## II B.COM

## CORE COURSE VII

## COST ACCOUNTING

**OBJECTIVE:** To enable the students to know the importance of costing and to understand the basic concepts.

## Unit – I

Definition, Scope and nature of cost accounting – cost concepts – classification – objectives and advantages – demerits of cost accounting – methods and techniques – cost unit – cost centers – cost sheet.

## Unit – II

Materials cost – purchase procedure – stores procedure – receipt and issue of materials – storage organization and layout – Inventory control – levels of stock, perpetual inventory. ABC Analysis, EOQ – Stores ledger – pricing of material issues, FIFO, LIFO, Simple Average & Weighted Average.

## Unit – III

Labour cost – Time recording and time booking – methods of remuneration and incentive schemes – overtime and idle time – labour turnover - types – causes and remedies.

## Unit – IV

Overheads – collection, classification, allocation, apportionment, absorption – recovery rates – Over & Under absorption – cost sheet and cost reconciliation statement.

## Unit – V

Job costing, Contract costing, Process costing (Normal loss, Abnormal loss and gains only) – operating costing.

Theory: 25%, Problem: 75%

## Text and Reference Books (Latest revised edition only)Cost Accounting by Jawahalal – TMH, New Delhi

1. Cost Accounting by Jain and Narang – Kalyani Publishers, Chennai
2. Cost Accounting by S.P. Iyengar – Sultan Chand & Sons, New Delhi.
3. Cost Accounting 2.e by A. Murthy and S. Gurusamy – Vijay Nicole Imprints (P) Ltd, Chennai
4. Cost Accounting by Bhagwathi and Pillai – Sultan Chand & Sons, New Delhi.
5. Cost Accounting by S.N. Maheswari – Sultan Chand & Sons, New Delhi.
6. Cost Accounting by Dr. R. Ramachandran & Dr. R. Srinivasan, Sri Ram Publication, Trichy.

## COST ACCOUNTING

## SUBJECT CODE: 16CCCCM7

## UNIT-I

#### Introduction

Cost Accounting is a branch of accounting and has been developed due to limitations of financial accounting. Financial accounting is primarily concerned with record keeping directed towards the preparation of Profit and Loss Account and Balance Sheet. It provides information regarding the profit and loss that the business enterprise is making and also its financial position on a particular date. The financial accounting reports help the management to control in a general way the various functions of the business but it fails to give detailed reports on the efficiency of various divisions.

#### Costing and Cost Accounting

The costing terminology of C.I.M.A., London defines costing as the “the techniques and processes of ascertaining costs”. These techniques consist of principles and rules which govern the procedure of ascertaining cost of products or services. The techniques to be followed for the analysis of expenses and the processes by which such an analysis should be related to different products or services differ from industry to industry. These techniques are also dynamic and they change with time.

The main object of traditional cost accounts is the analysis of financial records, so as to subdivide expenditure and to allocate it carefully to selected cost centers, and hence to build up a total cost for the departments, processes or jobs or contracts of the undertaking. The extent to which the analysis of expenditure should be carried will depend upon the nature of business and degree of accuracy desired. The other important objective of costing are cost control and cost reduction.

Cost Accounting may be regarded as “a specialized branch of accounting which involves classification, accumulation, assignment and control of costs.” The costing terminology of C.I.M.A, London defines cost accounting as “the process of accounting for costs from the point at which expenditure is incurred or committed to the establishment of its ultimate relationship with cost centers and cost units. In its widest usage, it embraces the preparation of statistical data, the application of cost control methods and the ascertainment of profitability of activities carried out or planned”.

Wheldon defines cost accounting as “classifying, recording and appropriate allocation of expenditure for determination of costs of products or services and for the presentation of suitably arranged data purposes of control and guidance of management”. It is thus a formal mechanism by means of which costs of products or services are ascertained and controlled.

#### General Principles of Cost Accounting

The following may be considered as the General Principles of Cost Accounting:

1. A cost should be related to its causes: Cost should be related as closely as possible to their causes so that cost will be shared only among the cost units that pass thorough the department of which the expenses are related.
2. A cost should be charged only after it has been incurred: While determining the cost of individual units those costs which have actually been incurred should be considered. For example, a cost unit should not be charged to the selling costs, while it is still in the factory. Selling costs can be charged with the products which are sold.
3. The convention of prudence should be ignored: Usually accountants believe in historical costs and while determining cost, they always attach importance to historical cost. In Cost Accounting this convention must be ignored, otherwise, the management appraisal of the profitability of the projects may be vitiated. According to W.M. Harper, “a cost statement should, as far as possible, give facts with no known bias. If a contingency needs to be taken into consideration it should be shown separately and distinctly”.
4. Abnormal costs should be excluded from cost accounts: Costs which are of abnormal nature (eg. Accident, negligence etc.) should be ignored while computing the cost, otherwise, it will distort costs figures and mislead management as to working results of their undertaking under normal conditions.
5. Past costs not to be charged to future period: Costs which could not be recovered or charged in full during the concerned period should not be taken to a future period, for recovery. If past costs are included in the future period, they are likely to influence the future period and future results are likely to be distorted.
6. Principles of double entry should be applied wherever necessary: Costing requires a greater use of cost sheets and cost statements for the purpose of cost ascertainment and cost control, but cost ledger and cost control accounts should be kept on double entry principle as far as possible.

#### Objectives of Cost Accounting

Cost accounting aims at systematic recording of expenses and analysis of the same so as to ascertain the cost of each product manufactured or service rendered by an organization. Information regarding cost of each product or service would enable the management to know where to economize on costs, how to fix prices, how to maximize profits and so on. Thus, the main objectives of cost accounting are the following.

1. To analyse and classify all expenditure with reference to the cost of products and operations.
2. To arrive at the cost of production of every unit, job, operation, process, department or service and to develop cost standard.
3. To indicate to the management any inefficiencies and the extent of various forms of waste, whether of materials, time, expenses or in the use of machinery, equipment and tools. Analysis of the causes of unsatisfactory results may indicate remedial measures.
4. To provide data for periodical profit and loss accounts and balance sheets at such intervals,

e.g. weekly, monthly or quarterly as may be desired by the management during the financial

year, not only for the whole business but also by departments or individual products. Also, to explain in detail the exact reasons for profit or loss revealed in total in the profit and loss accounts.

1. To reveal sources of economies in production having regard to methods, types of equipment, design, output and layout. Daily, Weekly, Monthly or Quarterly information may be necessary to ensure prompt constructive action.
2. To provide actual figures of costs for comparison with estimates and to serve as a guide for future estimates or quotations and to assist the management in their price fixing policy.
3. To show, where Standard Costs are prepared, what the cost of production ought to be and with which the actual costs which are eventually recorded may be compared.
4. To present comparative cost data for different periods and various volume of output and to provide guidance in the development of business. This is also helpful in budgetary control.
5. To record the relative production results of each unit of plant and machinery in use as a basis for examining its efficiency. A comparison with the performance of other types of machines may suggest the necessity for replacement.
6. To provide a perpetual inventory of stores and other materials so that interim Profit and Loss Account and Balance Sheet can be prepared without stock taking and checks on stores and adjustments are made at frequent intervals. Also to provide the basis for production planning and for avoiding unnecessary wastages or losses of materials and stores.

Last but not the least, to provide information to enable management to make short term decisions of various types, such as quotation of price to special customers or during a slump, make or buy decision, assigning priorities to various products, etc.

#### Cost Accounting and Financial Accounting-

Both financial accounting and cost accounting are concerned with systematic recording and presentation of financial data. Financial accounting reveals profits and losses of the business as a whole during a particular period, while cost accounting shows, by analysis and localization, the unit costs and profits and losses of different product lines. The main difference between financial accounting and cost accounting are summarized below.

