{\text{Direct labour hours}} = \frac{1,500}{500} = ₹\ 3$$

(2) Fixed overhead rate has been ascertained as under:

$$= \frac{\text{Fixed expenses}}{\text{Working hours}} = \frac{30,000}{10,000} = ₹\ 3$$

Fixed overhead for the job would be ₹ 3 × 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.

Solution:

Notes

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.

Notes

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

The work in process account receives debits for direct materials, direct labor and factory overhead costs. The work in process account is a controlling account. Cost ledgers maintain details on the costs of each individual job. An individual cost ledger account is called a job cost sheet. It provides extensive information on each job direct materials, direct labor, and factory overhead costs. When a job is completed, total costs are added up and divided by the number of units finished to determine cost per unit.

Notes

Example: From the data given below, obtained from the books of a factory, for the year ended 30th September, 2008

Particulars	Completed Jobs (₹)	Work-in-Progress (₹)
Materials from stores	4,70,000	1,50,000
Chargeable expenses	80,000	20,000
Wages	4,50,000	2,00,000
Materials transferred to work-in-progress	8,000	
Materials returned to stores	6,000	

Factory overhead is 80% of wages and office overhead 25% of factory cost. The value of executed jobs during the year was ₹ 2,000,000.

Prepare (a) Consolidated completed jobs account showing profit or loss; and (b) Consolidated work-in-progress account.

Solution:

Consolidated Completed Jobs Account for the Year Ending 30th September, 2008

Particulars			Amount (₹)	Particulars	Amount (₹)
To Materials		4,70,000		By Contractee's (Proceeds of job finished)	20,00,000
Less: Returned to stores	6,000				
Transferred to work-in-progress	8,000	14,000	4,56,000		
To Wages			4,50,000		
To Chargeable expenses			80,000		
To Factory overhead (80% wages)			3,60,000		
To Office overhead (25% of works cost i.e. ₹ 13,46,000)			3,36,500		
To Net profit (Transferred to Profit and Loss Account)			3,17,500		
			20,00,000		20,00,000

Consolidated Work-in-progress

Particulars		Amount (₹)	Particulars	Amount (₹)
To Material	1,50,000		By Balance c/d	6,72,500
Add: Transferred from comp. job	8,000	1,58,000		
To Wages		2,00,000		
To Chargeable expenses		20,000		
To Factory overhead (80% of wages)		1,60,000		
To Office overheads (25% of works cost)		1,34,500		
		6,72,500		6,72,500

10.4 Batch Costing

This is a variation of job costing. Under this method, 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,

Notes

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 constitute 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.

Caution Under this method the cost is ascertained in respect of a batch of goods or components manufactured.

There are certain products whose cost of production cannot be ascertained in isolation, i.e., for each and every unit of article produced.

Examples of such products are hardware (such as nuts, bolts, pins, screws, etc.) and Bakery products (such as breads, cakes, biscuits, etc.). So industries which manufacture products of this nature make use of batch costing. Other examples of industries which adopt batch costing are shoe manufacture, toys, ready-made garments, tyres and tubes, drugs and pharmaceuticals, spare parts and component parts as in the case of automobiles, radios, TV's, refrigerators, machineries, etc.

In order to know the cost of production of a batch of articles, a batch cost sheet is prepared.

Difference between Batch Costing and Job Costing

Batch costing does not differ from job costing in respect of accounting procedure. There are two points of differences between batch costing and job costing. They are:

(a) Under batch costing, a batch of articles produced constitutes a cost unit. But under job costing, each and every job is treated as a cost, and

(b) Under batch costing, production is taken up to be held in stock sold on demand and also a receiving specific order from customers. On the other hand, under job costing, production is undertaken only against specific orders.

The main essentials of batch costing are as under:

(i) This method is used where small parts of considerable number are produced, such as industries producing machinery parts, machine tools, etc.,

(ii) No special costing principles are involved, each batch constituting a separate unit divided into sub-units of each piece produced,

(iii) Entire production is divided into economic groups or batches and usual and appropriate costing methods are applied to each batch or group,

(iv) The advantages of the method are that the unit cost of every group is determined so that the total production cost is broken down into its constituent parts and profit and loss of each and every batch is known separately, and

(v) As production cost and volume of sales vary considerably from batch to batch, it sometimes becomes difficult to allocate overhead charges equitably. It is main drawback of the method.

Advantages: Following are the main advantages of batch costing:

(i) The accounting work is considerable reduced as a group of homogeneous jobs constitute a batch,

(ii) It takes the benefit of reduced cost of production arising out of economic batch quantity,

Notes

(iii) The loss of time under job costing arising out of inter-job transfer of materials, labours and tools is minimised under batch costing,

(iv) There is the advantages of consistent cost of production of every article produced in a batch under batch costing, and

(v) Supervision becomes easy and more effective by means of spreading over the supervision's time over all the units constituting the batch. Thus, the idle time of supervisor's as well as workers are eliminated.

Disadvantages: The main disadvantages or limitations of batch costing are:

(i) Determination of a batch from various jobs often pose problem. It is difficult to come across absolute homogeneity of jobs,

(ii) If the production of a batch is wrongly undertaken, say, owing to sub-standard materials or defective operations, the whole batch of articles is to be discarded which will become a great loss to the manufacturer. Pharmaceutical and drugs products offer best example to this point of disadvantage, and

(iii) When quantity of goods to be manufactured differs from customer to customer, again it becomes difficult to determine the batch.

10.5 Economic Batch Quantity

The concept of economic batch quantity is quite similar to economic order quantity. In batch costing, the determination of economic batch quantity assumes more importance. In fact, determining the size of the batch is a problem by itself under batch costing. This is so because, if the batches are many, the (i.e., quantity of production is less in every job) economies arising out of large scale production is not taken advantage of. Therefore, it is always necessary to determine the optimum size of the batch or economic batch quantity before the production is started. The economic batch quantity also helps in eliminating the setting up time involved whenever a batch of articles is produced.

Did u know? The concept of economic batch quantity is an example of the law of increasing returns and takes advantage of economies of large scale production.

By producing the goods in an optimum batch, it reduces the cost of production, thereby maximising the profit. In determining the economic batch quantity, two conflicting forces operate. They are:

- Production cost which include set up cost and other factors such as loss of time due to change of work, loss of speed of work when work is frequently changed on different jobs, wastage in materials, increased supervision cost, all these forces are responsible for increased cost of production, and
- Production in a very large batch quantity will lead to certain disadvantages such as, increased wear and tear of machines, breakdown of machines, problem of inspection, excess defectives of goods, large inventory, locked up capital and so on. Thus economic batch quantity strikes a balance between these two factors in order to take maximum benefit from production process.

Different formulas are developed to determine the economic batch quantity. One such formula is given below:

$$EBQ = \sqrt{\frac{2US}{C}}$$

Where, EBQ = Economic batch quantity

Notes

U = No. of units to be produced in a year

S = Set up cost per batch

C = Carrying cost per unit of production

Where rate of interest and cost of production per unit is given, the following formula is applicable:

$$EBQ = \sqrt{\frac{2US}{I \times C}}$$

Where, EBQ = Economic batch quantity

U = No. of units to be produced in a year

S = Set up cost per batch

I = Interest rate per year

C = Cost of manufacture per unit

Example: Compute the economic batch quantity for a company using batch costing with the following information:

Annual demand for the component	12,000
Set-up cost per batch	₹ 120
Carrying cost per unit of production	₹ 0.36

Solution:

$$\text{Economic Batch Quantity} = \sqrt{\frac{2US}{C}}$$

$$= \sqrt{\frac{2 \times 12,000 \times 120}{036}}$$

EBQ = 2,828 units

Example: The annual demand of a product is 24,000 units. It is produced in batches and the largest size of a single batch is 6,000 units. After each batch is complete, the set up cost is ₹ 750. The annual carrying cost is ₹ 2.25 per unit.

Assume average inventory as one-half of the number of units made in each batch. Selecting 4, 6, 8, 12 and 24 batches per annum, determine annual costs of each and state the optimum number of batches to minimize the total costs.

Solution:

No. of batches	4	6	8	12	24
Size of batch units	6,000	4,000	3,000	2,000	1,000
Average stock	3,000	2,000	1,500	1,000	500
Costs :					
Set up costs	3,000	4,500	6,000	9,000	18,000
Carrying cost	6,750	4,500	3,375	2,250	1,125
Total Cost	9,750	9,000	9,375	11,250	19,125

Optimum number is 6 batches per annum.

Notes

$$\text{Economic Batch Quantity} = \sqrt{\frac{2US}{C}}$$

$$= \frac{2\times 24,000\times 750}{2.25}$$

EBQ = 4,000 units

Example: M/s MBO Bearings Limited is committed to supply 24,000 bearings per annum to M/s Ashok Fans on a steady daily basis. It is estimated that it costs 10 paise as inventory holding cost per bearing per month and that the set up cost per run of bearing manufacture is ₹ 324.

(a) What should be the optimum run size bearing manufacture?

(b) What would be the interval between two consecutive optimum runs?

(c) Find out the minimum inventory holding cost.

Solution:

(a) $$\text{Economic Batch Quantity (EBQ)} = \sqrt{\frac{2US}{C}}$$

$$= \sqrt{\frac{2\times 24,000\times 324}{0.10\times 12}}$$

EBQ = 3,600 units

(b) Interval between two consecutive optimum runs:

$$= \frac{3,600}{2,000}\times 30 = 54 \text{ days}$$

(c) Minimum inventory cost per annum:

$$= \left(\frac{\text{Annual Production}}{\text{EBQ}}\times \text{Set up cost}\right) + (\text{Average inventory} \times \text{Holding cost per unit} \times 12)$$

$$= \frac{24,000\times ₹324}{3,600} + \frac{3,600}{2}\times ₹0.10\times 12$$

= ₹ 2,160 + ₹ 2,160 = ₹ 4,320

Example: The demand of an item is uniform at a rate of 25 units p.m. The set up cost is ₹ 30 each time a production is made. The production cost is ₹ 3 per item and the inventory carrying cost is 50 paise per unit p.m. If the shortage cost is ₹ 3 per item p.m. Determine how often to make a production run and of what size? Also calculate re-order level.

Solution:

(a) $$\text{Economic Batch Quantity} = \sqrt{\frac{2US}{C}}$$

$$= \frac{2\times 300\times 30}{0.50\times 12}$$

EBQ = 55 units

Notes

(b) $$\text{Duration} = \frac{\text{Production run size}}{\text{Monthly demand}} \times 30$$

$$= \frac{55}{25} \times 30 = 66 \text{ days}$$

$$= \frac{55}{25} \times 25 = 55 \text{ working days}$$

(c) $$\text{Re-order Level} = \left(\text{EBQ} \times \frac{\text{Shortage cost}}{\text{Carrying cost per unit} + \text{Shortage cost}} \right) - \text{Monthly demand}$$

$$= \left(55 \times \frac{3}{0.50 + 3} \right) - 25$$

= 47 – 25 = 22 units

Example: A contractor has to supply 10,000 paper cones per day to a textile unit. He finds that, when he starts a production run he can produce 25,000 paper cones per day. The cost of holding a paper cone in stock for one year is 2 paise and the set up cost of a production run is ₹ 18. How frequently should production run be made?

Solution:

For 365 days at the rate of 10,000 paper cones it works out to 36,50,000 cones.

(a) $$\text{Economic Batch Quantity} = \sqrt{\frac{2US}{C}}$$

$$= \frac{2 \times 36,50,000 \times 18}{0.02}$$

EBQ = 81,100 cones

(b) Production run in terms of days:

$$= \frac{\text{EBQ}}{\text{Daily production}}$$

$$= \frac{81,100}{10,000} = 8.11 \text{ calendar days or 8 days}$$

Task Component 'Mee' is made entirely in cost centre 100. Material cost is 6 paise per component and each component takes 10 minutes to produce. The machine operator is paid 0.72 paise per hour, and the machine hour rate is ₹ 1.50. The setting up of the machine to produce component 'Mee' takes 2 hours 20 minutes.

On the basis of this information prepare cost sheets showing the production and setting-up costs, both in total and per component, assuming that a batch of (i) 10 components, (ii) 100 components, and (iii) 1,000 components and produced.

Self Assessment

Notes

State whether the following statements are true or false:

1. Job costing is a method of costing applied in industries where production is measured in terms of completed jobs.
2. Job costing can be efficiently operated without highly developed production control system.
3. Job costing is not that useful in quoting cost plus contract.
4. The cost accountant estimates the cost of job after considering the various elements of cost and keeping in mind the specification of customer.
5. Materials may have to be purchased or requisitioned from the stores.
6. There is one job cost sheet is prepared for all the jobs undertaken.
7. Batch Costing is used where small parts of considerable number are produced.
8. The concept of economic batch quantity is an example of the law of increasing returns.
9. This is a variation of job costing.
10. Cost is not ascertained for each job separately.

Fill in the blanks:

11. Job costing is a method of costing whereby cost is …… for a job.
12. Job costing helps the management to know about the …… of the jobs.
13. The cost accountant …… the cost of job after considering the various elements of cost.
14. On completion of a job, the production department sends a completion report of job to the ……
15. Determination of a …… from various jobs often pose problem.

Case Study

Example on Job Costing

Cordek Ltd

Cordek Ltd was formed in 1973 to introduce specialist new products and services to the construction industry. Cordek has been at the forefront of developing innovative solutions manufacturing a wide range of products for a variety of applications. Having researched the market for suitable suppliers they contacted Vizual. Their requirements were based around a Job Costing System that gave them the ability to record time employees' spend on a particular job and/or task, and to be able to enter budgetary figures against jobs and be notified when a job is over budget.

Their main focus was on ease-of-use for their employees allowing them to record hours spent against the jobs they are working on. The management team required a further breakdown of how much time was spent on individual tasks within that particular job.

CaptureIT can cope with unlimited numbers of jobs and tasks, which means it is easily able to cope with all costing requirements.

Contd…

Notes

Pipe Supports Ltd

Established in 1968, Pipe Supports Limited was born out of her parent company, British Industrial Engineering to provide a comprehensive range of pipe supporting equipment to the power generation and petro-chemical industries. After 25 years in private ownership the business was purchased by Hill & Smith Holdings Plc in 1993 and the Pipe Supports Group was created. Their requirements focussed on the ability to record time employees' spend on a particular job and/or task, to have access to data in real time and to have the option of transferring attendance data to your Sage payroll system.

The easier it is for employees to use, then the more likely they are to use the system. Within CaptureIT, users have the ability to mark processes as complete. You can either mark the whole job as complete once it finished, or you can mark each task as complete as and when they are done. Both these methods will prevent any more time being booked by your employees. Completed jobs are removed from the user view so that you only see jobs that are live at that point in time.

All job costing data is recorded and accessible in real time with full management reporting capabilities. All reports can be accessed by administrators and exported in various formats with the ability to email the report to designated staff members such as line managers for immediate action.

The CaptureIT PayLink automatically transfers all attended time and job costs to Sage Payroll cutting out human error and drastically reducing manual administration time.

10.6 Summary

- 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.
- Job costing 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.
- Batch Costing is used where small parts of considerable number are produced, such as industries producing machinery parts, machine tools, etc.
- No special costing principles are involved, each batch constituting a separate unit divided into sub-units of each piece produced.
- Entire production is divided into economic groups or batches and usual and appropriate costing methods are applied to each batch or group.

10.7 Keywords

Economic batch quantity: Optimal batch quantity he

Job costing: Calculation of costs involved a construction

Production cost: Combined costs of raw material and labor incurred in producing goods

Supervision cost: Small monthly fee to offset the costs of supervision

Work-in-progress: Piece of work that is not yet finished

Notes

10.8 Review Questions

1. Define job costing. What are the main features of job costing? Give a proforma of cost sheet under such a system.
2. What is the concept of job costing? Discuss its advantages and limitations.
3. What is a job cost sheet? What kind of data generally appear on job cost sheet?
4. What is job costing? How does it differ from contract costing? Explain.
5. What is batch costing? How does it differ from job costing? Explain.
6. Write an explanatory note on job cost sheet by providing a proforma cost sheet.
7. Briefly explain the purpose of job costing and the procedure for ascertaining the job costs.
8. What is batch costing? What are its salient features?
9. What is meant by Economic Batch Quantity? How is it computed?
10. Following information is extracted from the job ledger in respect of Job No. 324:

    Materials ₹ 6,800, Wages 80 hours @ ₹ 5 per hour, and Variable overheads incurred for all jobs ₹ 10,000 for 4,000 labour hours.

    Find out the profit if the job is billed for ₹ 9,000.
11. From the following particulars relating to four jobs of a manufacture, ascertain the total cost of each job:

    Works overhead is 45% of prime cost and office overhead is 15% on works or factory cost.
12. The following information were obtained from the books of Kartik Company in respect of Job No. 222:

Materials	₹ 10,000
Wages:	
Deptt. X:	81 hours @ ₹ 4 per hour
Deptt. Y:	54 hours @ ₹ 3 per hour
Deptt. Z:	27 hours @ ₹ 3 per hour
Variable overheads:	
Deptt. X:	5,400 man hours ₹ 10,800
Deptt. Y:	2,000 man hours ₹ 4,000
Deptt. 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.
13. From the following figures relating to three jobs, find out the total cost of each job:

    Charge factory overheads 50% on wages and administrative and general overheads 10% on works cost.

Notes

Answers: Self Assessment

1.	True	2.	False
3.	False	4.	True
5.	True	6.	False
7.	True	8.	True
9.	True	10.	False
11.	Compiled	12.	Profitability
13.	Estimates	14.	costing department.
15.	batch		

10.9 Further Readings

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Online links

www.futureaccountant.com

www.managementstudyguide.com

Notes

Unit 11: Contract Costing

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Introduction

11.1 Definition

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Objectives

After studying this unit, you will be able to:

- Define the contract costing;
- Understand the procedure of costing;
- Explain the contract ledger.

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, parts, 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'.

11.1 Definition

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 a attribution of costs to individual contracts. The important objectives of contract costing are as follows:

- To determine the total cost of the contract,
- To determine the profit or loss for each or every contract, and
- To facilitate control of cost of each contract.

Notes

The main features of contract costing are as follows:

(i) A contract generally takes more than one year to complete,

(ii) Work is generally carried out at a site other than the contractor's own premises,

(iii) Each contract undertaken is treated as a cost unit,

(iv) Contract is done for a specific consideration which is known as contract price,

(v) Separate contract account is prepared for each contract in the books of contractor to ascertain profit or loss on each contract,

(vi) Most of the raw materials are specially purchased for each contract,

(vii) The contractor is paid in installments which is done after the work completed has been certified,

(viii) Most expenses, such as, insurance, telephone, electricity, etc. are also direct,

(ix) Plant, machinery and equipment may be purchased for the contract or may be hired for the duration of the contract,

(x) In case of large contracts, the contractor may employ sub-contractors for a part of the contract work,

(xi) Penalties may be incurred by the contractor for failing to complete the work within the contract period,

(xii) Contract costing is concerned with the costing of construction work on repair work and not with the costing of any goods,

(xiii) There is no heavy investments on assets initially in the case of contract costing,

(xiv) Nearly all labour is direct, and

(xv) Each contract or work involved in contract costing is executed or done as per the specifications given by the contractee.

Main points of distinction between contract costing and job costing are as follows:

(i) Contract is big in size whereas a job is small in size.

(ii) Contract work is done at site whereas jobs are usually carried out in factory premises.

(iii) A contract takes more time to complete whereas a job usually takes less time to complete.

(iv) 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.

(v) In contract costing, no heavy investment on assets whereas job costing involves heavy investment on assets initially.

(vi) 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.

(vii) Contract costing pertains to construction while the job costing is confined to production.

(viii) In contract costing, the cost computation is simple while in the job costing it is complex because of the overheads.

(ix) Contract costing is adopted in long-term contracts whereas the job costing is confined to finished goods for a small duration of time.

(x) In contract costing, the profit and loss can be ascertained in either completed or uncompleted stages while in the job costing it's done only on the stage of completion.

The procedure for costing of contracts is as follows:

(i) ***Contract Account:*** Every contract is allotted a separate number and a separate account is opened for each contract.

(ii) ***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:

- Cost of direct materials,
- Cost of direct labour,
- Cost of direct expenses,
- Cost of supervision,
- Depreciation of plant and machinery, and
- Sub-contract costs.

(iii) ***Indirect 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.

(iv) ***Transfer of Materials or Plant:*** When materials, plant, etc. are transferred from the contract, the contract account is credited by that amount.

(v) ***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 contract account is credited with the cost/value of the work-in-progress as on that date. Work-in-progress includes value of certified work and the cost of uncertified work.

(vi) ***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.

Notes Contract account is also debited with overheads which tend to be small in relation to direct costs.

11.2 Contract Ledger

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:

Notes

Contract Ledger

Contract No.	:	Contract Price	: .....
Date of Completion	:	Terms of Payment	: .....
Site	:	Work Certified	: .....
Remark	:	Date	: .....

Date	Particulars	Materials (₹)		Wages (₹)		Direct Charges (₹)		Plant (₹)		Indirect Expenses (₹)		Total (₹)
	Total											

Did u know? In contract ledger, a separate contract account is prepared for each individual contract, so that for a specific contract all cost 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 material and plant which are stolen are treated as abnormal loss and hence, 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 in complete then contract account is credited by cost of work-in-progress amount. In this work-in-progress, the cost 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.

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	....	

Contd…

Notes

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		....			
To Profit and Loss account (if the contract is complete balancing figure)		....	Plant lost, stolen or destroyed	....	
			Loss on sale of plant/ material	....	....
Or					
To WIP account (if work certified is less than 1/4th of contract price – balancing figure)		....	By Contractee account (contract price in case of completed contract + extra work price)		....
Or			Or		
To Balance c/d (if work certified is more than 1/4th of contract price)		....	By WIP account :		
			Value of work certified	....	
			Cost of work uncertified (in case of an incomplete contract)	....	....
		....			....
To Profit and loss account (profit and loss credited at the end of the year)		....	By Balance b/d		....
To WIP account (profit kept as reserve)		....			
		....			....

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.

Caution The only 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:

Notes

- 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:*** When several contracts are running at different areas, payroll is normally sectionalised 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 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.

Notes

Did u know? All wages of workers engaged on a particular contract are charged direct to the contract account.

(iii) ***Direct Expenses:*** The expenses incurred exclusively for a particular contract are treated as direct expenses and are chargeable to that contract for which 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 engages 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 time 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

Notes

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 expect to work on the contract on its completion.
- 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:

To the Contractor:

- The contractor has to suffer for his own efficiency. This is because profit is usually based as 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.

Notes

- 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 by 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	.....	.....
	_____	_____
	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 is 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

Amount of work certified	.....	
Amount of work uncertified	.....	.....
	_____	
Less: Profit transferred to WIP	.....	
Less: Cash received	.....	.....
	_____	_____
	Amount of Work-in-Progress	.....

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

Notes

contract, if it is expected that is 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:

Notional profit is the difference between cost of work certified and value of work certified. The formula is as follows:

Notional Profit = Value of work certified – (Cost of works to date – Cost of work not yet Certified)

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 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 less account:

(a) If the work certified is less then ¼th 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) It the work certified is 1/4th of contract price or more but less then ½ of the contract price, the profit transferred to profit and loss account should be 1/3rd of the notional profit:

Profit = Notional profit × 1/3

If it is desired to transfer the realised profit to profit and loss account it will be calculated as under:

Profit = 1/3 × National profit × (Cash received/Work certified)

(c) If the work certified is ½ or more than of the contract price, the profit transferred to profit and loss account would be 2/3rd of the notional profit:

Profit = Notional profit × 2/3rd

If it is desired to transfer the realised profit to profit and loss account, it will be calculated as under:

Profit = 2/3 × National profit × (Cash received/Work certified)

Notes

(d) Sometimes a contract is nearing completion, 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 the 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:

Profit = Estimated profit × (Work certified/Contract price)

If it is desired to transfer the realised profit to profit and loss account, it will be calculated as under:

Profit = Estimated profit × (Work certified/Contract price) × (Cash received/ Work certified)

Where,

Estimated Profit = Contract price – Total estimated cost

Total Estimated Cost = Costs incurred upto date + Estimated costs for completion of contract.

[*Important note:* If nothing is given in the problem, students are advised to use the concept of realised 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, some times, 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.

Compute a conservative estimate of profit on contract (which has been 90% complete) from the following particulars:

	₹
Total expenditure to date	22,50,000
Estimated further expenditure to complete the contract (including contingencies)	2,50,000
Contract Price	32,50,000
Work certified	27,50,000
Work uncertified	1,75,000
Cash received	21,25,000

Answer

The contract is 90% complete, the method used for transfer of profit to Profit and Loss Account for the current year will be on the basis of estimated profit on completed contract basis.

Notes

$$\text{Credit to Profit and Loss Account} = \text{Estimated profit on completed contract} \times \frac{\text{Work certified}}{\text{Contract price}} \times \frac{\text{Cash received}}{\text{Work certified}}$$

Estimated profit on completed contract basis = Contract Price – (Total expenditure to date + Estimated further expenditure to completed contract)

= 32,50,000 – (22,50,000 + 2,50,000) = ₹ 7,50,000

$$\text{Credit to Profit and Loss Account} = 750000 \times \frac{2750000}{3250000} \times \frac{2125000}{2750000} = ₹\ 7,50,000.$$

Example: Vikas undertook a contract for the construction of a building. Materials purchased ₹ 2,00,000. Materials supplied from stores ₹ 30,000. Materials returned to stores ₹ 4,000. Material costing ₹ 5,000 were stolen and materials worth ₹ 6,000 destroyed by fire. Materials costing ₹ 3,000 were sold for ₹ 2,600. Materials in-hand ₹ 25,000. Materials worth ₹ 50,000 were received from other building contract which was completed. Materials of ₹ 2,400 transferred to other contracts. Show the above particulars in Contract Account.

Solution:

Contract Account

Particulars	₹	Particulars		₹
To Material purchased	2,00,000	By Materials returned to stores		4,000
To Materials supplied from stores	30,000	By Materials transferred to other contracts		2,400
To Materials received from other contract	50,000	By Material sold		2,600
		By Profit & loss account:		
		Loss on material sold	400	
		Material stolen	5,000	
		Loss by fire	6,000	11,400
		By Materials in hand		25,000

Example: Plant costing ₹ 70,000 issued to contract on 1st April, 2008. Plant worth ₹ 2,000 was returned to store, Plant costing ₹ 3,000 was sold for ₹ 3,500. Plant worth ₹ 500 was stolen and worth ₹ 300 destroyed by fire. Plant in hand at the end of the year was ₹ 20,000.

Solution:

Date	Particulars	₹	Date	Particulars		₹
2008, 1st April	To Plant issued to site	70,000	2008, 1st April	By Plant returned to store		2,000
2009, 31st March	To Profit & loss account (3,500–3,000 = 500)	500	2009, 31st March	By Plant sold		3,500
				By Profit & loss account :		
				Plant stolen	500	
				Plant destroyed	300	800
				By Plant in hand c/d		20,000

Example: Show how would you deal with plant in Udai 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 (2,00,000– 47,000)	1,53,000	
		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 31st 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, 1st July	To Plant purchased		50,000	2009, 31st 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	1,02,500		Less : Dep.	3,750(1)	46,250
					By Contractee's account		3,00,000
	To Direct wages		40,000				
	To Direct expenses		42,000				
	To Indirect expenses (20% of direct wages)		8,000				
2009, 31st March	To Profit and loss account		1,33,750				
			3,76,250				3,76,250

Notes

Working note: (1)Calculating of depreciation on plant:

Depreciation = $\left(50,000 \times \frac{10}{100} \times \frac{9}{12}\right)$ = ₹ 3,750.

Contractee's Account

Date	Particulars	₹	Date	Particulars	₹
2009, 31st March	To Contract account	3,00,000	2009, 31st March	By Cash account	3,00,000
		3,00,000			3,00,000

Example: Neelam Construction obtained a contract for the govt. building for ₹ 3,50,000. Construction work commenced on 1st April, 2008 and at the end of the financial year they received payment of ₹ 1,50,000 representing 80% of the amount of work certified. The following information available from the books of the contractors:

Materials issued	₹ 80,000
Materials on hand on 31st March, 2009	₹ 5,000
Direct wages	₹ 90,000
Plant installed at site	₹ 80,000
Direct expenses	₹ 31,000
Overheads allocated to this contract	₹ 15,500
Work finished but not yet certified at cost	₹ 10,000
Plant to be depreciated at 10%	

Prepare the Contract Account for the year ended 31st March, 2009 and show your calculation of the amount adjusted to the credit of profit & loss account.

Solution:

Contract Account of Neelam Construction
For the year ending 31st March, 2009

Particulars	₹	Particulars		₹
To Materials	80,000	By Work-in-progress :		
To Direct wages	90,000	Work certified $\left(1,50,000 \times \frac{100}{80}\right)$	1,87,500	
To Plant	80,000			
To Direct expenses	31,000			
To Overheads	15,500	Work uncertified	10,000	1,97,500
		By Materials at site		5,000
		By Plant at site (80,000 – 8,000)		72,000
		By Profit and loss account (Loss)		22,000
	2,96,500			2,96,500

Example: Rinki Builders Limited spent ₹ 90,000 upto 31st March, 2009. The value of work certified to data was ₹ 1,00,000 and ₹ 90,000 has been received in cash. The contract is near completion and it is estimated that additional expenditure of ₹ 20,000 will be incurred. The contract price is ₹ 1,50,000. Ascertain the profit to be credited to profit and loss account.