1. Financial accounting aims at safeguarding the interests of the business and its proprietors and others connected with it. This is done by providing suitable information to various parties, such as shareholders or partners, present or prospective creditors etc. Cost accounting on the other hand, renders information for the guidance of the management for proper planning, operation, control and decision making.
2. Financial accounts are kept in such a way as to meet the requirements of the Companies Act, Income Tax Act and other statues. On the other hand cost accounts are generally kept voluntarily to meet the requirements of the management. But now the Companies Act has made it obligatory to keep cost records in some manufacturing industries.
3. Financial accounting emphasizes the measurement of profitability, while cost accounting aims at ascertainment of costs and accumulates data for this very purpose.
4. Financial accounts disclose the net profit and loss of the business as a whole, whereas cost accounts disclose profit or loss of each product, job or service. This enables the management to eliminate less profitable product lines and maximize the profits by concentrating on more profitable ones.
5. Financial accounting provides operating results and financial position usually gives information through cost reports to the management as and when desired.
6. Financial accounts deal mainly with actual facts and figures, but cost accounts deal partly with facts and figures, but cost accounts deal with facts and figures and partly with estimates.
7. In case of financial accounts stress is on the ascertainment and exhibition of profits earned or losses incurred in the business. On account of this reason in financial accounts, the transactions are recorded, classified and analyzed in a subjective manner i.e. according to the nature of expenditure. In cost accounts the emphasis is more on aspects of planning and control and therefore transactions are recorded in an objective manner.
8. Financial accounts are concerned with external transactions i.e. transactions between the business concern on one side and third parties on the other. These transactions form the basis for payment or receipt of cash. While cost accounts are concerned with internal transactions which do not form the basis of payment or receipt of cash.
9. The costs are reported in aggregate in financial accounts but costs are broken into unit basis in cost accounts.
10. Financial accounts do not provide information on the relative efficiencies of various workers, plants and machinery while cost accounts provide valuable information on the relative efficiencies of various plants and machinery.
11. In financial accounts stocks are valued at cost or market price whichever is less, whereas stocks are valued at cost price in cost accounts.

#### Importance of Cost Accounting

The limitations of financial accounting have made the management to realize the importance of cost accounting. Whatever may be the type of business, it involves expenditure on labour, materials and other items required for manufacturing and disposing of the product. The management has to avoid the possibility of waste at each stage. It has to ensure that no machine remains idle, efficient labour gets due incentive, by-products are properly utilized and costs are properly ascertained. Besides the management, the creditors and employees are also benefited in numerous ways by installation of a good costing system. Cost accounting increases the overall productivity of an organization and serves as an important tool, in bringing prosperity to the nation, thus, the importance of cost accounting can be discussed under the following headings:

1. **Costing as an aid to management**:- Cost accounting provides invaluable aid to management. It provides detailed costing information to the management to enable them to maintain effective control over stores and inventory, to increase efficiency of the organization and to check wastage and losses. It facilitates delegation of responsibility for important tasks and rating of employees. For all these the management should be capable of using the information provided by cost accounts in a proper way. The various advantages derived by the management from a good system of costing are as follows:
2. **Cost accounting helps in periods of trade depression and trade competition**. In periods of trade depression, the organization cannot afford to have wastages which pass unchecked. The management must know areas where economies may be sought, waste eliminated and efficiency increased. The organization must wage a war not only for its survival but also continued growth. The management should know the actual cost of their products before embarking on any scheme of price reduction. Adequate system of costing facilitates this.
3. **Cost accounting aids price fixation**. Although the law of supply and demand determines the price of the product, cost to the producer does play an important role. The producer can take necessary guidance from his costing records in case he is in a position to fix or change the price charged.
4. **Cost accounting helps in making estimates**. Adequate costing records provide a reliable basis for making estimates and quoting tenders.
5. **Cost accounting helps in channelizing production on right lines**. Proper costing information makes it possible for the management to distinguish between profitable and non-profitable activities; profits can be maximized by concentrating on profitable operations and eliminating non-profitable ones.
6. **Cost accounting eliminates wastages**. As cost accounting is concerned with detailed breakup of costs, it is possible to check various forms of wastages or losses.
7. **Cost accounting makes comparisons possible**. Proper maintenance of costing records

provides various costing data for comparisons which in turn helps the management in formulating future lines of action.

1. **Cost accounting provides data for periodical Profit and Loss Account**. Adequate costing records provide the management with such data as may be necessary for preparation of Profit and Loss Account and Balance Sheet at such intervals as may be desired by the management.
2. **Cost accounting helps in determining and enhancing efficiency**. Losses due to wastage of materials, idle time of workers, poor supervision etc will be disclosed if the various operations involved in the production are studied carefully. Efficiency can be measured, cost controlled and various steps can be taken to increase the efficiency.
3. **Cost accounting helps in inventory control**. Cost accounting furnishes control which management requires, in respect of stock of materials, work in progress and finished goods.
4. **Costing as an aid to Creditors**.

Investors, banks and other money lending institutions have a stake in the success of the business concern are therefore benefitted immensely by the installation of an efficient system of costing. They can base their judgment about the profitability and future prospects of the enterprise on the costing records.

1. **Costing as an aid to employees**.

Employees have a vital interest in their employer’s enterprise in which they are employed. They are benefited by a number of ways by the installation of an efficient system of costing. They are benefited, through continuous employment and higher remuneration by way of incentives, bonus plans, etc.

1. **Costing as an aid to National Economy**

An efficient system of costing brings prosperity to the business enterprise which in turn brings prosperity to the business enterprise which in turn results in stepping up of the government revenue. The overall economic development o f a country takes place as a consequence of increase in efficiency of production. Control of costs, elimination of wastages and inefficiencies led to the progress of the industry and, in consequence of the nation as a whole.

**Cost units**- The Chartered Institute of Management Accountants, London, defines a unit of cost as “a unit of quantity of product, service or time in relation to which costs may be ascertained or expressed”.

The forms of measurement used as cost units are usually the units of physical measurements like number, weight, area, length, value, time etc.

Following are some examples of cost unit.

**Industry/product Cost unit basis**

Automobile Numbers

Brick works per 1000 bricks

Cement per Tonne

Chemicals Litre, gallon, kilogram, ton

Steel Tonne

Sugar Tonne

Transport Passenger-kilometre, tonne kilometer

**Cost centre** – According to Chartered Institute of Management Accountants, London, cost centre means “a location, person or item of equipment (or group of these) for which costs may be ascertained and used for the purpose of cost control”. Cost centre is the smallest organizational sub- unit for which separate cost collection is attempted. Thus cost centre refers to one of the convenient unit into which the whole factory organization has been appropriately divided for costing purposes. Each such unit consists of a department or a sub-department or item of equipment or , machinery or a person or a group of persons.

For example, although an assembly department may be supervised by one foreman, it may contain several assembly lines. Some times each assembly line is regarded as a separate cost centre with its own assistant foreman.

The selection of suitable cost centres or cost units for which costs are to be ascertained in an undertaking depends upon a number of factors which are listed as follows.

1. Organization of the factory
2. Conditions of incidence of cost
3. Requirements of the costing system ie. Suitability of the units or centres for cost purposes.
4. Availability of information
5. Management policy regarding making a particular choice from several alternatives.

**Profit centre** – A profit centre is that segment of activity of a business which is responsible for both revenue and expenses and discloses the profit of a particular segment of activity. Profit centres are created to delegate responsibility to individuals and measure their performance.

#### Difference between Profit centre and Cost centre

The various points of difference between Profit centre and cost centre are as follows. Cost centre is the smallest unit of activity or area of responsibility for which costs are collected whereas a profit centre is that segment of activity of a business which is responsible for both revenue and expenses.

1. Cost centres are created for accounting conveniences of costs and their control whereas as a profit centre is created because of decentralization of operations i.e., to delegate responsibility to individuals who have greater knowledge of local conditions etc.
2. Cost centers are not autonomous whereas profit centres are autonomous.
3. A cost centre does not have target cost but efforts are made to minimize costs, but each profit centre has a profit target and enjoys authority to adopt such policies as are necessary to achieve its targets.
4. There may be a number of cost centres in a profit centre in a profit centre as production or service cost centres or personal or impersonal but a profit centre may be a subsidiary company within a group or division in a company.

#### Cost classification

Costs can be classified or grouped according to their common characteristics. Proper classification of costs is very important for identifying the costs with the cost centers or cost units. The same costs are classified according to different ways of costing depending upon the purpose to be achieved and requirements of a particular concern. The important ways of classification are:

1. **By Nature or Elements**. According to this classification the costs are classified into three categories i.e., Materials, Labour and Expenses. Materials can further be sub-classified as raw materials components, spare parts, consumable stores, packing materials etc. This helps in finding the total cost of production and the percentage of materials (labour or other expenses) constituted in the total cost. It also helps in valuation of work-in-progress.
2. **By Functions**: This classification is on the basis of costs incurred in various functions of an organization ie. Production, administration, selling and distribution. According to this classification, costs are divided into Manufacturing and Production Costs and Commercial costs.