Notes

Solution

Particulars	Amount (₹)
Total expenditure upto 31st March, 2009	90,000
Add : Additional estimated expenditure	20,000
Total Estimated Expenditure	1,10,000
Contract price	1,50,000
Less : Total estimated expenditure	1,10,000
Estimated Profit	40,000

Profit to be credited to profit and loss account :

$$= \text{Estimated profit} \times \frac{\text{Work certified}}{\text{Contract price}} \times \frac{\text{Cash received}}{\text{Work certified}}$$

$$= 40{,}000 \times \frac{1{,}00{,}000}{1{,}50{,}000} \times \frac{90{,}000}{1{,}00{,}000} = ₹\ 24{,}000.$$

Example: Compute a conservative estimate of profit on contract (which is 80% complete) from the following particulars. Illustrate at least four methods of computing the profit:

Contract price	₹ 1,93,600
Total expenditure to date	₹ 1,12,000
Work certified	₹ 1,40,000
Work uncertified	₹ 20,200
Estimated further expenditure to complete the contract (including contingencies)	₹ 30, 400
Cash received	₹ 1,00,000

Solution:

Notional Profit = Work certified + Work uncertified – Total expenditure to date

= 1,40,000 + 20,200 – 1,12,000 = ₹ 48,200

Estimated Profit = Contract price – [Total expenditure to date + Estimated expenditure to complete the contract]

= 1,93,600 – [1,12,000 + 30,400] = ₹ 51,200

(a) First Method: Profit = Notional profit × (2/3)

= 48,200 × (2/3) = ₹ 32,133

(b) Second Method: Profit = $\text{Notional profit} \times \frac{2}{3} \times \frac{\text{Cash received}}{\text{Work certified}}$

$$= 48{,}200 \times \frac{2}{3} \times \frac{1{,}00{,}000}{1{,}40{,}000} = ₹\ 22{,}952$$

(c) Third Method: Profit = $\text{Estimated profit} \times \frac{\text{Work certified}}{\text{Contract price}}$

$$= 51{,}200 \times \frac{1{,}40{,}000}{1{,}93{,}600} = ₹\ 37{,}025$$

Notes

(d) Fourth Method: Profit = $\text{Estimated profit} \times \frac{\text{Work certified}}{\text{Contract price}} \times \frac{\text{Cash received}}{\text{Work certified}}$

$$= 51,200 \times \frac{1,40,000}{1,93,600} \times \frac{1,00,000}{1,40,000}$$

$$= ₹\ 26,446$$

Example: Prepare the Contract Account on 31st March, 2009 from the following particulars:

Materials purchased	₹ 1,90,000
Materials issued from stores	₹ 40,000
Direct wages	₹ 2,54,000
Direct expenses	₹ 20,000
Plant purchased	₹ 1,70,000
Proportionate establishment charge	₹ 50,000

The contract was for ₹ 15,00,000 and up to 31st March, 2009, ₹ 6,00,000 had been received in cash which represented 80% of work certified. The materials at site unconsumed was valued at ₹ 25,000. The contract plant was to be depreciated by ₹ 17,000.

Solution:

Contract Account
For the year ending 31st March, 2009

Particulars	₹	Particulars	₹
To Materials purchased	1,90,000	By Materials at site	25,000
To Materials issued from stores	40,000	By Work certified	7,50,000
To Direct wages	2,54,000	(6,00,000×100/80)	
To Direct expenses	20,000		
To Establishment charges	50,000		
To Depreciation on plant	17,000		
To Notional profit	2,04,000		
	7,75,000		7,75,000
To Profit & loss account	1,08,800[1]	By Notional profit	2,04,000
To Work-in-progress account	95,200		
	2,04,000		2,04,000

Working note:[1] Profit= $\text{Notional profit} \times \frac{2}{3} \times \frac{\text{Cash received}}{\text{Work certified}}$

$$= 2,04,000 \times \frac{2}{3} \times \frac{6,00,000}{7,50,000} = ₹\ 1,08,800$$

Example: Following amounts have been spent on a contract still unfinished on 31st December, 2007:

Materials	₹ 90,000
Wages	₹ 60,000
Direct charges	₹ 60,000

Notes

₹ 2,00,000 have been received from the contractee, being 80% of the work certified. Calculate profit to be credited to profit and loss account, Uncertified work-in-progress being ₹ 20,000. Total value of the contract is ₹ 4,00,000.

Solution:

Contract Account

Particulars	₹	Particulars	₹
To Materials	90,000	By Work-in-progress :	
To Wages	60,000	Work certified	2,50,000
		(2,00,000 × 100/80)	
To Direct charges	60,000	Work uncertified	20,000
To Profit c/d	60,000		
	2,70,000		2,70,000
To Profit and loss account	32,000(1)	By Profit b/d	60,000
To Work-in-progress account	28,000		
	60,000		60,000

Working note:(1)

$$= \text{Total profit} \times \frac{2}{3} \times \frac{\text{Cash received}}{\text{Work certified}}$$

$$= 60,000 \times \frac{2}{3} \times \frac{2,00,000}{2,50,000}$$

= ₹ 32,000

Task 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 31st December, 2007	₹ 1,883
Wages accrued due at 31st December, 2007	₹ 2,400
Direct expenses accrued due at 31st December, 2007	₹ 240
Value of plant at 31st December, 2007	₹ 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, 2007.

Prepare Contract Account and Contractee's Account for the year 2007.

Notes

Difference between Process Costing and Job Costing

The main differences between process costing and job costing are as follows:

S. 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 entity.	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 an 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)	Cost 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 therefore 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.

Difference between Batch Costing and Job Costing

Batch costing does not differ from job costing in respect of accounting procedure. There are two points of differences between batch costing and job costing. They are:

(a) Under batch costing, a batch of articles produced constitutes a cost unit. But under job costing, each and every job is treated as a cost, and

(b) Under batch costing, production is taken up to be held in stock sold on demand and also a receiving specific order from customers. On the other hand, under job costing, production is undertaken only against specific orders.

Self Assessment

Fill in the blanks:

1. …… is similar to job costing.
2. Most of the costs of a contract can be allocated …… to the contract.
3. When several contracts are running at different areas, …… is normally sectionalized.
4. …… pertains to construction while the job costing is confined to production.
5. When materials, plant, etc. are transferred from the contract, the contract account is …… by that amount.

Notes

6. Work of specialised character, for which facilities are not internally available, is offered to a …… .
7. In ……, a separate contract account is prepared for each individual.
8. If the work certified is less then …… of the contract, no profit should be transferred to profit and loss account.
9. The preparation of contract account is the essence of …… .
10. …… is a modified method of contract costing.
11. …… is the difference between the value of work-in-progress certified and the cost of work-in-progress certified

State whether the following statements are true or false:

12. Contract costing is the method or technique of ascertaining cost of a contract.
13. A contract generally takes more than three year to complete.
14. The expenses incurred exclusively for a particular contract are treated as indirect expenses.
15. The contract price is governed by the contract, the contractees will also not suffer from risk of loss.

11.3 Summary

- 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. contract costing is the technique of ascertaining cost of a contract.

11.4 Keywords

Ascertaining Cost: Determining cost

Contract Cost: Cost relating to specific contract

Material Cost: Expenditure on raw materials and supplies

11.5 Review Questions

1. What is contract costing? To which industries is it found suitable?
2. How does contract costing differ form job costing? Discuss contract costing procedure in detail.
3. Explain the various features of contract costing.
4. What is a contract account? What important points should be borne in mind in its preparation?
5. What are the main features of cost-plus contract? Discuss its advantages and disadvantages.

Notes

6. Write short notes on the following:
   (a) Cost-plus contract, (b) Escalation clause,
   (c) Sub-contract cost, and (d) Work-in-progress.
7. What is the treatment of sub-contract cost in contract account?
8. Write short notes on the treatment of following in contract costing:
   (a) Certified work, (b) Uncertified work,
   (c) Issue of plant to contract, (d) Materials in hand, and
   (e) Contract ledger.
9. What is work-in-progress and how it is included in the contract account? Describe how this account will be shown in the balance sheet.
10. Discuss the important points for contract costing.
11. How will you treat profit on incomplete contracts in cost account?
12. Discuss contract ledger and prepare a specimen of the contract account.
13. Explain the different methods of computing profits in contract accounts.
14. Write short notes on the following:
    (a) Loss of completed and incomplete contract,
    (b) Notional profit, and
    (c) Profit on incomplete contract.
15. Indicate how would you deal with the following items:
    (a) Plant and machinery purchased and used on contract work,
    (b) Amounts received from contractee, and
    (c) Materials lying unused at site.
16. Rajendra took a contract on 1st April, 2007. The contract price was ₹ 7,50,000. The expenses were made upto its completion i.e. 30th September, 2008 as follows:

	₹		₹
Material purchased	50,000	Establishment charges	6,000
Material issued from stores	1,50,000	Plant issued	3,00,000
Materials from other contract	1,00,000	Material returned to stores	20,000
Wages	2,50,000	Material at the end	8,000
Direct expenses	10,000	Plant in the end	2,00,000

Prepare Contract Account

17. From the following information prepare Contract Account:

	₹
Purchase of material	10,000
Wages paid	12,000
Plant sent to site	4,000
Closing value of plant	3,600

Notes

Direct expenses	3,000
Administrative expenses	1,000
Materials on hand at the end	2,000
Materials returned	1,000
Contract price	2,00,000
Work certified	40,000
Work uncertified	1,600
Cash received from contractee	28,000

Show also work-in-progress in Balance Sheet.

[Important note: Since the amount of cash received from contractee ₹ 28,000 is more than the balance of work-in-progress, cash received from contractee will be shown in liability side of Balance Sheet.]

18. Mahesh Building contractors undertook building construction contract, contract price being ₹ 15,00,000. Contract started on 1st April, 2008. Following expenses were incurred during the year:

Direct material purchased	₹ 2,40,000
Material issued from stores	₹ 3,30,000
Material received from other contract	₹ 75,000
Direct wages	₹ 2,70,000
Indirect expenses	₹ 75,000
Plant and machinery	₹ 3,00,000
Accrued direct wages	₹ 15,000
Accrued expenses	₹ 7,500
Material returned to stores	₹ 15,000
Material transferred to other contract	₹ 21,000
Material lost by fire	₹ 10,500
Plant stolen	₹ 30,000
Materials in hand on 31st March, 2009	₹ 12,000
Plant in hand on 31st March, 2009	₹ 2,43,000

The contract was completed on 31st March, 2009 but only three-fourth contract price was received upto this date. Prepare Contract Account and Contractee Account and also show the items in Balance Sheet.

19. The following expenses were incurred by a contractor on a contract which he started on 1st April, 2008:

Plant	₹ 1,50,000
Materials purchased	₹ 1,25,000
Direct wages	₹ 1,50,000
Direct expenses	₹ 25,000

Notes

Materials 31st March, 2009	₹ 37,500
Plant 31st March, 2009	₹ 1,12,500
Cash received from contractee	₹ 3,00,000
Materials returned to stores	₹ 5,000
Work certified	₹ 3,50,000
Cost of work uncertified	₹ 1,25,000

Prepare Contract Account and Work-in-progress Account assuming that the contract price was ₹ 12,00,000. How will work-in-progress appear in the Balance Sheet of the contractor?

[*Important note:* Since the amount of cash received from contractee is more than the balance of work-in-progress, cash received from contractee will be shown in liability side of Balance Sheet.]

20. Mr. Kartik started contract on 1st April, 2008 and incurred the following expenses on the contract during the year 2008-09:

Materials purchased	₹ 60,000
Direct wages	₹ 65,000
Plant used	₹ 25,000
Direct expenses	₹ 12,500
Other Information's:	
Contract price	₹ 5,00,000
Work certified	₹ 3,75,000
Cash received 75% of work certified	–
Work uncertified	₹ 12,500
Materials in hand	₹ 5,000
Material lost	₹ 3,750
Plant lost	₹ 6,250
Plant returned to stores 31st March, 2009	₹ 2,500

Depreciation charge @10% per annum on plant. Prepare Contract Account and point out how much profit is to be taken to Profit and Loss Account?

21. A building contractor have undertaken construction work at contract price of ₹ 6,25,000 began the execution of work on 1st April, 2008. The following are the particulars of the contract up to 31st March, 2009:

Materials issued from stores	₹ 4,000
Purchase of materials	₹ 1,20,000
Wages	₹ 1,00,000
Indirect expenses	₹ 36,000
Plant used	₹ 1,40,000
Material returned to stores	₹ 8,000
Materials lost by fire	₹ 2,000
Materials at site on 31st March, 2009	₹ 4,000
Plant at site on 31st March, 2009	₹ 1,20,000

Cash received on account upto 31st March amounted to ₹ 2,24,000 representing 80 percent of the work certified. The remaining 20 percent being retained until completion. The work finished but not certified was ₹ 40,000. Prepare the Contract Account and Contractee's Account.

Answers: Self Assessment

1.	Contract costing	2.	direct
3.	payroll	4.	Contract costing
5.	credited	6.	sub-contractor.
7.	contract ledger	8.	¼th
9.	contract costing	10.	Cost-plus Contract
11.	Notional profit	12.	True
13.	False	14.	False
15.	True		

11.6 Further Readings

Books

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Online links

www.futureaccountant.com

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Notes

Unit 12: Process Costing and its Applications

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Objectives

After studying this unit, you will be able to:

- Understand the differences between process and job costing;
- Describe the wastage scrap and spoilage.

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.

Did u know? 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.

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 provided costs are accumulated on a process basis and record of units produced is available.

According to CIMA, "The costing method 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 Kohler, "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".

Notes

Characteristics of Process Costing

The main characteristics of process costing are:

(i) The products or goods are processed in one or more processes,

(ii) The products are distinguishable in processing stage,

(iii) The products or goods are standardized, and

(iv) When a product is produced through various processes, the output of each process in transferred to the next process and that of last process is transferred to the finished goods or finished stocks.

Features of Process Costing:

(a) The production is continuous

(b) The product is homogeneous

(c) The process is standardized

(d) Output of one process become raw material of another process

(e) The output of the last process is transferred to finished stock

(f) Costs are collected process-wise

(g) Both direct and indirect costs are accumulated in each process

(h) If there is a stock of semi-finished goods, it is expressed in terms of equivalent units

(i) The total cost of each process is divided by the normal output of that process to find out cost per unit of that process.

12.1 Application of Process Costing

Process costing may be used in a wide number of industries. The following types of industries may be used process costing:

(a) Production or manufacturing industries, such as cement, rubber, glass, textiles, paper, iron, steel, aluminium, milk-dairy, biscuits, soap-making, flour milling 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.

12.2 Differences between Process Costing and Job Costing

The main differences between process costing and job costing are as follows:

S.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 entity.	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.

Contd…

Notes

(iv)	In process costing, transfer from one process to another is an 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)	Cost 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 therefore 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.

Elements of Product Cost

(i) ***Direct Material:*** Direct material is material that can be directly identified with each unit of the product. Direct material can be conveniently measured and directly charged to the product. For example, raw cotton in textile manufactures, sugar-cane in sugar industry and leather for shoe making industry. The cost of direct material includes the following:

- All type of raw materials issued from the store.
- Raw materials specifically purchased for the specific job or project.
- Raw materials transferred from one cost centre to another cost centre.
- Primary packing material, like cartons, cardboard boxes etc.

(ii) ***Indirect Material:*** They are those materials which do not normally form a part of the finished product. It has been defined as "materials which cannot be allocated but which can be apportioned to or absorbed by cost centres or cost units". These are:

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

(iii) ***Direct Labour:*** Direct labour is labour that can be identified directly with a unit of finished product. All the labour charges expended in altering the construction, composition, confirmation or condition of the product is included in it. It includes the payment of direct wages made to the following groups of direct labour:

- Direct labour engaged on the actual production of the product.
- Direct labour engaged in adding this manufacture by way of supervision, maintenance and tool setting, etc.
- Inspectors, analysts, etc. especially required for such production.