**Manufacturing and Production Costs** are costs involved in manufacture, construction and fabrication of products.

**Commercial Costs** are (a) administration costs (b) selling and distribution costs.

1. **By Degree of Traceability to the Product :** According to this, costs are divided indirect costs and indirect costs. **Direct Costs** are those costs which are incurred for a particular product and can be identified with a particular cost centre or cost unit. Eg:- Materials, Labour. **Indirect Costs** are those costs which are incurred for the benefit of a number of cost centre or cost units and cannot be conveniently identified with a particular cost centre or cost unit. Eg:- Rent of Building, electricity charges, salary of staff etc.
2. **By Changes in Activity or Volume:** According to this costs are classified according to their behavior in relation to changes in the level of activity or volume of production. They are fixed, variable and semi-variable. **Fixed Costs** are those costs which remain fixed in total amount with increase or decrease in the volume of the output or productive activity for a given period of time. Fixed Costs per unit decreases as production increases and vice versa. Eg:- rent, insurance of factory building, factory manager’s salary etc. **Variable Costs** are those costs which vary in direct proportion to the volume of output. These costs fluctuate in total but remain constant per unit as production activity changes. Eg:- direct material costs, direct labour costs, power, repairs etc. **Semi-variable Costs** are those which are partly fixed and partly variable. For example; Depreciation, for two shifts working the total depreciation may be only 50% more than that for single shift working. They may change with comparatively small changes in output but not in the same proportion.
3. **Association with the Product:** Cost can be classified as product costs and period costs. Product costs are those which are traceable to the product and included in inventory cost, thus product cost is full factory cost. Period costs are incurred on the basis of time such as rent, salaries etc. thus it includes all selling and administration costs. These costs are incurred for a period and are treated as expenses.
4. **By Controllability**: The **CIMA** defines controllable cost as “a cost **which can be** influenced by the action of a specified member of an undertaking” and a non-controllable cost as “a cost which cannot be influenced by the action of a specified member of an undertaking”.
5. **By Normality:** There are normal costs and abnormal costs. Normal costs are the costs which are normally incurred at a given level of output under normal conditions. Abnormal costs are costs incurred under abnormal conditions which are not normally incurred in the normal course of production.Eg:- damaged goods due to machine break down, extra expenses due to disruption of electricity, inefficiency of workers etc.
6. **By Relationship with Accounting Period:** There are capital and revenue expenses depending on the length of the period for which it is incurred. The cost which is incurred in purchasing an asset either to earn income or increasing the earning capacity of the business is called capital cost, for example, the cost of a machine in a factory. Such cost is incurred at one point of time but the benefits accruing from it are spread over a number of accounting years. The cost which is incurred for maintaining an asset or running a business is revenue expenditure. Eg:- cost of materials, salary and wages paid, depreciation, repairs and maintenance, selling and distribution.
7. **By Time..**Costs can be classified as 1) Historical cost and 2) Predetermined Costs.

The costs which are ascertained and recorded after it has been incurred is called historical costs. They are based on recorded facts hence they can be verified and are always supported by evidences. Predetermined costs are also known as estimated costs as they are computed in advance of production taking into consideration the previous periods’ costs and the factors affecting such costs. Predetermined costs when calculated scientifically become standard costs. Standard costs are used to prepare budgets and then the actual cost incurred is later-on compared with such predetermined cost and the variance is studied for future correction.

#### Types, Methods and Techniques of Costing

The general fundamental principles of ascertaining costs are the same in every system of cost accounting, but the methods of analysis and presenting the costs vary from industry to industry. Different methods are used because business enterprises vary in their nature and in the type of products or services they produce or render. Basically, there are two principal methods of costing, namely (i) Job Costing, and (ii) Process costing.

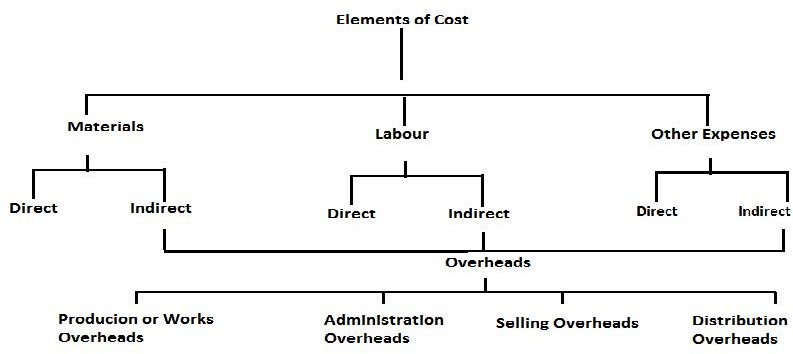
1. **Job costing**: It refers to a system of costing in which costs are ascertained in terms of specific jobs or orders which are not comparable with each other. Industries where this method of costing is generally applied are Printing Process, Automobile Garages, Repair Shops, Ship- building, House building, Engine and Machine construction, etc. Job Costing includes the following methods of costing:
2. ***Contract Costing***: Although contract costing does not differ in principle from job costing, it is convenient to treat contract cost accounts separately. The term is usually applied to the costing method adopted where large scale contracts at different sites are carried out, as in the case of building construction.
3. ***Batch Costing***: This method is also a type of job costing. A batch of similar products is regarded as one job and the cost of this complete batch is ascertained. It is then used to determine the unit cost of the articles produced. It should, however, be noted that the articles produced should not lose their identity in manufacturing operations.
4. ***Terminal Costing***: This method is also a type of job costing. This method emphasizes the essential nature of job costing, ie, the cost can be properly terminated at some point and related to a particular job.
5. ***Operation Costing***: This method is adopted when it is desired to ascertain the cost of carrying out an operation in a department, for example, welding. For large undertaking, it is frequently necessary to ascertain the cost of various operations.
6. **Process Costing**: Where a product passes through distinct stages or processes, the output of one process being the input of the subsequent process, it is frequently desired to ascertain the cost of each stage or process of production. This is known as process costing. This method is used where it is difficult to trace the item of prime cost to a particular order because its identity is lost in volume of continuous production. Process costing is generally adopted in textile industries, chemical industries, oil refineries, soap manufacturing, paper manufacturing, tanneries, etc.
7. **Unit or single or output or single output costing**: This method is used where a single article is produced or service is rendered by continuous manufacturing activity. The cost of the whole production cycle is ascertained as a process or series of processes and the cost per unit is arrived at by dividing the total cost by the number of units produced. The unit of costing is chosen according to the nature of the product. Cost statements or cost sheets are prepared under which various items of expenses are classified and the total expenditure is divided by total quantity produced in order to arrive at unit cost of production. This method is suitable in industries like brick-making, collieries, flour mills, cement manufacturing, etc. this method is useful for the assembly department in a factory producing a mechanical article eg. Bicycle.
8. **Operating Costing**: This method is applicable where services are rendered rather than goods produced. The procedure is same as in the case of single output costing. The total expenses of the operation are divided by the units and cost per unit of services is arrived at. This method is employed in Railways, Road Transport, Water supply undertakings, Telephone services, Electricity companies, Hospital services, Municipal services, etc.
9. **Multiple or Complete Costing**: Some products are so complex that no single system of costing is applicable. It is used where there are a variety of components separately produced and subsequently assembled in a complex production. Total cost is ascertained by computing component costs which are collected by job or process costing and then aggregating the costs through use of the single or output costing system. This method is applicable to manufacturing concerns producing Motor Cars, Aeroplanes, Machine tools, Type-writers, Radios, Cycles, Sewing Machines, etc.
10. **Uniform Costing**: It is not a distinct method of costing by itself. It is the name given to a common system of costing followed by a number of firms in the same industry. This helps in comparing performance of one firm with that of another.
11. **Departmental Costing**: When costs are ascertained department by department, the method is called “Departmental Costing”. Usually, for ascertaining the cost of various goods or services produced by the department, the total costs will have to be analysed, say, by the use of job costing or unit costing.

In addition to the above methods of costing, mention can be made of the following techniques

of costing which can be applied to any one of the above method of costing for special purposes of cost control and policy making:

1. Standard or Predetermined Costs.
2. Marginal Costs

**Elements of Cost**- The management of an organization needs necessary data to analyze and classify costs for proper control and for taking decisions for future course of action. Hence the total cost is analyzed by elements of costs ie by the nature of expenses. The elements of costs are three and they are materials, labour and other expenses. These can be further analyzed as follows.



By grouping the above elements of cost, the following divisions of cost are obtained.

* 1. Prime cost = Direct Materials + Direct Labour+ Direct Expenses
  2. Works or Factory Cost = Prime Cost + Works or Factory Overheads
  3. Cost of Production = Works Cost + Administration Overheads
  4. Total Cost or Cost of Sales = Cost of Production + Selling and Distribution Overheads The difference between the cost of sales and selling price represents profit or loss.

**Illustration 1**. Find the Prime Cost, Works Cost, Cost of production, total Cost and profit from the following:- Direct Materials Rs.20000; Direct Labour Rs. 10000; Factory Expenses Rs. 7000; Administration Expenses Rs. 5000; Selling Expenses Rs. 7000 and Sales Rs.60,000.

**Solution**:

Prime Cost = Direct Materials + Direct Labour = Rs.20,000 + Rs.10,000 = Rs.30,000. Works Cost = Prime Cost + Factory Expenses = Rs.30,000 + Rs.7,000 = Rs.37,000.

Cost of Production = Works Cost + Administration Expenses=Rs.37000+ Rs.5, 000 = Rs.42, 000.

Total Cost or Cost of sales= Cost of Production + Selling Expenses = Rs.42, 000+ Rs.7, 000 = Rs.49, 000. Profit = Sales - Total Cost = Rs.60,000 - Rs.49,000=Rs.11, 000.

These terms can be explained as follows

1. **Direct Materials** are those materials which can be identified in the product and can be conveniently measured and directly charged to the product. For example, bricks in houses, wood in furniture etc. Hence all raw materials, materials purchased specifically for a job or process like glue for book making, parts or components purchased or produced like batteries for radios and tyres for cycles, and primary packing materials are direct materials.
2. **Indirect Materials** are those materials which cannot be classified as direct materials. Examples are consumables like cotton waste, lubricants, brooms, rags, cleaning materials, materials for repairs and maintenance of fixed assets, high speed diesel used in power generators etc.
3. **Direct Labour** is all labour expended in altering the construction, composition, confirmation or condition of the product. Thus direct wages means the wages of labour which can be conveniently identified or attributed wholly to a particular job, product or process or expended in converting raw materials into finished goods. Thus payment made to groups of labourers engaged in actual production, or carrying out of an operation or process, or supervision, maintenance, tools setting, transportation of materials, inspection, analysis etc is direct labour.
4. **Direct Expenses** are expenses directly identified to a particular cost centre. Hence expenses incurred for a particular product, job, department etc are direct expenses. Example royalty, excise duty, hire charges of a specific plant and equipment, cost of any experimental work carried out especially for a particular job, travelling expenses incurred in connection with a particular contract or job etc.
5. **Overheads** may be defined as the aggregate of the cost of indirect materials, indirect labour and such other expenses including services as cannot conveniently be charged direct ot specific cost units. Overheads may be sub-divided into (i) Manufacturing Overheads; (ii) Administration Overheads; (iii) Selling Overheads; (iv) Distribution Overheads; (v) Research and Development Overheads.

**Cost sheet or Statement of Cost**: When costing information is set out in the form of a statement, it is called “Cost Sheet”. It is usually adopted when there is only one main product and all costs almost are incurred for that product only. The information incorporated in a cost sheet would depend upon the requirement of management for the purpose of control.

#### Specimen of Cost Sheet or Statement of Cost

Direct Materials

Direct Labour

Prime cost

Total Cost Cost per Unit

Rs. Rs.

xxx xxx

xxx xxx

xxx xxx

Add: Works Overheads

Works Cost

xxx

xxx

xxx

xxx

Add: Administrative Overheads

Cost of Production

xxx

xxx

xxx

xxx

Add: Selling and Distribution Overheads

Total Cost or Cost of Sales

xxx

xxx

xxx

xxx

**Illustration 2:** Calculate Prime Cost, Factory Cost, Cost of Production, Cost of Sales and profit from the following particulars:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Rs. |  | Rs. |
| Direct Materials | 1,00,000 | Consumable stores | 2,500 |
| Direct Wages | 30,000 | Manager’s Salary | 5,000 |
| Wages of Foreman | 2,500 | Directors’ fees | 1,250 |
| Electric power | 500 | Office Stationery | 500 |
| Lighting: Factory | 1,500 | Telephone Charges | 125 |
| Office | 500 | Postage and Telegrams | 250 |
| Storekeeper’s wages | 1,000 | Salesmen’s salary | 1,250 |
| Oil and water | 500 | Travelling expenses | 500 |
| Rent: Factory | 5,000 | Advertising | 1,250 |
| Office | 2,500 | Warehouse charges | 500 |
| Repairs and Renewals: |  | Sales | 1,89,500 |
| Factory plant | 3,500 | Carriage outward | 375 |
| Transfer to Reserves | 1,000 | Dividend | 2,000 |
| Discount on shares written off | 500 |  |  |
| Depreciation: Factory Plant | 500 |  |  |
| Office Premises | 1,250 |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Solution** |  | | |
| **STATEMENT OF COST AND PROFIT** |
|  |  | **Rs.** | **Rs.** |
| Direct Materials |  |  | 1,00,000 |
| Direct Wages |  |  | 30,000 |
|  | Prime Cost |  | 1,30,000 |
| Add: Factory Overheads: |  |  |  |
| Wages of foreman |  |  | 2,500 |
| Electric power |  |  | 500 |
| Storekeeper’s Wages |  |  | 1,000 |
| Oil and Water |  |  | 500 |
| Factory rent |  |  | 5,000 |
| Repairs and renewals-Factory Plant |  |  | 3,500 |
| Factory lighting |  |  | 1,500 |
| Depreciation-Factory Plant |  |  | 500 |
| Consumable stores |  |  | 2,500 |

17**,**500

Factory Cost 1,47,500

|  |  |  |  |
| --- | --- | --- | --- |
| Add: | Administration Overheads:  Office rent | | 2,500 |
|  | Repairs and Renewals-Office Premises | | 500 |
|  | Office lighting | | 500 |
|  | Depreciation : Office Premises | | 1,250 |
|  | Manager’s Salary | | 5,000 |
|  | Director’s fees | | 1,250 |
|  | Office Stationery | | 500 |
|  | Telephone charges | | 125 |
|  | Postage and telegrams | | 250 |
|  |  | | 11,875 |
|  | Cost of Production | | 1,59,375 |
| Add: | Selling and Distribution Overheads: Carriage Outward |  | 375 |
|  | Salesmen’s Salaries |  | 1,250 |
|  | Travelling Expenses |  | 500 |
|  | Advertising |  | 1,250 |
|  | Warehouse charges |  | 500 |
|  |  |  | 3,875 |
|  |  | Cost of Sales | 1,63,250 |
|  |  | Profit | 26,250 |
|  |  | Sales | 1,89,500 |

# UNIT II

## Materials

**Materials: -** The materials are a major part of the total cost of producing a product and are one of the most important assets in majority of the business enterprises. Hence the total cost of a product can be controlled and reduced by efficiently using materials.

The materials are of two types, namely:

1. Direct materials: The materials which can be easily identified and attributable to the individual units being manufactured are known as direct materials. These materials also form part of finished products. All costs which are incurred to obtain direct materials are known as direct material costs.
2. Indirect materials: Indirect materials, on the other hand, are those materials which are of small value such as nuts, pins, screws, etc. and do not physically form part of the finished product. Costs associated with indirect materials are known as indirect material costs.

Factory supplies, office supplies and selling supplies are generally termed as stores.

**Purchasing Control and Procedure**: Purchasing is an art. Wrong purchases increase the cost of materials, store equipments and the finished goods. Hence it is imperative that purchases should be effectively, efficiently and economically performed.

Dr. Walters defines scientific purchasing as the “Procurement by purchase of the proper materials, machinery, equipment and supplies of stores used in the manufacture of a product, adapted to marketing in the proper quantity and quality at the proper time and the lowest price consistent with the quality desired”.

According to Alford and Beatty, “Purchasing is the procuring of materials, supplies, machines tools and services required for the equipment, maintenance and operation of a manufacturing plant”.

The major objectives of scientific purchasing it to purchase the right quantity at the best price, materials purchased should suit the objective, production should not be held up, unnecessarily capital should not be locked up in stores, best quality of materials should be purchased and company’s competitive position and its reputation for fairness and integrity should be safeguarded.

Only scientific purchasing will help in achieving the above objectives. With proper plans, materials can be purchased at a lower price than competitors, turnover of investment in inventories can be high, purchasing department can advise regarding substitute materials, new products, change in trends, creating goodwill etc.

#### Methods of Purchasing

Purchasing can be broadly classified as centralized and localized purchasing.