(iv) ***Indirect Labour:*** The wages of that labour which cannot be allocated but which can be apportioned to or absorbed by, cost centres or cost units is known as indirect labour. In other words, wages paid to labour which are employed other than or production constitute

Notes

indirect labour costs. Examples of indirect labour are: charge hands and supervisors, maintenance workers, labour employed in service departments, material handling and internal transport, apprentices, trainees and instructors, factory clerical staff and labour employed in time and security office etc.

(v) ***Direct or Chargeable Expenses:*** They include all expenditures other than direct material and direct labour that are specifically incurred for a particular product or job. Such expenses are charged directly to the particular cost account concerned as part of the prime cost. Examples of direct expenses are: excise duty, royalty, surveyor's fees, cost of rectifying defective work, travelling expenses to the job, experimental expenses of projects, expenses of designing or drawings, repairs and maintenance of plant obtained on hire and hire of special equipment obtained for a contract.

(vi) ***Indirect Expenses:*** Indirect expenses are expenses which can not be allocated but which can be apportioned to or absorbed by cost centres or cost units as rent, insurance, municipal taxes, salary of manager, canteen and welfare expenses, power and fuel, cost of training for new employees, lighting and heating, telephone expenses, etc.

(vii) ***Overheads:*** Overheads may be defined as the cost of indirect materials, indirect labour and such other expenses including services as cannot conveniently be charged direct to specific cost units. Thus overheads are all expenses other than direct expenses. Overheads may be divided into following categories:

(a) Factory or works overheads cover all indirect expenditure incurred by the undertaking from the receipt of the order until its completion is ready for dispatch either to the customer or to the finished goods store depreciation on plant and machinery, buildings and equipments, insurance charges on fixed assets, repairs and maintenance of fixed assets, electricity charges, coal and other fuel charges, rent, rates and taxes of works, etc.

(b) Office and administrative overhead consists of all expenses incurred in the direction, control and administration of a factory. Examples are the expenses in running the general office e.g., office rent, light, heat, salaries, salary to secretaries and accountants, general managers, directors, executives, investigations and experiments and miscellaneous fixed charges.

(c) Selling overheads comprises the cost of products or distributors of soliciting and recurring orders for the articles of commodities dealt in and of efforts to find and retain customers. It includes sales office expenses, salesmen's salaries and commission, show room expenses, advertisement charges, fancy packing, samples and free gifts, after sales service expenses and demonstration and technical advice to potential customers.

(d) Distribution overheads comprise all expenditure incurred from the time the product is completed in the work until it reaches its destination. Its includes warehouse rent, warehouse staff salaries, insurance, expenses on delivery vans and trucks, expenses on special packing for bulk transport, losses in warehouse stocks and finished goods damaged in transit and cost of repairing, etc.

Illustration: A certain product passes through three processes before it is completed. The output of each process is charged to next process at a price calculated to give a profit of 20% on transfer price (i.e. 25% on the cost price). The output of Process III is charged to finished goods stock account on a similar basis. There was no work in progress at the beginning of the year and overheads had been ignored. Stocks in each process have been valued at prime cost of the processes.

Notes

The following data are obtained at the end of December 2007

Particulars	Process I (₹)	Process II (₹)	Process III (₹)	Finished Stock (₹)
Direct Material	30,000	20,000	40,000	
Direct Wages	20,000	30,000	10,000	
Stock as on 31st December	10,000	20,000	30,000	30,000
Sales during the year	–	–	–	1,70,000

From the above information prepare,

(a) Process cost accounts showing the profit element at each stage

(b) Actual realized profit

(c) Stock valuation as would appear in the Balance Sheet

Solution:

The Process Accounts are shown below.

Dr. Process I A/c Cr

Particulars	Total (₹)	Cost (₹)	Profit (₹)	Particulars	Total (₹)	Cost (₹)	Profit (₹)
To Material	30,000	30,000	–	By Transfer to Process II A/c	50,000	40,000	10,000
To Wages	20,000	20,000	–				
Total	50,000	50,000	–				
Less: Closing Stock c/d	10,000	10,000	–				
Prime Cost	40,000	40,000	–				
Gross Profit 25% on cost	10,000	–	10,000				
Total	50,000	40,000	10,000	Total	50,000	40,000	10,000
Stock b/d	10,000	–	10,000				

Dr. Process II A/c Cr

Particulars	Total (₹)	Cost (₹)	Profit (₹)	Particulars	Total (₹)	Cost (₹)	Profit (₹)
To Transfer from Process I	50,000	40,000	10,000	By Transfer to Process III	1,00,000	72,000	28,000
To Materials	20,000	20,000	–				
To Wages	30,000	30,000					
Total	1,00,000	90,000	10,000				
Less: Closing Stock c/d	20,000	18,000	2,000				

Notes

Dr. Process III A/c Cr

Particulars	Total (₹)	Cost (₹)	Profit (₹)	Particulars	Total (₹)	Cost (₹)	Profit (₹)
Prime Cost	80,000	72,000	8,000				
Gross Profit 25% on cost	20,000	–	20,000				
Total	1,00,000	72,000	28,000	Total	1,00,000	72,000	28,000
Stock b/d	20,000	28,000	2,000				

Dr. Finished Stock A/c Cr

Particulars	Total (₹)	Cost (₹)	Profit (₹)	Particulars	Total (₹)	Cost (₹)	Profit (₹)
To Transfer from Process II	1,00,000	72,000	28000	By Transfer to Finished Stock	1,50,000	97,600	52,400
To Materials	40,000	40,000	--------				
To Wages	10,000	10,000					
Total	1,50,000	1,22,000	28,000				
Less: Closing Stock c/d	30,000	24,400	5,600				
Prime Cost	1,20,000	97,600	22,400				
Gross Profit – 25% on cost	30,000	-------	30,000				
Total	1,50,000	97,600	52,400	Total	1,50,000	97,600	52,400

Dr. Finished Stock A/c Cr

Particulars	Total (₹)	Cost (₹)	Profit (₹)	Particulars	Total (₹)	Cost (₹)	Profit (₹)
To Transfer from Process III	1,50,000	97,600	52,400	By Sales	1,70,000	78,080	91,920
Less: Stock c/d	30,000	19,520	10,480				
Total	1,20,000	78,080	41,920				
Gross Profit 25% on cost	50,000	---	50,000				
Total	1,70,000	78,080	91,920	Total	1,70,000	78,080	91,920
Stock b/d	30,000	19,520	10,480				

(A) Calculation of Profit on Closing Stock

The amount of profit included in the closing stock can be computed with the help of the following formula.

Cost of stock = [Cost column/Total column] x Stock Process I = Amount of profit = nil

Process II = [Cost column/Total column] x Stock

- ₹ 90,000/₹ 1,00,000 x 20,000 = ₹ 18,000
- Profit = ₹ 20,000 – ₹ 18,000 = ₹ 2,000

Process III = ₹ 1,22,000/1,50,000 x 30,000 = ₹ 24,400

Profit = ₹ 30,000 – ₹ 24,400 = ₹ 5,600

Notes

Finished Stock: ₹ 97,600/₹ 1,50,000 X ₹ 30,000 = ₹ 19,520

Profit = ₹ 30,000 – ₹ 19,520 = ₹ 10,480

(B) Actual Realized Profit is as shown below:

Particulars	Apparent Profit from Process (₹)	Unrealized Profit in Closing Stock (₹)	Actual Profit [Gross] (₹)
Process I	10,000	Nil	10,000
Process II	20,000	2,000	18,000
Process III	30,000	5,600	24,400
Finished Stock	50,000	10,480	39,520
Total	1,10,000	18,080	91,920

(C) Stock Valuation for Balance Sheet purpose:

Particulars	Amount (₹)
Process I	10,000
Process II	18,000
Process III	24,400
Finished Stock	39,520
Total	91,920

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 upto finished stage. There is no departure from the principles regarding direct and indirect expenditures. The costs of processing will include:

- Materials,
- Labour,
- Direct Expenses, and
- 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.

Notes 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 was the expenses:

Notes

	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
" Materials	2.00	2,000			
" Direct wages	5.00	5,000			
" Direct expenses	0.80	800			
" Indirect expenses	2.50	2,500			
	16.30	16,300		16.30	16,300

Process Account B

Particulars	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
" Materials	3.00	3,000			
" Direct wages	4.00	4,000			
" Direct expenses	0.90	900			
" 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
" Materials	2.00	2,000			
" Direct wages	3.00	3,000			
" Direct expenses	1.00	1,000			
" 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:

Notes

	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 X_1
(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
" Direct labour	7.50	1,500			
" Direct expenses	2.00	400			
" Production overheads	11.25	2,250			
	40.75	8,150		40.75	8,150

Process Account X_2

Particulars	Cost per unit (₹)	Total (₹)	Particulars	Cost per unit (₹)	Total (₹)
To Output transferred from process X1	40.75	8,150	By Output transferred to process X_3	65.25	13,050
" Direct materials	2.50	500			
" Direct labour	8.00	1,600			
" Direct expenses	2.00	400			
" Production overheads	12.00	2,400			
	65.25	13,050		65.25	13,050

Process Account X_3

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
" Direct materials	2.50	500			
" Direct wages	4.50	900			
" Production overheads	6.75	1,350			
	79.00	15,800		79.00	15,800

12.3 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, disappearance of basic raw material through evaporation, smoke, etc. In process type of industry, wastage may have lower reusable value.

Notes

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.

Caution 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 same 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.

Did u know? The sate 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 in 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 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 is 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.

Reason for Calculation of Inter Process Profit

The output of one process is transferred to the subsequent process at cost price. However sometimes, the transfer is made at cost + certain percentage of profit. This is done when each process is treated as a profit center. In such cases, the difference between the debit and credit side of the process account represents profit or loss and is transferred to the Profit and Loss Account. The stocks at the end and at the beginning contain an element of unrealized profits, which have to be written back in this method. If the profit element contained in the closing inventory is more than the profit element in the opening inventory, profit will be overstated and vice versa. Profit is realized only on the goods sold, thus to obtain the actual profit the main task would be to calculate the profit element contained in the inventories. In order to compute the profit element,

Notes

in closing inventory and to obtain the net realized profit for a period, three columns have to be shown in the ledger for showing the cost, unrealized profit and the transfer price.

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
" Labour	2,500		
" Direct expense	500		
" 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
" Materials	1,500		
" Labour	2,000		
" Direct expense	100		
" 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
" Materials	1,000		
" Labour	2,500		
" Direct expense	500		
" 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:

Notes

	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
			By Finished stock account	37.814	22,690
To Raw materials	3.333	2,000			
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

Notes

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 ton and ₹ 200 per ton respectively. The process figures are as follows:

	Process A (₹)	Process B (₹)
Materials consumed in tons	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 ton.

Solution:

Process Account A

Particulars	Tons	Amount (₹)	Particulars	Tons	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 ton)	850	1,41,000
	1,000	1,49,000		1,000	1,49,000

Process Account B

Particulars	Tons	Amount (₹)	Particulars	Tons	Amount (₹)
To Process A a/c	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	782	1,53,600
To Manufacturing expenses		5,000	₹ 196.42 per ton)		
	920	1,72,000		920	1,72,000

Example: The information given below is extracted from the cost accounts of a industry production a commodity in the manufacture of which three processes are involved. Prepare cost accounts showing the cost of the output and the cost per unit at each stage of manufacture:

(a) The operations in each separate process are completed daily.

(b) 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 (₹)	Process B (₹)	Process C (₹)
Direct wages	640	1,200	2,925
Manufacturing expenses	360	300	360
Factory on cost	200	225	240
Raw materials consumed	2,400	–	–

Notes

Production (Gross)	37,000 Units	–	–
Wastage	1,000 Units	1,500 Units	500 Units
Stock 1st July, 2006	–	4,000 Units	16,500 Units
Stock 31st 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	36,000	3,600
To Wages		640	(Cost per unit ₹ 0.10)		
To Manufacturing expenses		360	By Wastage	1,000	--
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				
	40,000				
Less : Closing stock	1,000		By Wastage	1,500	--
	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				
	54,000				
Less : Closing stock	5,500		By Wastage	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 being passed on the next process. From the following figures show the cost of each process.

Notes

	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
Production for the month of June	36,000 Units	37,500 Units	48,000 Units
Stock at beginning (1st June)	–	4,000 Units	16,500 Units
Stock at close (30th June)	–	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
" Direct wages		9,200			
" Works on cost		16,000			
" 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 (30th June @ ₹ 1.25 unit)	1,000	1,250
" Transferred from Process M Account	36,000	45,000	" Wastage	1,500	–
" Materials		30,000	" Transfer to Process O Account (Cost per unit ₹ 3.21)	37,500	1,20,500
" Direct wages		16,000			
" Works on cost		15,000			
" 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 (30th June @ ₹ 3.21 per unit)	5,500	17,655
" Transferred from			" Wastage	500	–
Process N Account	37,500	1,20,500	" Finished stock (Cost per unit ₹ 5.59)	48,000	2,68,560
" Materials		50,000			
" Direct wages		27,750			
" Works on cost		18,000			
" 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.

Notes

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 tons	250	152	145
Cost of per tons (₹)	120	80	50
Direct wages (₹)	85,800	20,250	10,560
Direct expenses (₹)	13,800	13,870	2,250
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	Tons	Amount (₹)	Particulars	Tons	Amount (₹)
To Materials	250	30,000	By Wastage (4%)	10	
" Direct wages		85,800	" Process B (20%)	48	25,920
" Direct expenses		13,800	" Warehouse (80%)	192	1,03,680
	250	1,29,600		250	1,29,600

Process Account B

Particulars	Tons	Amount (₹)	Particulars	Tons	Amount (₹)
To Process A a/c	48	25,920	By Wastage (5%)	10	--
" Raw materials	152	12,160	" Process C (50%)	95	36,100
" Direct wages		20,250	" Warehouse (50%)	95	36,100
" Direct expenses		13,870			
	200	72,200		200	72,200

Process Account C

Particulars	Tons	Amount (₹)	Particulars	Tons	Amount (₹)
To Process B a/c	95	36,100	By Wastage (2.5%)	6	--
" Raw materials	145	7,250	" Warehouse (100%)	234	56,160
" Direct wages		10,560			
" Direct expenses		2,250			
	240	56,160		240	56,160

Example: The products 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 ton and ₹ 200 per ton respectively. The Process figures are as follows:

Notes

	Process A	Process B
Materials consumed (Tons)	1,000	70
Cost of materials per ton	₹ 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 ton.