* 1. ***Centralized Purchasing***: In a large organization, manufacturing units are many. In such cases centralized purchasing is beneficial. The advantages of centralized purchasing are:
     1. Specialized and expert knowledge is available.
     2. Advantages arise due to bulk purchases.
     3. The cost of purchasing can be reduced and selling price can be lowered.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tender Nos. |  |  |  |  |
| Issued on. |  |  |  |  |

* + 1. As there is good knowledge of market conditions, greater control can be exercised.
    2. When materials have to be imported, it is advantageous to centralize the buying.
    3. Economy and ease in compilation and consultation of results.
    4. It can take advantage of market changes.
    5. Investment in inventories can be reduced.
    6. Other advantages include undivided responsibility, consistent buying policies.

Factors to be considered when decision regarding centralization has to be taken are geographical separation of plants, homogeneity of products, type of material bought, location of supplies etc.

* 1. ***Decentralization of Purchases:*** The advantages of localized purchasing or decentralization of purchases are:-

1. Each plant may have its own particular need. This can be given special attention.
2. Direct contact can be established with suppliers.
3. The time lag between indenting and receiving materials can be reduced.
4. Technical requirements of each plant can be ascertained.

**Purchase Procedure:** The steps usually followed for purchase of materials may be enumerated as follows:-

1. **Indenting for materials :** The stores department prepares indents for the purchase of materials for replenishment of stocks (regular indents) or for a special job(special indents) and sends it to the purchase department. Regular indents are prepared periodically and placed when the ordering level for different items of stocks are reached. The quantity indented is equal to the ordering quantity fixed for each item. The special indents are based on the demands received either from the planning or production department.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| XYZ Co. Ltd.  MATERIAL PURCHASE INDENT  Date: For the Period:  Indent No: Demand Note No:  Regular/Special | | | | | |
| Sl.  No. | Description | Stores Code No. | Quantity | Last Pur. Order No. | Special remarks |
|  |  |  |  |  |  |
| Store Keeper | | For Purchase Dept. Use | | | |

1. **Issue of tenders to suppliers**: The purchase department issue tenders to suppliers or publish them in papers. The suppliers quote their terms of price and delivery/payment. After the last date for receipt of quotations is over, the tenders are opened and a comparative statement is prepared. Tenders are prepared in triplicate. Of them, two are sent to the suppliers and one is retained with the purchase department. The supplier mentions his terms in the original.

While considering the tenders, the reliability of the supplier has to be taken into account. The quality of goods and time taken to deliver the goods on previous occasions should be checked. The financial stability and capacity to deliver goods should be ensured.

Sometimes purchases may be made without inviting quotations. The circumstances are when prices are controlled, or purchases are made under long term contracts, or catalogue prices are available or when there is a cost plus contract. If purchase is made under cost plus profit basis, the cost composition and reasonableness of price should be checked.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| INVITATION TO TENDER  Indent No: Tender No:  Date: Date:  To  XYZ Co.Ltd.  …………….  …………….  Dear Sirs,  The stores mentioned below are required to be delivered at our works godown. The terms and conditions of supply are mentioned overleaf. The first copy of this tender should be returned to us duly filled in before………………….  A security deposit of Rs should also accompany your reply which will be returned if  we do not place an order with you.  Yours faithfully,  For ABC Co.Ltd. | | | | | | |
| Particulars Of stores/ Supplies | Quantity required | Place of Delivery | Date of delivery required | Quantity which can be supplied | Rate | |
| Per Unit | Price |
|  |  |  |  |  |  |  |
| We agree to supply the above on terms mentioned below. Special conditions:  Place: For XYZ Co. Ltd. | | | | | | |

1. **Placing of purchase orders**: Normally six copies of purchase order are made. The supplier, stores, inspection department, store accounting section, purchase department and progress department are sent one copy each.

The purchase order has legal and accounting significance. From legal point of view, it binds both the parties to the terms of the contract. Form the accounting point of view; it signifies the

amount which has to be spent. It signifies the stores department to accept the goods and the accounts department to accept the bill.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| A.B.C. CO. LTD.  MATERIALS PURCHASE ORDER  Order No: Indent No: Store Receipt No:  Date: Quotation No: Inspection Note No: To  ……………….  ……………….  This is in response to your quotation against our Tender No:…………….. The terms and conditions mentioned overleaf will be applicable. Please supply the following items at the prices indicated below: | | | | | | |
| Sl.  No. | Description | Stores Code No. | Specification | Quantity | Unit | Price |
|  |  |  |  |  |  |  |
| Terms of Delivery: Please send bill to: Terms of Payment:  Special Conditions: For A.B.C. Co. Ltd. | | | | | | |

1. **Inspection**: The supplier delivers goods at the place specified. Two delivery challans are prepared by the supplier one of which is returned. It is a proof of delivery. After receiving the goods, the inspection department or production department or maintenance department (as the case may be) is intimated.

The inspector checks that the materials are in accordance with the quality required, standard expected, tolerances allowed etc. After inspection an inspection note is prepared in triplicate, one copy is sent to the supplier, one to the stores, and one to the inspection department.

1. Receiving Stores: The stores department prepares a Stores Receipt Note for the quantity of stock accepted in inspection. After issuing of the Stores Receipt, the Storekeeper is

responsible for the stocks. The stores receipt is the document for the posting of receipts in Bin Card and the Stores Ledger. It is prepared in quadruplicate and sent to the supplier; stores accounting section and purchase department and one copy are retained with the stores. The supplier encloses this copy along with his bill. The stores accounting section compares the note with the purchase order.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ABC CO. Ltd.  STORES RECEIPT NOTE  S.R. No: P.O.No: Inspection Note No: Date: Date: Date:  Received form M/s under their delivery challan no: dated  the following items of stores against the above purchase order: | | | | | |
| Stores  Code No: | Description | Unit | Quantity | Price | Value |
|  |  |  |  |  |  |
| Posted in:-  Bin Card ………………. Stores Ledger………………… Signature of Storekeeper………………. | | | | | |

1. **Checking and passing of bills for payment**: Bills received by the purchase department are forwarded to the stores accounting section to check the authenticity regarding quantity and price and the arithmetical accuracy. Special items included in the bills eg:- freight, packing charges are verified with the purchase order. The bill is later passed for payment.

**Storekeeping**: Store keeping is a service function. The storekeeper is a custodian of all the items

kept in the store. The stores should be maintained properly and cost minimized. The main objectives of store keeping are:-

1. To protect stores against losses
2. To keep goods ready for delivery/issue
3. To provide maximum service at minimum cost.

**The duties and functions of Store-keeper can be summarized as follows:**

1. Materials should be received, unloaded, inspected and then moved to stores. The materials have to be stored in appropriate places and records the receipts in proper books.
2. The stores records should be maintained in an efficient and orderly manner so that materials can be easily located and information can be obtained for various departments.
3. The stores should provide maximum protection and safety and accessibility and utilize minimum space. Suitable storage devices should be installed.
4. The materials should be given special covering to prevent damage due to atmospheric conditions.
5. All issues should be properly recorded, efficiently, promptly and accurately. All issues should be duly authorized and procedures laid down should be duly followed.
6. The storekeeper is responsible for co-ordination with materials control according to the type of production, size of the company, the organization structure etc.
7. Ensure that all transactions are posted in the Bin Card see that the Bin Card is up-to- date.
8. All items should be in its proper place.
9. Maintenance of stores at required levels.
10. Neatness in stores to facilitate physical verification.
11. Co-ordination and supervision of staff in the stores department.
12. Periodical review of various scales, measuring instruments, conversion ratios etc.
13. Protect stores from fires, rust, erosion, dust, theft, weather, heat, cold, moisture and deterioration etc.

#### Requisitioning for Stores

One of the duties of the storekeeper is to send requisitions for materials for replenishment in time so that the production is not held up due to shortage of materials. The storekeeper should also see that there is no unnecessary blocking of capital due to overstocking of materials. For this he keeps a check on the re-order level, economic ordering quantity, and the maximum and minimum quantity which he is authorized to store in respect of each kind of material.

#### Re-ordering Level

Re-ordering level is that point of level of stock of a material where the storekeeper starts the process of initiating purchase requisition for fresh supplies of that materials. This level is fixed somewhere between the maximum and minimum levels in such a way that the difference of quantity of the material between the re-ordering level and minimum level will be sufficient to meet the requirements of production until the fresh supply of the materials is received.

**Re-ordering Level= Minimum Level + Consumption during the time required to get the fresh delivery**

According to Wheldon,

**Re-ordering Level= Maximum Level x Minimum re-order period.**

Here, maximum re-order period means the maximum period taken to get the material once the order for new material is placed. Wheldon has taken the maximum period and maximum consumption during that period so that factory may not stop production due to shortage of materials.

**Illustration: 3**. Calculate the ordering level of material A from the following particulars:

Minimum Limit 1,000 units. Maximum Limit 5,000 units.

Daily requirement of material 200 units. Time required for fresh delivery 10 days. **Solution**

Ordering Level=Minimum limit + Consumption during the time required for fresh delivery = 1000 units+ 200 units x 10 days = 3000 units

Order for the purchase of material should be placed when the material in stock reaches 3,000 units. Illustration: 4. Calculate the re-ordering level from the following information:

Maximum consumption = 500 units per day Minimum consumption = 400 units per day Re-order period = 10 to 12 days Solution

Re-order Level = Maximum consumption x maximum re-order period

= 500 units x 12 days = 6000 units.

#### Economic Ordering Quantity

The quantity of material to be ordered at one time is known as economic ordering quantity. This quantity is fixed in such a manner as to minimize the cost of ordering and carrying the stock.

The total costs of a material usually consist of:

Total acquisition cost + total ordering cost + total carrying cost.

Since the acquisition cost per unit of material is same whatever is the quantity purchased, it is usually excluded when deciding the quantity of a material to be ordered at one time. The only costs to be taken care of are the ordering costs and carrying costs which vary with the quantity ordered.

***Carrying Cost:*** It is the cost of holding the materials in the store and includes:

* 1. Cost of storage space which could have been utilized for some other purpose.
  2. Cost of bins and racks
  3. Cost of maintaining the materials to avoid deterioration.
  4. Amount of interest payable on the amount of money locked up in the materials.
  5. Cost of spoilage in stores and handling.
  6. Transportation cost in relation to stock.
  7. Cost of obsolescence of materials due to change in the process or product.
  8. Insurance cost
  9. Clerical cost etc.

In India all these costs amount to 20 to 25 % of the cost of materials per year. Hence it becomes necessary to reduce such carrying cost for efficient operations.

***Ordering Cost:*** It is the cost of placing orders for the purchase of materials and includes:

* + 1. Cost of staff posted in the purchasing department, inspection section and stores accounts department.
    2. Cost of stationary postage and telephone charges.

Thus, this type of costs includes cost of floating tenders, cost of comparative evaluation of quotations, cost of paper work, and postage involved in placing the order, cost of inspection and cost of accounting and making payments. In other words, the cost varies with the number of orders.

*When the quantity of materials ordered is less, the cost of carrying will decrease but ordering cost will increase and vice versa.*

2CO I

Q =

Q = Quantity to be ordered

C = Consumption of the material concerned in units during a year.

O = Cost of placing one order including the cost of receiving the goods i.e. the cost of getting an item into the firms inventory

I = Interest payment including variable cost of storing per unit per year i.e holding costs of inventory.

**Illustration 4**: Find out the economic ordering quantity (EOQ) from the following particulars.

Annual usage: 6000 units

Cost of material per unit: Rs. 20

Cost of Placing and receiving one order: Rs.60

Annual carrying cost of one unit: 10% of inventory value.

**Solution**

EOQ =

Where C = Annual usage of material ie6,000 units O = Cost of placing one order ie Rs.60

I = Annual carrying cost of one unit ieRs. 20 x 10= Rs. 2

100

EOQ = 2 x 6,000units x 60 = 3,60,000 = 600 units Rs.2

The formula 2CO of economic ordering quantity is applicable only if annual consumption of raw material in

I

units is given. But if the consumption of material is given in value, the formula 2CO of economic ordering I

quantity will remain the same; however, the meaning of signs will differ as given: C= Annual requirement of material in rupees

O= Cost of placing one order

I = % carrying Cost.

#### Minimum Level or Safety Stock level

The minimum level is the minimum quantity of the material which must be maintained in hand at all times. The quantity is fixed so that the production is not held up due to shortage of the materials. In fixing this level, the following factors should be considered:

* 1. Lead time i.e. time lag between indenting and receiving of the material. It is the time required to replenish the supply.
  2. Rate of consumption of the material during the lead time.
  3. Nature of the material. Minimum level is not required in case of a special material which is

required against customer’s specific order.

Formula for calculating minimum level or safety stock level given by Wheldon is as follows: Minimum Stock Level = Re-ordering level – (Normal consumption x Normal Re-order period)

#### Maximum Level

It is the maximum of stock which should be held in stock at any time during the year. The quantity is fixed so as to avoid overstocking as it leads to the following disadvantages.

* 1. Overstocking leads to increase in working capital requirement which could be profitable used somewhere else.
  2. Overstocking will need more godown space, so more rent will have to be paid.
  3. It may also lead to obsolescence on account of overstocking.
  4. There are chances that the quality of materials will deteriorate because large stock will require more time before they are consumed.
  5. There may be fear of depreciation in market values of the overstocked materials. According to Wheldon,

Maximum Stock level = Reordering level + Re-ordering Quantity –

(Minimum consumption x Minimum re-ordering period)

#### Danger Level

This level means that level of stock at which normal issues of the material are stopped and issues are made only under specific instructions. The purchase officer will make special arrangements to get the materials which reach at their danger levels so that the production may not stop due to shortage of materials.

Danger Level = Average consumption x Max.re-order period for emergency purchases.

#### Average Stock Level

The average stock level is calculated by the following formula:

Average Stock Level = Minimum Stock Level + ½ of Re-order Quantity. Or ½ (Minimum Stock Level + Maximum Stock Level)

**Illustration 5**: Calculate the minimum stock level, maximum stock level, re-ordering level and average stock level from the following information:

1. Minimum consumption = 100 units per day
2. Maximum consumption = 150 units per day
3. Normal consumption = 120 units per day
4. Re-order period = 10-15 days
5. Re-order quantity = 1,500 units
6. Normal re-order period = 12 days

**Solution**

Re-ordering Level = Maximum Consumption x Maximum re-order period

= 150 units x 15 days = 2,250 units

Minimum Stock Level = Re-ordering Level-(Normal consumption x Normal re-order period)

= 2,250 – (120 x12) = 810 units

Maximum Stock Level = Re-ordering Level + Re-order Quantity – (Minimum Consumption x Minimum Re-Order Period)

= 2,250 + 1500 – (100 x 10)= 2,750 units

Average stock Level = Minimum Stock Level + ½ Re-order Quantity

= 810 units + ½ x 1500 units = 1,560 units

#### Stores (or Materials) records

In the stores the most important two records kept are bin cards and stores ledger.

* 1. Bin Card. A bin card is a record of the receipt and issue of material and is prepared by the store keeper for each item of stores. A bin card is also known as bin tag or stock card and is usually kept in the rack where the material is kept. In a bin card not only the receipt and issue of material is recorded, minimum quantity, maximum quantity and ordering quantity are stated on the card. This helps the store keeper to send the material requisition for the purchase of material in time.
  2. Stores Ledger: This ledger is kept in the costing department and is identical with the bin card except that receipts, issues and balances are shown along with their money values. This provides the information for the pricing of materials issued and the money value at any time of each item of stores.

#### Perpetual Inventory System

The Chartered Institute of Management Accountants, London, defines the perpetual inventory as “a system of records maintained by the controlling department, which reflects the physical movements of stocks and their current balance”. Thus this is a system in which, with the help of Bin Cards and Stores Ledger, the balance of stock is ascertained after every receipt and issue of materials. This is helps in avoiding closing down of firm for physical verification.

Advantages of the Perpetual Inventory System

The following are the advantages of the perpetual inventory system:

1. It avoids the disruption of production for physical checking of all items of stores at the end of the year.
2. The preparation of Profit and Loss Account and Balance Sheet is possible without physical verification of stock.
3. A detailed and more reliable control on the materials in store is obtained.
4. As the work of recording and continuous stocktaking is carried out systematically and without undue haste, the figures are more reliable.
5. Continuous stocktaking will make the storekeeper and the stores accountant more vigilant in their work and they will try to keep the records accurate and up-to-date.
6. Planning of production can be done without any fear of shortage as the management is constantly informed of the stores position.
7. An inbuilt system of internal check will be in operation as bin cards and the stores ledger keep a check on each other.
8. Errors and shortage of stock are readily discovered and efforts are made to avoid the shortage of stock in future.
9. The capital invested in the stores can be kept under control and efficiently used as stock can be compared with the minimum and maximum levels.
10. It makes available correct stock figures for claim to be lodged with the insurance company for loss on account of stock destroyed by fire.