Solution:

Process Account A

Particulars	Tons	Amount (₹)	Particulars	Tons	Amount (₹)
To Materials @ ₹200/-	1,000	2,00,000	By Loss in weight (2% of 1,000 tons)	20	–
" Manufacturing wages		20,000			
" Manufacturing expenses		6,000	" Sale of Scrap (5% of 1,000 tons and sold @ ₹ 100 a ton)	50	5,000
			" Transfer to Process B (Cost per ton ₹ 237.63)	930	2,21,000
	1,000	2,26,000		1,000	2,26,000

Process Account B

Particulars	Tons	Amount (₹)	Particulars	Tons	Amount (₹)
To Transferred from Process A	930	2,21,000	By Loss in weight (2% of 1,000 tons)	20	–
" Materials @ ₹300/-	70	21,000			
" Manufacturing wages		15,000	" Sale of scrap (5% of 1,000 tons and sold @ ₹ 200 a ton)	50	10,000
" Manufacturing expenses		4,000			
			" Transfer to Finished stock (Cost per ton ₹269.89)	930	2,51,000
	1,000	2,61,000		1,000	2,61,000

Task 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 ton and from process C ₹ 20 a ton. The product 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 (Tons)	1,000	140	1,348
Cost per ton	120	200	80
Direct wages and expenses	30,800	25,760	18,100

Prepare an account for each process, showing the cost per ton of each product.

Self Assessment

Notes

Fill in the blanks:

1. Industries which are engaged in the manufacture of products which involve continuous operation or process are known as .....
2. Process costing is also one important method of .....
3. ..... represents the portion of a basic raw material lost in processing, having no recovery value.
4. In process costing production is a continuous flow and the products are .....
5. In ....., each product unit is different and therefore more managerial attention is needed for proper control.
6. ..... as discarded material which has same recovery value and which is usually either disposed of without further treatment.
7. Materials issued for a particular process are ..... direct to it and so also labour engaged only on that process.
8. Defective products are not up to the standard or they do not meet .....
9. In process costing ..... is homogeneous, stable and controllable.
10. In job costing, there may not be ..... in an accounting period.

State whether the following statements are true or false:

11. Materials issued for a particular process are debited direct to it and so also labour engaged only on that process.
12. In job costing various jobs are separate and independent.
13. The total of each process account less any work in progress is transferred to the next process account.
14. Wastage represents the portion of a basic raw material lost in processing, having no recovery value.
15. Any value realized from spoilage is credited to the production order or production overheads account.

Case Study

Accounting for Spoiled Units

The House Hold Aids Company assembles clip clothespins in three sections, and uses process costing. Under normal operating conditions, each section has a spoilage rate of 2%. However, spoilage can go as high as 5% and is usually discovered when a faulty pin enters process or on final completion by a section.

The spring mechanism is the only material which can be saved from a spoiled unit. The production supervisor assigns a worker once or twice a week to remove the springs from spoiled units. The salvaged springs are placed in bins at the assembly tables in section No1 to be used again. No accounting entry is made of this salvage operation.

In the past, the controller has made no attempt to account for spoilage separately. Lost unit costs have been absorbed by the units transferred out of the section and those remaining in the process. However, because spoilage is increasing, a different method is needed.

Contd…

Notes

The spoiled work should be broken into normal and abnormal spoilage. The cost of normal spoilage should be absorbed by good completed units. All materials salvaged should be assigned a value and placed in materials inventory. Sectional materials costs should be reduced by the value assigned to salvaged materials.

Abnormal spoilage should be charged to factory overhead account. The cost to be included in this account should be the amount accumulated against a clothespin up to the point of being scraped, and the total loss in scraped clothespins should be shown in the cost of production report of the department responsible for the loss.

12.4 Summary

- In process costing the products or goods are processed in one or more processes.
- The products are distinguishable in processing stage.
- The products or goods are standardized.
- Cost are compiled on time basis: for production, for a given accounting period, for each process.
- Wastage represents the portion of a basic raw material lost in processing, having no recovery value. Wastage may be visible.
- In process type of industry, wastage may have lower reusable value.

12.5 Keywords

Compiled Cost: Presentation of complete cost in a accurate way.

Manufacturing Plant: A plant consisting of one or more buildings with facilities for manufacturing.

Mining Units: Specified area of plant from which minerals are extracted.

Scrap: A small piece or amount left over.

12.6 Review Questions

1. Define Process Costing and explain its working procedure.
2. Distinguish between Process Costing and Job Costing.
3. Discuss the Process Costing and explain its objectives.
4. 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 upto 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

Notes

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.

5. The following informations are extracted from the cost accounts of a factory producing a commodity in the manufacture of which three processes are involved. Prepare process accounts, showing the cost of the output and the cost per unit at each stage of manufacture. You may presume that:

   (a) The operations in each separate process are completed daily, and

   (b) The value at which units are to be charged to process two and three is the cost per unit of process one and one plus two respectively.

Process	Process 1	Process 2	Process 3
Wages	₹ 2,500	5,000	6,500
Machine expenses	₹ 1,400	1,200	1,200
Factory overheads	₹ 1,100	1,550	900
Raw materials consumed	₹ 8,000	–	–
Units	Units	Units	
Production (Gross)	2,750	–	–
Wastage	150	210	200
Stock at beginning	–	250	500
Stock at end	–	440	100

6. In a factory the product passes through two processes I and II. A loss of 5% is allowed in process I and 2% in process II, nothing being realised by disposal of wastage.

   During May, 2006, 10000 units of materials costing ₹ 6 per unit were introduced in Process I. The other costs are:

	Process I (₹)	Process II (₹)
Direct materials	–	6,140
Direct wages	10,000	6,000
Overheads	6,000	4,600

   The output was 9,300 units from process I. 9,200 units were produced by process II, which were transferred to the warehouse.

   8000 units of the finished product were sold @₹ 15 per unit. The selling and distribution expenses were ₹ 2 per unit.

   Prepare (a) Process accounts, and (b) a statement of profit or loss of the factory for May 2006, assuming there were no opening stocks of any type.

7. Ramesh Chemicals Ltd. manufactures and sells their chemical produced by consecutive processes:

   The products of these processes are dealt with as under:

	Process A	Process B	Process C
Transferred to next process	66%	60%	–
Transferred to warehouse for sale	33%	40%	100%

Notes

In each process, 4% of the weight put is lost and 6% is scrap which from Process A realised ₹ 3 per ton, from Process B ₹ 5 per ton and from Process C ₹ 6 per ton.

The following particulars related to January, 2004:

	Process A	Process B	Process C
Raw materials used in tons	1,400	160	1,260
Rate per ton	₹ 10	₹ 16	₹ 7
Wages and other expenses	₹ 5,152	₹ 3,140	₹ 2,898

Prepare process Accounts showing cost per ton of each product.

8. The product of a manufacturing concern passes through two processes A and B and then to finished stock. It is ascertained that in each process normally 5% of the total weight is lost and 10% is scrap which from Processes A and B realizes ₹ 80 per ton and ₹ 200 per ton respectively.

The following are the figures relating to both the processes:

	Process A	Process B
Raw materials in tons	1,000	70
Cost of raw materials per ton	₹ 125	200
Direct wages	₹ 28,000	10,000
Manufacturing expenses	₹ 8,000	5,250
Output in tons	830	780

Prepare process accounts showing cost per ton of each process. There was no stock or work-in-progress in any process.

9. The product of an industry passes through three different Processes I, II and III. It is ascertained from past experience that loss in each process is incurred as under:

Process I: 2%, Process II: 5%, Process III: 10%.

The percentage of loss in each case is computed on the basis of number of units entering the process concerned.

The loss of each process has a scrap value. The loss of Processes I and II is sold at ₹ 1 per unit and that of Process III at ₹ 4 per unit.

The industry gives you the following additional information's for the month of June, 2006:

2,000 units of crude material were introduced in process I at a cost of ₹ 8 per unit. Besides this the following were other expenses:

	Process I (₹)	Process II (₹)	Process III (₹)
Materials	8,000	3,000	2,000
Wages	12,000	8,000	6,000
Works expenses	2,000	1,000	3,000
Output in units	1,950	1,925	1,590
Stock (unit): June 1st	200	300	500
June 30th	150	400	–
Stock: Valuation on June 1, per unit	₹ 19	₹ 27	₹ 36.5

Stock on 30 June, 2006 are to be valued at cost as shown by month's production accounts. Prepare the process accounts.

Notes

Answers: Self Assessment

1.	process industries	2.	costing
3.	wastage	4.	standardised.
5.	job costing	6.	Scrap
7.	debited	8.	dimensional specifications
9.	production	10.	opening or closing work-in-progress
11.	True	12.	True
13.	True	14.	True
15.	True		

12.7 Further Readings

Books

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Online links

www.futureaccountant.com

www.managementstudyguide.com

Notes

Unit 13: Normal Wastage, Abnormal Loss and Abnormal Gain

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Objectives

After studying this unit, you will be able to:

- Define normal wastage;
- Define abnormal loss;
- Understand abnormal gain;
- Identify oil refineries.

Introduction

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, 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.

13.1 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.

Caution 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.

13.2 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:

$$= \frac{\text{Normal cost}}{\text{Normal output}} \times \text{Units of abnormal loss}$$

13.3 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 effect the cost of production.

Did u know? 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.

Notes

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)x50]		
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
To Wages		2,000	[(14,328÷4,230)x80]		
To Manufacturing expenses		1,000	By Finished stock	4,150	14,057
	4,700	14,375		4,700	14,375

Example: The product of Ajay company passes 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 @ ₹ 20 per 100 units. The following information is obtained for the month March, 2008:

Notes

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
" Introduced materials		4,000	" Abnormal wastage	100	97
" Direct labour		6,000	" Output transferred to process II @ ₹ 0.97 per unit	19,500	18,883
" Expenses		1,000			
	20,000	19,000		20,000	19,000

Process Account II

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process II a/c	19,500	18,883	By Normal wastage	975	48
" Materials		1,500	" Output transferred to process III @ ₹ 1.34 per unit.	19,250	25,807
" Direct labour		4,000			
" Expenses		500			
" 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
" Materials		1,000	" Abnormal wastage	1,425	2,543
" Direct labour		3,000	" Output transferred to Finished stock Account @ ₹ 1.78 per unit.	15,900	28,379
" Expenses		1,500			
	19,250	31,307		19,250	31,307

Example: The product of a factory passes 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.

Notes

	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 1st June, 2007 (in units)		4,000	16,500
Stock 30th 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	--
			By Transfer to Process III (₹1.50 per unit)	37,500	56,250
To Stock 1st June 2007	4,000	4,000			
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 1st June 2007	16,500	24,750	By Wastage	500	--
To Transferred from Process II	37,500	56,250	By Stock on 30th June 2007 @₹ 1.50 per unit	5,500	8,250
To Direct wages		29,250			
To Machine expenses		3,600	By Finished goods a/c (cost ₹ 2.25 per units)	48,000	1,08,000
To Factory on cost		2,400			
	54,000	1,16,250		54,000	1,16,250

Notes

Example: The products Ltd. manufactures and sells their chemicals produced by consecutive process:

The products of three processes are as under:

	Process I (₹)	Process II (₹)	Process III (₹)
Transferred to next process	66 %	60%	–
Transferred to warehouse for sale	33 %	40%	100%

In each process, 4% of the total weight put is lost and 6% is scrap, which from process I realises ₹ 3 per ton, from process II ₹ 5 per ton and from process III ₹ 6 per ton. The following particulars relate October, 2005:

Raw materials used:

Process I 1,400 tons @₹ 10 per ton

Process II 160 tons @ ₹ 16 per ton

Process III 1,260 tons @ ₹ 7 per ton

Manufacturing wages and expenses:

Process I ₹ 5,152

Process II ₹ 3,140

Process III ₹ 2,895

Prepare process accounts showing the cost per ton of each product.

Solution:

Process Account I

Particulars	Tons	Amount (₹)	Particulars	Tons	Amount (₹)
To Materials	1,400	14,000	By Loss in weight	56	--
" Wages		5,152	" Sale of scrap	84	252
			" Transfer to Warehouse	420	6,300
			" Process II (cost per ton ₹ 15)	840	12,600
	1,400	19,152		1,400	19,152

Process Account II

Particulars	Tons	Amount (₹)	Particulars	Tons	Amount (₹)
To Transferred from process I a/c	840	12,600	By Loss in weight	40	--
			" Sale of scrap	60	300
" Materials	160	2,560	" Transfer to Warehouse	360	7,200
" Wages		3,140	" Transfer to Process III (cost per ton ₹ 20)	540	10,800
	1,000	18,300		1,000	18,300

Notes

Process Account III

Particulars	Tons	Amount (₹)	Particulars	Tons	Amount (₹)
To Transferred from process II a/c	540	10,800	By Loss in weight	72	--
			" Sale of scrap	108	648
" Materials	1,260	8,820	" Cost of production transfer to warehouse (cost per ton ₹ 13.19)	1,620	21,867
" Wages		2,895			
	1,800	22,515		1,800	22,515

Task Pramod Limited produce a patent materials used in building 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 tons	1,000	–	–
Cost of per ton	200	–	–
Manufacturing wages and expenses	72,500	40,800	10,710
Weight lost	5%	10%	20%
Scrap (sold at ₹ 50 per ton)	50 tons	30 tons	51 tons

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 ton of each process.

13.4 Oil Refinery Processes

Oil refineries have normally three processes:

(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 is crude oil 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.

Notes

Example: The following details are extracted from the costing records of an oil mill for the year ended 31st March, 2007:

Purchases of 500 tons 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 tons of crude oil was produced.

250 tons of oil was produced from the refining process.

248 tons of refined oil was finished for delivery.

Copra sacks sold ₹ 400.

175 tons of copra residue sold ₹ 11,000.

Loss-in-weight in crushing 25 tons.

45 tons 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 ton of each process and the total cost per ton of finished oil:

(a) Copra crushing process,

(b) Refining process, and

(c) Finishing process including casking.

Solution:

Copra Crushing Process

Particulars	Tons	Amount (₹)	Particulars	Tons	Amount (₹)
To Copra used	500	2,00,000	By Sale of copra stocks	--	400
" Labour		2,500	" Sale of copra residue	175	11,000
" Electric power		600			
" Sundry materials		100	" Loss in weight	25	--
" Repairs to machinery		280	" Cost of crude oil (cost per ton ₹ 646.66)	300	1,94,000
" Steam		600			
" Factory expenses		1,320			
	500	2,05,400		500	2,05,400

Notes

Refining Process

Particulars	Tons	Amount (₹)	Particulars	Tons	Amount (₹)
To Crude oil	300	1,94,000	By By-products	45	6,750
" Labour		1,000	" Loss in weight	5	--
" Electric power		360	" Cost refined oil products (cost per ton ₹ 768.20)	250	1,92,050
" Sundry materials		2,000			
" Repairs to machinery		330			
" Steam		450			
" Factory expenses		660			
	300	1,98,800		300	1,98,800

Finishing Process

Particulars	Tons	Amount (₹)	Particulars	Tons	Amount (₹)
To Refined oil	250	1,92,050	By Loss in weight	2	--
" Labour		1,500	" Cost of finished oil produced (cost per ton ₹ 788.20)	248	1,94,600
" Electric power		240			
" Repairs to machinery		140			
" Steam		450			
" 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 ton ₹ 814.93)	248	2,02,100
" 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:

Karnels consumed 100 tons ₹ 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		
Sundry materials for refining	₹ 380		
Barrels for storing finished oil	₹ 4,205		

Cake sales 40 tons for ₹ 3,000, crude oil obtained 55 tons, sundry bags sold ₹ 180, residual oil and fats sold for 180 (4 tons), refined oil 50 tons, finished oil stored in barrels 48 tons, and 2 tons 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:

Notes

Crushing Process Account

Particulars	Tons	Amount (₹)	Particulars	Tons	Amount (₹)
To Cost of kernels	100	45,000	By Cake sales	40	3,000
" Wages		1,600	" Sundry sales	--	180
" Power and steam		240	" Loss in weight	5	--
" Repairs and stores		80	" Transfer of crude oil to refining process	55	44,140
" Rent and taxes		100			
" Sundry works expenses		40			
" Office on cost		260			
	100	47,320		100	47,320

Refining Process Account

Particulars	Tons	Amount (₹)	Particulars	Tons	Amount (₹)
To Crushing process	55	44,100	By Sundry sales	4	180
" Sundry materials		380	" Loss in weight	1	--
" Wages		1,180	" Cost of refined oil transferred to Finishing process	50	46,200
" Power and steam		200			
" Rent and taxes		150			
" Sundry works expenses		50			
" Office on cost		280			
	55	46,380		55	46,380

Finishing Process Account

Particulars	Tons	Amount (₹)	Particulars	Tons	Amount (₹)
To Refining process	50	46,200	By Sundry sales	2	220
" Wages		1,175	" Cost of Finishing	48	52,000
" Barrels		4,205			
" Power and steam		300			
" Rent and taxes		120			
" Sundry works expenses		70			
" Office on cost		150			
	50	52,220		50	52,220

Example: In an Industry, the output passes through three processes to completion i.e., Crushing, Refining and Finishing. The details are given below for the month of March, 2006:

	Crushing (₹)	Refining (₹)	Finishing (₹)
Wages	15,000	12,000	10,000
Power	6,000	5,000	3,000
Steam	2,000	1,000	500
Other expenses	3,000	2,000	500

Notes

Copra purchased 3,000 kg costing ₹ 3,00,000. Crude oil produced 2,500 kg, refined oil 1,800 kg, and finishing oil 1,760 kg.

500 kg crude oil was sold at cost plus 20% in Crushing process. Copra residue 300 kg sold for ₹ 10,000 and sacks sold for ₹ 1,000. Wastage of 100 kg of Refining process sold for ₹ 800. Casks cost ₹ 3,000. Oil stored in casks sold for ₹ 200 per kg. Prepare necessary accounts of process.

Solution:

Crushing Process Account

Particulars	Kg	Amount (₹)	Particulars	Kg	Amount (₹)
To Copra purchased	3,000	3,00,000	By Loss in weight	200	–
" Wages		15,000	" Copra residue sold	300	10,000
" Power		6,000	" Sacks sold		1,000
" Steam		2,000	" Crude oil sold (Cost ₹ 63,000 Plus 20% Profit 12,600) [(3,15,000 / 2,500) x 500]	500	75,600
" Other expenses		3,000			
" Profit and Loss a/c (Profit on crude oil sold)		12,600			
			" Refining Process a/c (cost per kg ₹ 126)	2,000	2,52,000
	3,000	3,38,600		3,000	3,38,600

Refining Process Account

Particulars	kg	Amount (₹)	Particulars	kg	Amount (₹)
To Crushing Process a/c (Output recd. @₹ 126)	2,000	2,52,000	By Loss in weight	100	--
			" Wastage sold	100	800
" Wages		12,000	" Finishing process a/c (Output transferred, cost per kg ₹ 105.67)	1,800	2,71,200
" Power		5,000			
" Steam		1,000			
" Other expenses		2,000			
	2,000	2,72,000		2,000	2,72,000

Finishing Process Account

Particulars	kg	Amount (₹)	Particulars	kg	Amount (₹)
To Refinishing Process a/c (Refinished oil)	1,800	2,71,200	By Loss in weight	40	–
			" Finished stock a/c (Cost per kg ₹ 162.67)	1,760	2,85,200
" Wages		10,000			
" Power		3,000			
" Steam		500			
" Other expenses		500			
	1,800	2,85,200		1,800	2,85,200

Notes

Particulars	kg	Amount (₹)	Particulars	kg	Amount (₹)
To Finished Process (Refined oil)	1,760	2,85,200	By Total Cost of casks finished oil c/d (Cost per kg ₹ 163.75)	1,760	2,88,200
" Cost of casks		3,000			
	1,760	2,88,200		1,760	2,88,200
To Cost of casks finished oil (per kg ₹ 163.75)	1,760	2,88,200	By Sales @ ₹ 200 per kg	1,760	3,52,000
" Profit and Loss a/c (Profit per kg ₹ 36.25)		63,800			
	1,760	3,52,000		1,760	3,52,000

Self Assessment

Fill in the blanks:

1. …… represents the portion of a basic raw material lost in processing, having no recovery value
2. In process type of industry, wastage may have lower ……
3. In the case of normal wastage, all …… incurred are charged to the good units of output.
4. Sometimes the percentage of wastage or loss may …… the determined standard percentage of normal wastage.
5. At the end of the accounting year, the abnormal effectives account is transferred to the …… of profit and loss account.
6. The value of the abnormal effectives is …… to the concerned process account and credited to the abnormal effectives account.
7. Oil obtained from refining process is ……
8. The product of a factory passes through …… processes of manufacture.

State whether the following statements are true or false:

9. Normal Wastage is the amount of loss which is unavoidable because of the nature of raw materials.
10. Any wastage exceeding the normal percentage is termed normal loss or wastage.
11. If the quantum of wastage is less than the predetermined percentage of normal wastage, the difference is called as abnormal gain or effectives.
12. 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.
13. Crude oil from crushing process is debited.
14. Abnormal loss or wastage is a part of production.
15. Refined oil obtained from refining process is credited.

Notes

Case Study

Process Costing and Optimization to Avoid Losses

To improve efficiency and reduce costs you need to streamline processes, remove or reduce non value adding activities, and solve problems that cause extra costs.

By using Activity-Based Costing and Process Management you'll get insight into the cost of processes and activities, and what drives those costs. This information is essential if you want to make changes that result in measurable cost savings and improved efficiency.

The Prodacapo software solutions for activity based management and process management enable you to:

- Measure and analyze costs and number of full time employees (FTE) per activity and process
- Prioritize which process improvements or cost reductions will be most beneficial
- Identify non value added activities and decide how to improve them
- Benchmark your business units and identify best practices

Once you've made your changes, you can follow-up to make sure costs don't rise or performance decline. By continuously measuring the unit cost of processes and activities you'll be able to manage efficiency and take steps if costs increase.

Prodacapo Process Management is a powerful solution for process costing and optimization. It uniquely combines both process mapping and process costing functionality in a single solution and helps you achieve measurable results quickly.

Use the Prodacapo solution for 'stand-alone' projects, for process optimization and cost reduction, or "turbo charge" other process improvement initiatives such as Six Sigma and TQM.

13.5 Summary

- 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.
- 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 products or goods are standardized.
- When a product is produced through various processes, the output of each process in transferred to the next process and that of last process is transferred to the finished goods or finished stocks.
- In each process, there is a residue left after transfer of the partially completed product to the next process. 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.

Notes

13.6 Keywords

Abnormal Gain: Gain out of abnormal effective usage

Crushing: Pressing or Squeezing

Distinct Processes: Distinguishable

Oil Refinery: Refinery for petroleum

Production Techniques: Methods of production

13.7 Review Questions

1. Write short notes on abnormal gain or abnormal effective in process costing.
2. How would you account for wastage in the cost of production? Define normal wastage and abnormal effective and distinguish between them.
3. Write short notes on:

   (a) Scrap and wastage (b) Inter-Process Profit

   (c) Joint Expenses (d) Equivalent Production.
4. A product is obtained after passing it through three processes. The following information is collected for August, 2005:

	Process A	Process B	Process C
Materials	₹ 5,200	₹ 3,960	₹ 5,924
Wages	₹ 4,000	₹ 6,000	₹ 8,000
Output in units during the month	950	840	750
Normal loss	5%	10%	15%
Value of scrap per unit	₹ 4	₹ 8	₹ 10

   Additional information are given below:

   1,000 units @ ₹ 6 each were introduced in Process A. There was no stock of materials or WIP at the beginning or at the end of that month. The production overhead was ₹ 18,000 for that month.

   Prepare the necessary process accounts indicating normal loss, abnormal loss and abnormal gain.
5. Product 'X' is obtained after it passes through three distinct processes. The following information is obtained from the accounts for the month ending December 31st, 2006:

Items	Total (₹)	Process A (₹)	Process B (₹)	Process C (₹)
Materials	7,542	2,600	1,980	2,962
Wages	9,000	2,000	3,000	4,000
Production overheads	9,000	–	–	–

   1,000 units at ₹ 3 each were introduced to process A. There was no stock of material or work-in-progress at the beginning or end of the period. The output of each process passes direct to the next process and finally to finished stores. Production overheads are recovered on 100 per cent of wages. The following additional data are obtained:

Notes

Process	Output during the month	Percentage of normal loss to input	Value of scrap per unit (₹)
A	950	5%	2
B	840	10%	4
C	750	15%	5

Prepare the process accounts and abnormal gain or loss accounts.

6. A product is obtained after passing it through three processes. The following information is collected for August, 2005:

	Process A	Process B	Process C
Materials	₹ 5,200	₹ 3,960	₹ 5,924
Wages	₹ 4,000	₹ 6,000	₹ 8,000
Output in units during the month	950	840	750
Normal loss	5%	10%	15%
Value of scrap per unit	₹ 4	₹ 8	₹ 10

Additional information are given below:

1,000 units @ ₹ 6 each were introduced in Process A. There was no stock of materials or WIP at the beginning or at the end of that month. The production overhead was ₹ 18,000 for that month.

Prepare the necessary process accounts indicating normal loss, abnormal loss and abnormal gain.

7. 600 kg of a material was charged to Process A at the rate of ₹ 4 per kg. The direct wages accounted for ₹ 200 and other expenses amounted to ₹ 760. The normal loss is 10% of input and the net production was 500 kg. Assuming that process scrap is saleable at ₹ 2 per kg. Prepare a ledger account of Process A clearly showing the values of normal or abnormal loss.

8. The product of a soap factory has to pass through three stages before the article comes out in a finished form. These processes are known as I, II and III. The wastage in each of these processes is as follows:

Process I 2%; Process II 5% and 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 output of each process passes immediately to the next process and the finished units are passed from Process III into stock. The following other information is obtained:

	Process I (₹)	Process II (₹)	Process III (₹)
Materials	8,000	4,000	2,000
Direct wages	12,000	8,000	6,000
Other expenses	2,000	2,000	3,000

40,000 units have been issued to Process I at a cost of ₹ 16,000. The output of each process has been as under: Process I 39,000, Process II 37,600 and Process III 32,000. There is no stock or work-in-progress in any process. Prepare the Process Accounts.

Notes

Answers: Self Assessment

1.	Wastage	2.	Reusable value.
3.	production expenses	4.	exceed
5.	credit side	6.	debited
7.	debited	8.	Three
9.	True	10.	False
11.	True	12.	True
13.	True	14.	False
15.	False		

13.8 Further Readings

Books

Arora M. N., *Cost and Management Accounting*, Himalaya Publishing House, 2010.

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Online links

www.futureaccountant.com

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Notes

Unit 14: Equivalent Production in Process Costing

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Objectives

After studying this unit, you will be able to:

- Explain the costing of joint products;
- Define the inter process costing;
- Describe the equivalent production.

Introduction

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.

Joint products are produced simultaneously by a common process or series of processes, with each product processing more than a nominal value in the form in which it is produced. The definition emphasizes the point that the manufacturing process creates products in a definite quantitative relationship. An increase in one product's output will bring about an increase in the quantity of the other products, or vice versa, but not necessarily in the same proportion.

14.1 Definition and Explanation of Joint Product Cost

Joint product cost cay be defined as that cost which arises from the common processing or manufacturing of products produced from a common raw material. Whenever two or more different products are created from a single cost factor, a joint product cost results. A joint cost is incurred prior to the point at which separately identifiable products emerge from the same process.

Notes

Example: For example, the production of coke, for which coal is the original raw material. In addition to coke as its major product, the process produces sulfate of ammonia, light oil, crude tar and gas. The greater quantity of gas is not sold but is used to fire the coke ovens and the boilers in the power plant. The cokeovens are the split-off point for cost assignments. The cost of each product consists of a pro rata share of the joint cost plus any separable or subsequent costs incurred in order to put the products into saleable condition.

Average Unit Cost Method: Under this method, the joint cost is apportioned to the joint products by computing the average unit cost of the product units. The average unit cost is computed by dividing the total manufacturing cost by the total number of units produced of all products. This method is useful where all the products produced are uniform with each other in all the respects.

This method will not be useful if the production units are not similar with each other.

Physical Unit Method: Under this method, the joint costs are allocated or apportioned to joint products on the basis of relative physical units of output of each joint product till split-off occurs. These physical units refer to weight or measure such as pounds, tonnes, gallons, bales, volume etc. This method is suitable where the joint products will be measurable in the same units. This method cannot be applied when joint products consist of different types of units like liquids and solids.

Survey Method: Survey Method is also termed as "Points Value Method." In this method, joint costs are allocated on the basis of percentage or points value is assigned to each products according to their relative importance. This method is also taken into various relevant factors such as volume, mixtures, selling price, technical engineering and marketing processes. The ratio of joint costs can be calculated by physical quantities of each products are multiplied with the weight age points.

Contribution Margin Method: This method is also called as "Gross Margin Method." According to this method joint costs are allocated or apportioned as fixed cost and variable cost incurred at the point of separation. Joint fixed costs are apportioned on the basis of contribution of each product whereas variable portion of joint costs are apportioned according to the volume of units produced.

Standard Cost Method: Under this method, joint costs are apportioned on the basis of standard costs. For this, standard costs are determined in advance for aU joint products based on past experience, technical aspects, operational efficiency and cost factors of each products, etc.

Weighted Average Method: Under this method, weights are assigned to each unit based upon size of the units, difference in type of labor employed, material consumption, market share, efforts of labor required and so on. The joint cost is apportioned on the basis of the weights assigned to each product. This method is highly useful if the weights assigned are on objective basis. If subjective element creeps in, the method may not give accurate results.

Market Value Method: This method is also termed as "Relative Sales Value Method." According to this method, the number of units of each product manufactured is multiplied by the product's selling price to obtain the sales value of production. The portion of total joint costs allocated to each product is equal to the ratio of the sales value of each product's total market value. Here, there are various kinds of market value methods:

(a) ***Market Value at Separation Point:*** Under this method, the market value of the joint products at the split off point is ascertained on the basis of dividing joint cost. Weightage is also given to the quantities of each product:

(b) ***Market Value after Further Processing:*** In this method, joint cost are apportioned according to the ratio of final selling price of each product.

Notes

(c) ***Net Realizable Value:*** This method is also called as "Reverse Cost Method." Under this method, the estimated profit, selling and distribution expenses and post separation costs are reduced from the sales value of each joint products.

A ratio is established on the basis of which the total costs before separation point is apportioned. Subsequent costs are added to arrive at product costs.