#### ABC Analysis

Under ABC Analysis, the materials in stock are divided into three categories for the purpose of control. Generally it is seen that the materials which constitute the least percentage of items in stock may contribute to a large percentage of value and a large percentage of items may represent a smaller percentage of value of items consumed. Between these two items are those items, the percentage of which is more or less equal to their value in consumption. Items falling in the first category are treated as ‘A’ items, of the second category as ‘B’ items and items of the third category are taken as ‘C’ items. Such an analysis of material is known as ABC analysis. This technique of stock control is also known as stock control according to value method or Always Better Control method or Proportional Parts Value Analysis method. Thus, under this technique of material control, materials are listed in ‘A’, ‘B’ and ‘C’ categories in descending order based on money value of consumption.

ABC analysis measures the cost significance of each item of material. It concentrates on important

items, so it is also known as ‘Control by Importance and Exception” (CIE).

The report of the Indian Productivity Team on “Stores and Inventory Control in U.S.A., Japan and West Germany” gives the following example of ABC Analysis:

|  |  |  |
| --- | --- | --- |
| *Group* | *Percentage of Items* | *Percentage of Costs* |
| A | 8% | 75% |
| B | 25% | 20% |
| C | 67% | 5% |

The significance of this analysis is that a very close control is exercised over the items of ‘A’ group which account for a high percentage of costs while less stringent control is adequate for category ‘B’ and very little control would suffice for category ’C’ items.

#### Issue of materials

Materials issued from stores are debited to the jobs or work orders which received them and credited to the materials account. These jobs are debited with the value of materials issued to them.

But what is the value of materials? Theoretically the value includes the invoice price less trade discount, the freight, cartage, octroi and insurance on incoming materials, expenses of purchase, receiving, storing and record keeping and carriage from the stores up to the process plant. However,

in practice, it involves minute calculations for including all these expenses and is a big task compared to the benefit derived from it.

Moreover the price changes according to the market conditions and at any given time there will be stock of materials purchased at different times at different prices. Hence the problem as to at what price the materials should be issued?

There are many methods of pricing material issues. The most important being: FIFO, LIFO, simple and weighed average methods.

#### First in First Out (FIFO)

Under this method material is first issued from the earliest consignment on hand and priced at the cost at which that consignment was placed in the stores. In other words, materials received first are issued first. The units in the opening stock of materials are treated as if they are issued first, the units from the first purchase issued next, and so on until the units left in the closing stock of materials are valued at the latest cost of purchases.

This method is most suitable in times of falling prices because the issue price of materials to jobs or work order will be high while the cost of replacement of materials will be low. But in case of rising prices this method is not suitable because the issue price of materials to production will be low while the cost of replacement of materials will be high. The following example will illustrate how issues of materials are valued under this method.

**Illustration 6**: The received side of the Stores Ledger Account shows the following particulars:

Jan. 1 Opening Balance: 500 units @ Rs.4 Jan. 5 Received from vendor: 200 units @ Rs.4.25 Jan.12 Received from vendor: 150 units @ Rs.4.10 Jan.20 Received from vendor: 300 units @ Rs.4.50 Jan.25 Received from vendor: 400 units @ Rs.4

Issues of material were as follows:

Jan. 4- 200 units; Jan.10- 400 units; Jan. 15- 100 units; Jan 19- 100 units; Jan.26- 200 units;

Jan.30- 250 units.

Issues are to be priced on the principle of “first in first out”. Write the Stores Ledger

Account in respect of the materials for the month of January.

#### Solution:

SOLUTION STORES LEDGER

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Date | Particulars | Receipts | | | Issues | | | Balance | | |
| Quantity  (Units) | Total  Cost(Rs) | Unit  cost(Rs) | Quantity  (units) | Total  Cost(Rs) | Unit  cost(Rs) | Quantity  (units) | Amount  (Rs) | Per  unit(Rs) | |
| Jan 1 | Balance b/d | - | - | - | - | - | - | 500 | 2000 | 4 |
| Jan 4 | Requisition slip no. …….. | - | - | - | 200 | 800 | 4 | 300 | 1200 | 4 |
| Jan 5 | Goods received note no. …… | 200 | 850 | 4.25 | - | - | - | 300 | 1200 | 4 |
|  |  |  |  |  |  |  |  | 200 | 850 | 4.25 |
| Jan 10 | Requisition slip no. …….. | - | - | - | 300 | 1200 | 4 |  |  |  |
|  |  |  |  |  | 100 | 425 | 4.25 | 100 | 425 | 4.25 |
| Jan 12 | Goods received note no. …… | 150 | 615 | 4.10 | - | - | - | 100 | 425 | 4.25 |
|  |  |  |  |  |  |  |  | 150 | 615 | 4.10 |
| Jan 15 | Requisition slip no. …….. | - | - | - | 100 | 425 | 4.25 | 150 | 615 | 4.10 |
| Jan 19 | Requisition slip no. …….. | - | - | - | 100 | 410 | 4.10 | 50 | 205 | 4.10 |
| Jan 20 | Goods received note no. …… | 300 | 1350 | 4.50 | - | - | - | 50 | 205 | 4.10 |
|  |  |  |  |  |  |  |  | 300 | 1350 | 4.50 |
| Jan 25 | Goods received note no. …… | 400 | 1600 | 4.00 | - | - | - | 50 | 205 | 4.10 |
|  |  |  |  |  |  |  |  | 300 | 1350 | 4.50 |
|  |  |  |  |  |  |  |  | 400 | 1600 | 4.00 |
| Jan 26 | Requisition slip no. …….. | - | - | - | 50 | 205 | 4.10 | 150 | 675 | 4.50 |
|  |  |  |  |  | 150 | 675 | 4.50 | 400 | 1600 | 4.00 |
| Jan 30 | Requisition slip no. …….. | - | - | - | 150 | 675 | 4.50 | 300 | 1200 | 4.00 |
|  |  |  |  |  | 100 | 400 | 4.00 |  |  |  |

**Illustration** : Prepare Stores Account on Last in First Out method assuming the same particulars as in Illustration 6:

#### Simple Average Method

In this method, price 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 the prices used in that total. This method may lead to over-recovery or under-recovery of cost of materials from production because quantity purchased in each lot is ignored.

Eg:- 1000 units purchased @ Rs.10 2000 units purchased @ Rs.11 3000 units purchased @ Rs.12

In this example, simple average price will be Rs.11 calculated as below: Rs.10 + Rs.11 + Rs.12 = Rs.11

3

#### Weighted Average Methods

In this method, price is calculated by dividing the total cost of materials in the stock from which the materials to be priced could be drawn by the total quantity of materials in that stock.

In the above example, the weighted average price is Rs.11.33 per unit calculated as follows: 1000 x Rs.10+ 2000 x Rs.11 + 3000 x Rs.12 = Rs.11.33

1000+2000+3000

In the periods of heavy fluctuations in the prices of materials, the average cost method gives better results because it tends to smooth out the fluctuations in prices by taking the average of prices of various lots in stock.

**Illustration** : Prepare Stores Account on Last in First Out method assuming the same particulars as in Illustration 6:

SOLUTION LIFO Method

STORES LEDGER ACCOUNT

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Date | Particulars | Receipts | | | Issues | | | Balance | | |
| Quantity  (Units) | Total  Cost(Rs) | Unit  cost(Rs) | Quantity  (units) | Total  Cost(Rs) | Unit  cost(Rs) | Quantity  (units) | Amount  (Rs) | Per  unit(Rs) |
| Jan 1 | Balance b/d | - | - | - | - | - | - | 500 | 2000 | 4 |
| Jan 4 | Requisition slip no. …….. | - | - | - | 200 | 800 | 4 | 300 | 1200 | 4 |
| Jan 5 | Goods received note no. …… | 200 | 850 | 4.25 | - | - | - | 300 | 1200 | 4 |
|  |  |  |  |  |  |  |  | 200 | 850 | 4.25 |
| Jan 10 | Requisition slip no. …….. | - | - | - | 200 | 850 | 4.25 |  |  |  |
|  |  |  |  |  | 200 | 850 | 4.00 | 100 | 400 | 4.00 |
| Jan 12 | Goods received note no. …… | 150 | 615 | 4.10 | - | - | - | 100 | 400 | 4.00 |
|  |  |  |  |  |  |  |  | 150 | 615 | 4.10 |
| Jan 15 | Requisition slip no. …….. | - | - | - | 100 | 410 | 4.10 | 100 | 400 | 4.00 |
|  |  |  |  |  |  |  |  | 50 | 205 | 4.10 |
| Jan 19 | Requisition slip no. …….. | - | - | - | 50 | 205 | 4.10 |  |  |  |
|  |  |  |  |  | 50 | 200 | 4.00 | 50 | 200 | 4.00 |
| Jan 20 | Goods received note no. …… | 300 | 1350 | 4.50 | - | - | - | 50 | 200 | 4.00 |
|  |  |  |  |  |  |  |  | 300 | 1350 | 4.50 |
| Jan 25 | Goods received note no. …… | 400 | 1600 | 4.00 | - | - | - | 50 | 200 | 4.00 |
|  |  |  |  |  |  |  |  | 300 | 1350 | 4.50 |
|  |  |  |  |  |  |  |  | 400 | 1600 | 4.00 |
| Jan 26 | Requisition slip no. …….. | - | - | - | 200 | 800 | 4.00 | 50 | 200 | 4.00 |
|  |  |  |  |  |  |  |  | 300 | 1350 | 4.50 |
|  |  |  |  |  |  |  |  | 200 | 800 | 4.00 |
| Jan 30 | Requisition slip no. …….. | - | - | - | 200 | 800 | 4.00 | 50 | 200 | 4.00 |
|  |  |  |  |  | 50 | 225 | 4.50 | 250 | 1125 | 4.50 |