Selling Price Method: Under this method, the joint cost is apportioned on the basis of sales value at the split off point. The logic is that a product should bear the share of the joint cost according to its sale price. If sales price is higher than that of the other products, more share of joint cost should be charged to that product and if it is comparatively less than that of other products, less share of joint cost should be charged to the same. Though logically this method seems to be sound, in practice, charging higher share of joint cost to the product with higher sales value may not be justified due to the fact that lesser efforts are required for manufacturing of the same.

Standard Cost Method: Method charges issued materials at a predetermined or estimated price reflecting a normal or an expected future price. The difference between the actual and standard cost is recorded in a purchase price variance account. The variance account enables management to observe the extent to which actual materials costs differ from planned objectives or predetermined estimates. Materials are charged into production at the standard price, Thereby eliminating the erratic costing inherent in the actual cost methods.

14.2 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:

(i) ***Average Unit Cost Method:*** Average Unit cost is the 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.

(ii) ***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.

(iii) ***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. Point's values or percentages 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.

Notes

(iv) ***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.

The term by-product is also known as "Minor Product." It refers to any product of comparatively less value that is incidentally manufactured along with the main products. In other words, if the products produced are not as of equal importance, then the products of significantly low value are known as "by products." Accordingly, they are jointly produced with other main products and remain inseparable up to the point of split off or point of separation. Accounting Treatment or Method of Valuation of By-products The object of valuation of by-products cost accounting is to assign a portion of the total costs to each by-products. This is important to calculate the unit product cost and prepare the profit and loss account and balance sheet. Following are the important methods employed in this connection:

(1) ***Non-cost Method:*** This method is also known as "Sales Value Method." While in valuation of the by-products only sales value of by-products is taken in to account in accounting treatment of by-products they use anyone of the following non-cost methods:

(a) *Other Income Method:* Under this method, when the sales value of the by-products is very low or negligible, it is treated as other income and same is credited to the profit and loss account.

(b) *Adding Sales Value to Total Cost Method:* Under this method all the cost of joint products deducted from the combined sales proceeds of both joint products and main products.

(c) *Crediting to Sales Value Loss Selling and Distribution Expenses:* Under this method, costs incurred relating to selling and distribution expenses of by-products are deducted from the sales value of by-product and the net sales value credited to the process account.

(d) *Reverse Cost Method:* In this method, cost of by-product is determined by sales of the by-product deducted from the estimated profit and all costs incurred on by-products after split off point. This method also known as "crediting sales value less profit."

(2) ***Cost Methods:*** Cost methods are useful to determine the cost of by-products when the apportion of the portion of joint costs incurred to by-products. The following are the important methods included under this categories.

(a) *Replacement Cost Method:* This method is also called as "Opportunity Cost Method." In this method, by-products are determined where by-products are used as raw material in some other process. Here the by-products are value at the opportunity lost of purchasing or replacing them. The opportunity cost of by-product refers to the cost which could have been incurred had the by-product being used as material could have been purchased from the market. The process account is credited with the value of by-product so ascertained.

(b) *Standard Cost Method:* In this method, a standard cost is fixed for each by-product and the process account is credited with this standard cost.

(c) *Apportionment on Suitable Basis:* Under this method, if the value of by products is considerably significant, the actual cost of by-product is ascertained by apportioning the joint costs up to the point of physical separation by way of suitable basis used for costing of joint products.

Notes

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

Did u know? 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 upto 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.

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 management 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:

Notes

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
" Labour		3,000			
" Direct expenses		600			
" 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
" Material		2,000	" Transfer to Process III @ ₹ 25.32	600	15,190
" Labour		2,500			
" Direct expenses		200			
" Indirect expenses		500			
" 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
" Materials		1,500	" Finished goods a/c @ ₹ 33.98	600	20,390
" Labour		2,500			
" Direct expenses		500			
" Indirect expenses		500			
" 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.

Notes

Solution:

Joint Expenses Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Materials	9,000	By X's Production a/c	13,900
" Labour	4,000	" Y's Production a/c	1,100
" 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
" Materials	2,000		
" Labour	800		
" 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
" Materials	1,000		
" Labour	300		
" Other expenses	400		
			2,800

Example: A XYZ chemical process yields 70 per cent of the materials introduced as main product and 20 per cent as a by-product, 10 per cent being lost. Technical information reveals that of the materials 75 percent is absorbed by the main product and 25% by the by-product. One unit of main product needs double the time needed for one unit of by-product and overheads are absorbed in the ratio of 3:1.

During a week, 1,000 units of raw materials at a cost of ₹ 5,000 were introduced. Labour totaled ₹ 3,200 and overheads came to ₹ 2,000. Wastage realised ₹ 200. Ascertain the cost of two products.

Solution:

Total number of units produced:

		Units
Main product	70%	700
By-product	20%	200
Wastage	10%	100
Materials introduced		1,000

Notes

Cost Sheet for XYZ Chemical

Particulars	Main Product (700 Units)			By Product (200 units)	
	Basic of Allocation	Total (₹)	Per Unit (₹)	Total (₹)	Per unit (₹)
Materials	75:25	3,750	5.36	1,250	6.25
Labour[1]	14:2	2,800	4.00	400	2.00
Overheads (₹2,000 less ₹ 200)	3:1	1,350	1.93	450	2.25
Total		7,900	11.29	2,100	10.50

Working note:[1] Labour is allocated in the ratio of 14:2 because the main product needs double the wage of that required for the by-product. Hence for purpose of allocation of labour, 700 units of the main product are equivalent to 1,400 units of by-products.

Example: In manufacturing the main product A, a company processes the resulting waste material into two by-products X_1 and X_2. You are required to apportion total cost up to separation point among: A, X_1 and X_2 from the following data. Total cost up to separation point was ₹ 1,36,000.

	A	X_1	X_2
Sales	3,28,000	32,000	48,000
Cost after separation		9,600	14,400
Percentage of net profit to sales		20%	30%
Percentage of selling expenses to sales	20%	20%	20%

Solution:

Cost Charged to By-product

Particulars	Amount (₹)	X_1 (₹)	Amount (₹)	X_2 (₹)
Sale		32,000		48,000
Less : Profit	6,400		14,400	
Selling expenses	6,400	12,800	9,600	24,000
Cost of production		19,200		24,000
Less : cost after separation		9,600		14,400
		9,600		9,600

Statement of Cost and Profit

Particulars	A (₹)	X_1 (₹)	X_2 (₹)
Joint cost	1,36,000		
Less : Charged to X1 a X2 (as per above statement)	19,200	9,600	9,600
	1,16,800	9,600	9,600
Cost after separation		9,600	14,400
Cost of production	1,16,800	19,200	24,000
Selling expenses (20% of sales)	65,600	6,400	9,600
Total Cost	1,82,400	25,600	33,600
Profit	1,45,600	6,400	14,400
Sales	3,28,000	32,000	48,000

Notes

14.3 Inter Process Profit

The usual practice is to transfer the materials to the next process at cost and from the last process to the finished stock account also at cost. But sometimes the transfer is made at market price. It should be noted that merely to add a margin of profit to the cost while transferring the materials to the next process cannot serve any useful purpose. The transfer should be made at the current market price. Following are the main objectives of inter process profit:

- To show whether the cost of production completes with the market price, and
- To make each process stand on its own efficiency and economies.

If the market price be higher than cost, a process account will reveal profit. Then the stock in the next process will not be valued at cost. The value of stock will include a margin of profit which is not proper for balance sheet purposes.

Example: A product passes through three processes A, B and C. The output of process A and process B is charged to the next process at a price calculated to give a profit of 16% on the transfer price while the output of process C is charged to the finished stock account as a profit of 13% on the transfer price.

From the following particulars, prepare the process cost accounts, and calculate the amount of reserve that should be made in respect of the stock in hand.

	Process A (₹)	Process B (₹)	Process C (₹)
Materials and Direct labour	7,000	2,800	4,800
Closing stock	2,000	2,800	2,000

There were no stocks in hand at the beginning of the period and the question of on cost has been ignored. The closing stocks are valued at prime cost in each process.

Solution:

Process Account A

Particulars	Amount (₹)	Particulars	Amount (₹)
To Materials and Direct labour	7,000	By Closing stock	2,000
To Profit (20% on cost or 16 ⅔ % on transfer price)	1,000	By Process B a/c	6,000
	8,000		8,000

Process Account B

Particulars	Amount (₹)	Particulars	Amount (₹)
To Process A a/c	6,000	By Closing stock	2,800
To Materials and Direct labour	2,800	By Process C a/c	7,200
To Profit (20% on cost or 16 ⅔ % on transfer price)	1,200		
	10,000		10,000

Notes

Process Account C

Particulars	Amount (₹)	Particulars	Amount (₹)
To Process B	7,200	By Closing stock	2,000
To Materials and Direct labour	4,800	By Finished stock a/c	11,500
To Profit (15% on cost or 13 ⅓ % on transfer price)	1,500		
	13,500		13,500

Example: A product passes through two processes A and B. Output of Process A is passed to Process B at cost plus 25 per cent profit and finished output is similarly transferred to Finished Stock Account at cost plus 25 per cent profit. There was no partly finished work in either process on 30th June, on which date the following further information's was available:

	Process A (₹)	Process B (₹)
Materials consumed	2,000	6,000
Direct labour	3,000	4,000
Closing stock (30th June)	1,000	3,000

Out of the finished stocks, a portion remained at hand valued at ₹ 5,000 and the balance was sold for ₹ 20,000. Ignoring the question of overheads and assuming there were no opening stocks; prepare the Process and Finished stock accounts.

Solution:

Process Account A

Particulars	Amount (₹)	Particulars	Amount (₹)
To Materials	2,000	By Transfer to Process B a/c	5,000
" Direct labour	3,000	" Closing stock	1,000
" Profit & Loss account (25% on ₹ 4,000)	1,000		
	6,000		6,000

Process Account B

Particulars	Amount (₹)	Particulars	Amount (₹)
To Transferred from Process A a/c	5,000	By Transfer to Finished stock account	15,000
" Materials	6,000		
" Direct labour	4,000	" Closing stock	3,000
" Profit (25% on ₹ 12,000)	3,000		
	18,000		18,000

Finished Stock Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Transferred from Process B a/c	15,000	By Sales	20,000
" Profit and Loss a/c	10,000	" Closing stock	5,000
	25,000		25,000

Notes

14.4 Equivalent Production

Equivalent production represents the production of a process in terms of completed units. In other views, it means converting the uncompleted production into its equivalent of completed units. In every process, an estimate is made of the percentage completion of any work-in-progress. A production statement and a cost statement will then be prepared.

Notes The work-in-progress is inspected and an estimate is made of the degree of completion, usually on a percentage basis. It is most important that this estimate is as accurate as possible because a mistake at this stage would affect the stock valuation used in the preparation of final accounts.

The techniques of calculating equivalent production are as follows:

(a) Firstly the opening incomplete or work-in-progress units should be converted into equivalent units as incomplete.

For example, opening work-in-progress is 500 units which are 60% complete, therefore only 40% work is to be done on these units in the process. Thus, on these units a cost of 500 × 40% = 200 units will be incurred in the process to complete these,

(b) To above units, add units started and finished during the production period or units completed in the process. These will be new units introduced less closing units and units scrapped,

(c) Thereafter, add equivalent units of closing units, and

(d) The total of all these will be equivalent production.

Equivalent unit should be calculated separately for each element of cost (viz. material, labour and overheads) because the percentage of completion of the different cost component may be different.

Accounting Procedure

The following procedure is followed when there is work-in-progress:

(1) Find out equivalent production after taking into account of the process losses, degree of completion of opening and/or closing stock.

(2) Find out net process cost according to elements of costs i.e. material, labour and overheads.

(3) Ascertain cost per unit of equivalent production of each element of cost separately by dividing each element of costs by respective equivalent production units.

(4) Evaluate the cost of output finished and transferred work in progress.

The total cost per unit of equivalent units will be equal to the total cost divided by effective units and cost of work-in-progress will be equal to the equivalent units of work-in-progress multiply by the cost per unit of effective production. In short the following from steps an involved.

Step 1 – prepare statement of Equivalent production

Step 2 – Prepare statement of cost per Equivalent unit

Step 3 – Prepare of Evaluation

Step 4 – Prepare process account

Notes

The problem on equivalent production may be divided into four groups.

I. when there is only closing work-in-progress but without process losses

II. when there is only closing work-in-progress but with process losses

III. when there is only opening as well as closing work-in-progress without process losses

IV. when there is opening as well as closing work-in-progress with process losses

Situation I

Only closing work-in-progress without process losses: In this case, the existence of process loss is ignored. Closing work-in-progress is converted into equivalent units on the basis of estimates on degree of completion of materials, labour and production overhead. Afterwards, the cost per equivalent unit is calculated and the same is used to value the finished output transferred and the closing work-in-progress.

Situation II

When there is closing work-in-progress with process loss or gain: If there are process losses the treatment is same as already discussed in this chapter. In case of normal loss nothing should be added to equivalent production. If abnormal loss is there, it should be considered as good units completed during the period. If units scrapped (normal loss) have any reliable value, the amount should be deducted from the cost of materials in the cost statement before dividing by equivalent production units. Abnormal gain will be deducted to obtain equivalent production.

Situation III

Opening and closing work-in-progress without process losses: Since the production is a continuous activity there is possibility of opening as well as closing work-in-progress. The procedure of conversion of opening work-in-progress will vary depending on the method of apportionment of cost followed viz, FIFO, Average cost Method and LIFO.

Let us discuss the methods of valuation of work-in-progress one by one.

(a) ***FIFO Method:*** The FIFO method of costing is based on the assumption of that the opening work-in-progress units are the first to be completed. Equivalent production of opening work-in-progress can be calculated as follows:

Equivalent Production = Units of Opening WIP x Percentage of work needed to finish the units

(b) ***Average Cost Method:*** This method is useful when price fluctuate from period to period. The closing valuation of work-in-progress in the old period is added to the cost of new period and an average rate obtained. In calculating the equivalent production opening units will not be shown separately as units of work-in-progress but included in the units completed and transferred.

(c) ***Weighted Average Cost Method:*** In this method no distinction is made between completed units from opening inventory and completed units from new production. All units finished during the current accounting period are treated as if they were started and finished during that period. The weighted average cost per unit is determined by dividing the total cost (opening work-in-progress cost + current cost) by equivalent production.

(d) ***LIFO Method:*** In LIFO method the assumption is that the units entering into the process is the last one first to be completed. The cost of opening work-in-progress is charged to the

Notes

closing work-in-progress and thus the closing work-in-progress appears cost of opening work-in-progress. The completed units are at their current cost.

(1) Format of statement of Equivalent Production :

Input		Output		Equivalent Production					
Particulars	**Units**	**Particulars**	**Units**	**Material**		**Labour**		**Overheads**	
				%	**Units**	**%**	**Units**	**%**	**Units**
Opening Stock	xx	Units completed	xx	xx	xx	xx	xx		
Units Introduced	xx	Normal Loss	xx	--	--	--	--		
		Abnormal Loss	xx	xx	xx	xx	xx		
	xx	Equivalent Units	xx	xx	xx	xx	xx	xx	Xx

(2) Statement of cost per Equivalent Units :

Element of costing	Cost (₹)	Equivalent Units	Cost per Equivalent Units (₹)
Material Cost (Net)	Xx	Xx	Xx
Labour Cost	Xx	Xx	Xx
Overheads Cost	Xx	xx	Xx
	xx		Xx

(3) Statement of Evaluation

Particulars	Element of cost	Equivalent Units	Cost per equivalent units (₹)	Cost (₹)	Total Cost (₹)
Units completed	Material	xx	xx	Xx	
	Labour	xx	xx	xx	
	Overheads	xx	xx	xx	Xx
Closing WIP	Material	xx	xx	xx	
	Labour	xx	xx	xx	
	Overheads	xx	xx	xx	Xx
Abnormal Loss	Material	xx	xx	xx	
	Labour	xx	xx	xx	
	Overheads	xx	xx	xx	Xx

Illustration: The following information is given in respect of Process costing 10 : 3 for the month of January 2009.

Opening stock – 2,000 units made up of

	₹
Direct Material – I	12,350
Direct Material – II	13,200
Direct Labour	17,500
Overheads	11,000

Notes

Transferred from Process 2 – 20,000 units @ ₹ 6 per unit. Transferred to Process 4 – 17,000 units
Expenditure incurred in process – 3

	₹
Direct Material	30,000
Direct Labour	60,000
Overheads	60,000

Scrap:1,000 units-Direct Materials 100%,Direct Labour 60%, Overheads 40%.

Normal Loss 10 % of Production.

Scrapped units realized ₹ 4/- per unit

Closing stock : 4,000 units – Degree of completion. Direct Materials 80 %, Direct Labour 60 % and Overheads 40 %.

Prepare Process 3 Account using average price method along with necessary supporting statements.

Solution:

Statement of Equivalent Production (Weighted Average Cost Material)

Particulars	Total Units	Material – I		Material – II		Labour		Overheads	
				%	Units	%	Units	%	Units
Units Completely									
Processed	17000	100	17000	100	17000	100	17000	100	17000
Normal Loss	1800	-							
10% of (2000 +									
20000 – 4000)									
Abnormal Gain	800	100	800	100	800	100	800	100	800
Closing Stock	4000	100	4000	80	3200	60	2400	40	1600
	22000		20200		19400		18600		17800

Statement of Cost

Particulars	Cost (₹)	Equivalent Units	Rate/Equivalent Units (₹)
Material – I :			
Opening balance 2000 units	12,350		
Cost of 20000 units @ ₹ 6			
Per unit	1,20,000		
	1,25,150	20,200	6.1955
Material – II :			
Opening Stock	13,200		
In Process II	30,000		
	43,200	19,400	2.2268

Contd…

Notes

Labour :			
Opening Labour	17,500		
In Process II	60,000		
	77,500	18,600	4.1667
Overheads :			
Opening Stocks	11,000		
In Process II	60,000		
	71,000	17,800	3.9888
Total cost per unit			**16.5778**

Valuation of Equivalent Unit

			₹
Finished goods	(17000 units x ₹ 16.5778)		2,81,822
Abnormal Units	(800 units x ₹ 16.5778)		13,262
Work in progress			
Material I	(4000 units x ₹ 6.1955)	24,782	
Material II	(3200 units x ₹ 2.2268)	7,126	
Labour	(2400 units x ₹ 4.1667)	10,000	
Overheads	(1600 units x ₹ 3.9888)	6,382	48,290

Dr. Process III A/c Cr.

Particulars	Units	₹	Particulars	Units	₹
To Opening WIP	2,000	57,050	By Normal Loss	1,800	7,200
To Process 2	20,000	1,20,000	By Finished Goods		
To Direct			Units	17,000	2,81,822
Material II		30,000	By Closing Balance	4,000	48,290
To Direct Labour		60,000			
To Overheads		60,000			
To Abnormal Gain	800	13,262			
	22,800	**3,37,312**		**22,800**	**3,37,312**

Example: From the following information's find out (i) Equivalent Production, (ii) Cost per unit of Equivalent Production, and (iii) Prepare Process A Account. Assume there is no opening work-in-progress and process loss.

Input	1,900 units
Output	1,500 units
Closing work-in-progress	400 units

Items	Degree of completion of closing WIP in %	Process costs of the current period (₹)
Materials	80	3,640
Direct labour	70	5,340
Overheads	70	3,560

Solution:

Notes

Statement of Equivalent Production

Input		Output		Equivalent Production					
Items	Units	Items	Units	Materials		Direct labour		Overheads	
				%	Units	%	Units	%	Units
Units Introduced	1,900	Units completed	1,500	100	1,500	100	1,500	100	1,500
		Work-in-progress	400	80	320	70	280	70	780
	1,900		1,900		1,820		1,780		1,780

Statement of Cost

Element of Cost or Items	Cost (₹)	Equivalent Production (units)	Cost per units (₹)
Materials	3,640	1,820	2.00
Direct labour	5,340	1,780	3.00
Overheads	3,560	1,780	2.00

Statement of Evaluation (Cost of per unit)

Production	Element of Cost	Equivalent Production (units)	Cost per unit	Cost (₹)	Total Cost (₹)
Finished	Materials	1,500	2	3,000	
	Direct labour	1,500	3	4,500	
	Overheads	1,500	2	3,000	10,500
Work-in-progress	Materials	320	2	640	
	Direct labour	280	3	840	
	Overheads	280	2	560	2,040

Process Account

Items	Units	Amount (₹)	Items	Units	Amount (₹)
To Materials	1,900	3,640	By Finished stock a/c	1,500	10,500
To Direct labour		5,340	By Work-in-progress	400	2,040
To Overheads		3,560			
	1,900	12,540		1,900	12,540

Example: From the following information's calculate: (i) Statement of Equivalent Production, and (ii) Cost per unit of finished production.

Units introduced in the process	4,000
Units completed and transferred to next process	3,000
Units in process at the end	800
Stage of completion: Materials 80%; Labour and Overheads 70%	
Normal process loss (units)	200
Value of scrap per unit	₹ 10
Cost of Raw materials	₹ 80,000

Notes

Direct wages ₹ 1,10,000

Overheads ₹ 75,000

Solution:

Statement of Equivalent Production

Input		Output		Equivalent Production in Units			
				As regards materials		As regards direct wages and overheads	
Particulars	Units	Particulars	Total Units	Stage of completion	No. of units	Stage of completion	No. of Units
Units Introduced in the process	4,000	Completed and transferred to next process	3,000	100%	3,000	100%	3,000
		Closing stock	800	80%	640	70%	560
		Normal loss	200	--	--	--	
Total	4,000	Total	4,000				
		Total equivalent completed units			3,640		3,560

Statement of Cost

Elements of cost	Cost (₹)	Equivalent Production in Units	Cost per Unit (₹)
Materials	80,000		
Less: Value of scrap 200 units @₹ 10	2,000		
	78,000	3,640	21.43
Direct wages	1,10,000	3,540	30.90
Overheads	75,000	3,560	21.07
Total	2,63,000	–	73.40

Example: The following data is available in respect of Process Z for the month of June, 2006:

Opening Stock 100 units

Value: Materials (A) ₹ 4,000; Material (B) ₹ 2,000.

Labour ₹ 350, Production Overheads ₹ 800

Transfer from process 1:16,000 units of ₹ 81,000

Transfer to process 3: 14,500 units

	Labour added to process 2	₹ 43,750
	Labour amounted to	₹ 14,300
	Production overhead absorbed	₹ 28,500
	Units scrapped:	500
Degree of completion:	Materials	100%
	Labour	60%
	Production overhead	20%

Normal loss was estimated at 5% of production units realised ₹ 5 per unit

Notes

Closing stock: 2,000 units

Degree of completion: Materials 50%

Labour 20%

Production overhead 20%

Prepare the process and other accounts using weighted average cost method.

Solution:

Statement of Equivalent Units

Particulars	Units	Material A		Material B		Labour		Production Overheads	
		Units	%	Units	%	Units	%	Units	%
Normal Loss	750(a)	--	--	--	--	--	--	--	--
Completed units	14,500	14,500	100	14,500	100	14,500	100	14,500	100
Closing stock	2,000	2,000	100	1,000	50	400	20	400	20
	17,250	16,500		15,500		14,900		14,900	
Less : Abnormal gain	250(d)	250	100	250	100	250	100	250	100
Total	17,000	16,250		15,250		14,650		14,650	

Statement of Cost of Equivalent Units

Particulars	(₹)	Cost (₹)	Equivalent Units	Cost per Equivalent unit (₹)
Materials (A) :				
Opening WIP	4,000			
Process 1	81,000			
	85,000			
Less: Scrap of Normal @ ₹ 5 x 750 units	3,750	81,250	16,250	5.00
Materials (B) :				
Opening WIP	2,000			
Add: Materials	43,750	45,750	15,250	3.00
Labour :				
Opening WIP	350			
Add: Current cost	14,300	14,650	14,650	1.00
Production Overhead :				
Opening WIP	800			
Add: Current period	28,500	29,300	14,650	2.00
		1,70,950		

Notes

Statement of Cost

Production	Elements of cost	Equivalent Units	Cost per unit	Cost (₹)	Total Cost (₹)
Completed units	Material (A)	14,500	5	72,500	
	Material (B)	14,500	3	43,500	
	Labour	14,500	1	14,500	
	Production overheads	14,500	2	29,000	1,59,500
Closing Stock	Material (A)	2,000	5	10,000	
	Material (B)	1,000	3	3,000	
	Labour	400	1	400	
	Production overhead	400	2	800	14,200
Abnormal Gain	Material (A)	250	5	1,250	
	Material (B)	250	3	750	
	Labour	250	1	250	
	Production overhead	250	2	500	2,750

Process Account 2

Particulars	Units	₹	Particulars	Units	₹
To Balance b/d	1,000	7,150	By Normal loss a/c	750	3,750
" Process 1 a/c	16,000	81,000	" Process 3 a/c	14,500	1,59,500
" Materials		43,750	" Balance c/d	2,000	14,200
" Labour		14,300			
" Production overheads		28,500			
" Abnormal gain	250	2,750			
	17,250	1,77,450		17,250	1,77,450

Normal Loss Account

To Process 2 a/c	750	3,750	By Bank	500	2,500
			" Abnormal gain a/c	250	1,250
	750	3,750		750	3,750

Abnormal Gain Account

To Normal loss a/c	250	1,250	By Bank	250	2,750
" Costing P and L a/c		1,500			
	250	2,750		250	2,750

Working notes:

(a) Normal loss 5% of units processed i.e. 5% of 15,000 = 750 units

(b) Units processed = Opening stock + Transfer from Process 1 – Closing stock

= 1,000 +16,000 – 2,000 = 15,000 units

(c) Normal output = Opening WIP + Transfer from Process 1 – Closing WIP – Normal Loss

= 1,000 + 16,000 – 2,000 – 750 = 14,250 units

Self Assessment

Notes

State whether the following statements are true or false:

1. Costing for joint products implies the assignment of a portion of the joint cost to each of the joint product.
2. Average Unit cost is the simplest method.
3. The basic problem in respect of joint products is that of apportioning the joint cost.
4. Physical Unit method is a physical base such as raw materials weight, linear measure volume.
5. By-products with relatively unimportant market value, are feasible nor practicable.
6. The income realised from the sale of by-products is increased by the selling costs incurred on the sale and manufacturing costs.
7. The work-in-progress is inspected and an estimate is made of the degree of completion, usually on a percentage basis.
8. The sale proceeds of by-products may be debited to the account of main product.
9. All income received from the sale of by-products may be considered as income and credited to the Trading Account.
10. This method of apportioning joint costs to products on the basis of relative value is the most popular and convenient method.
11. Under average method the average process cost is obtained by adding the opening work-in-progress and the current cost and dividing the total by total equivalent units.

Fill in the blanks:

12. The …… are split in the ratio of selling price of individual products.
13. …… are relatively considered less important.
14. The sale proceeds of by-products may be …… to the account of main product and thus it can be …… from the cost of production of main product.
15. If the market price be higher than cost, a process account will reveal ……
16. …… represents the production of a process in terms of completed units.

14.5 Summary

- 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.
- Equivalent production represents the production of a process in terms of completed units. In other views, it means converting the uncompleted production into its equivalent of completed units. In every process, an estimate is made of the percentage completion of any work-in-progress. A production statement and a cost statement will then be prepared.

Notes

14.6 Keywords

By-products: Secondary product.

Equivalent Production: Number of units produced and material used.

Market Price: Price of a commodity in the market.

Physical Unit: A unit of measurement.

14.7 Review Questions

1. Explain the treatment of by-product in process costing.
2. Define joint products, by-products and give example of each.
3. Explain the various ways for apportioning of Joint cost to joint products.
4. "The value of scrap generated in a process should be credited to the process account". Do you agree with this statement? Give reasons.
5. What is the concept of Equivalent Production? Explain in detail.
6. Explain briefly the distinction between Joint Products and By-products.
7. Explain the term Waste, Scrap, Spoilage and Defectives. Enumerate the steps for control and the principles of accounting of such losses to be followed in manufacturing concern.
8. What are equivalent units of production? State the two principal methods of calculating equivalent units.
9. What are various methods of accounting for By-products? Briefly explain each of the methods.
10. What do you mean by inter-process profit? Discuss its procedure.
11. Product A yields by-products B and C. The joint expenses of manufacture are:

Materials	₹ 11,200
Labour	₹ 9,500
On cost	₹ 9,000
	₹ 29,700

Subsequent expenses are as follows:

	A (₹)	B (₹)	C (₹)
Materials	4,000	2,500	1,300
Labour	4,200	3,000	1,200
On cost	4,400	2,000	1,000
	12,600	7,500	3,500
The selling prices are	51,000	21,000	10,000
The estimated profit on sales is	40%	30%	20%

Show the manner in which you would apportion the joint expenses of manufacture and prepare Process Accounts.

Notes

12. A work order passes through two distinct processes. The product of the first process, less wastage and by-product becomes the raw materials for the second process. All by-products are sold off direct from the factory. The following information is obtained from the industry records:

	Process I	Process II
Raw materials	1,000 tons at ₹ 30 a ton	
Wages	₹ 25,000	₹ 20,000
Factory overheads	80% of wages	75% of wages
Wastages	10 tons	15 tons
Sale of by-products	190 tons at cost plus 20%	85 tons at cost plus 25%

Give the necessary accounts for I and II processes, showing at each stage the cost of the production and the profit on the sale of the by-products.

13. The following details are available from the books of a industry in which two processes are employed. Prepare necessary accounts.

	Process I	Process II
Materials	1,000 tons @ ₹ 50 per ton	
Wages	₹ 30,000	₹ 20,000
Factory overheads	50% of wages	30% of wages
Wastage	100 tons	200 tons
By-products	100 tons sold at cost plus 20%	200 tons sold at cost plus 25%

Answers: Self Assessment

1.	True	2.	True
3.	True	4.	True
5.	False	6.	False
7.	True	8.	False
9.	False	10.	True
11.	True	12.	joint costs
13.	By-products	14.	Credited, deducted
15.	Profit	16.	Equivalent production

14.8 Further Readings

Books

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Online links

www.futureaccountant.com

www.managementstudyguide.com