# UNIT III Labour

Labour cost is a second major element of cost. The control of labour cost and its accounting is very difficult as it deals with human element. Labour is the most perishable commodity and as such should be effectively utilized immediately.

#### Importance of Labour Cost Control

Labour is of two types ***(a) direct labour, (b) indirect labour***. Direct Labour is that labour which is directly engaged in the production of goods or services and which can be conveniently allocated to the job, process or commodity or process. For example labour engaged in spinning department can be conveniently allocated to the spinning process.

Indirect Labour is that labour which is not directly engaged in the production of goods and services but which indirectly helps the direct labour engaged in production. The examples of indirect labour are supervisors, sweepers, cleaners, time-keepers, watchmen etc. The cost of indirect labour cannot be conveniently allocated to a particular job, order, process or article.

The distinction between direct and indirect labour must be observed carefully because payment of direct labour is a direct expenditure and is a part of prime cost whereas payment of indirect labour is an item of indirect expenditure and is shown as works, office, selling and distribution expenditure according to the nature of the time spent by the indirect worker.

Management is interested in the labour costs due to the following reasons.

* + To use direct labour cost as a basis for increasing the efficiency of workers.
  + To identify direct labour cost with products, orders, jobs or processes for ascertaining the cost of every product, order, or process.
  + To use direct labour cost as a basis for absorption of overhead, if percentage of direct labour cost to overhead is to be used as a method of absorption of overhead.
  + To determine indirect labour cost to be treated as overhead and
  + To reduce the labour turnover.

Hence control of labour cost is an important objective of management and the realization of this objective depends upon the co-operation of every member of the supervisory force from the top executive to foremen.

#### Time keeping

Time-keeping will serve the following purposes:

1. Preparation of Pay Rolls in case of time-paid workers.
2. Meeting the statutory requirements.
3. Ensuring discipline in attendance.
4. Recording of each worker’s time ‘in’ and ‘out’ of the factory making distinction between

normal time, overtime, late attendance, early leaving.

1. For overhead distribution when overheads are absorbed on the basis of labour hours.

#### Methods of Time-keeping

There are two methods of time-keeping. They are the ***manual methods*** and the ***mechanicalmethods***. Whichever method is used it should make a correct record of the time and the method should be cost effective and minimize the risk of fraud.

The manual methods of time keeping are as follows:

1. Attendance Register Method, and
2. Metal Disc Method

#### Attendance Register Method

This is the traditional method where an attendance register or muster roll is kept at the time office near the factory gate or in each department. The timekeeper records the name of the worker, the worker’s number, the department in which he is working, the rate of wages, the time of arrival and departure, normal time and overtime. If the workers are literate, they may make a record of time themselves in the presence of a time-keeper or foreman.

This method is simple and inexpensive and can be used in small firms where the number of workers is not large. However recording the time of workers who work at customers’ premises and places which are situated at a distance from the factory is not practical in this method.

#### Metal Disc Method

Under this method, each worker is allotted a metal disc or a token with a hole bearing his identification number. A board is kept at the gate with pegs on it and all tokens are hung on this board. These boards can be maintained separately for each department so that the workers can remove the token without delay and put it in a tray or box kept near the board. Immediately after the scheduled time for entering the factory, the box is removed and the latecomers will have to give their tokens to the timekeeper and their exact time of arrival is recorded. The tokens or disc left on the board will represent the absentee workers. Later the timekeeper records the attendance in the attendance register and subsequently it is passed on to the Pay Roll Department.

#### Mechanical Methods

The mechanical methods that are generally used for the recording of time of workers may be as follows:

1. Time Recording Clocks
2. Dial Time Records

#### Time Recording Clocks

The time recording clock is a mechanical device which automatically records the time of the workers. Under this method, each worker is given a *Time Card* which is kept in a tray near the factory gate and as the worker enters the gate, he picks up his card from the tray, puts it in the time recording clock which prints the exact time of arrival in the proper space against the particular day. This procedure is repeated for recording time of departure for lunch, return from lunch and time of leaving the factory in the evening. Late arrivals and overtime are recorded in red to attract the attention of the management.

#### Dial Time Records

Under this method, a dial time recorder machine us used. It has a dial with number of holes (usually about 150) and each hole bears a number corresponding to the identification number of the worker concerned. There is one radial arm at the centre of the dial. As a worker enters the factory gate, he is to press the radial arm after placing it at the hole of his number and his time will automatically be recorded on roll of a paper inside the dial time recorder against the number. The sheet on which the time is recorded provides a running account of the worker’s time and it can calculate the number of hours and prepare the wage sheets. However, the high installation cost of the dial time recorder and its use for only a limited number of worker are the drawbacks of this method.

#### Time Booking

Time booking is the recording of time spent by the worker on different jobs or work orders carried out by him during his period of attendance in the factory. The objects of time booking are:

1. To ensure that time spent by a worker in a factory is properly utilized on different jobs or work orders.
2. To ascertain the labour cost of each individual job or work order.
3. To provide a basis for the apportionment of overhead expenses over various jobs or work orders when the method for the allocation of overheads depends upon time spent on different jobs.
4. To ascertain unproductive time or idle time so as to make efforts to keep it in limit.
5. To know the time taken to complete a particular job so that bonus can be paid as per the incentive schemes.
6. To know the efficiency of workers, it is necessary to make the comparison of actual time taken with time allowed for completing a particular task.

Following documents are generally used for time booking:

1. Daily Time Sheets
2. Weekly Time Sheets
3. Job Tickets or Job Cards.

Daily time sheets are given to each worker where he records the time spent by him on each job or work order. Weekly time sheets record the same particulars for a week and hence one card is required for a week. Job cards are used to keep a close watch on the time spent by a worker on each job so that the labour cost of a job may be conveniently ascertained.

#### Idle Time

There is always a difference between the time booked to different jobs or work orders and the time recorded at the factory gate. This difference is known as idle time. Idle time is of two types.

1. Normal Idle Time
2. Abnormal Idle Time

**Normal Idle Time**: This represents the time, the wastage of which cannot be avoided and, therefore, the employer must bear the labour cost of this time. But every effort should be made to reduce it to the lowest possible level. Examples of normal idle time are: time taken in going from the factory gate to the department in which the worker is to work and back at the end of the day, time taken in picking up the work for the day, time between the completion of one work and the start of another work, time taken for personal needs like tea or toilet, time taken for machine maintenance, time taken for waiting for instructions, printouts, machine set-up time etc.

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

**Abnormal Idle Time:** It is that time the wastage of which can be avoided if proper precautions are taken. Example: time wasted due:- to breakdown of machinery on account of inefficiency of the works engineer, failure of the power supply, shortage of materials, waiting for instructions, waiting for tools and raw materials, strikes or lock-outs in the factory.

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

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

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

1. Overtime is paid at higher rate.
2. Overtime is done at late hours when workers have become tired and efficiency will it be as much as during the normal working hours.
3. Workers will develop the habit of working slowly during normal hours and complete the work using overtime to earn more wages.
4. Expenses like lighting, cost of supervision, and wear and tear of machines will increase disproportionately.

Overtime should be recorded separately and thoroughly investigated to see that it is incurred only when genuinely required.

The treatment of overtime depends on the situation. If overtime is incurred for because of the sequence of jobs, then normal wages is charged to labour cost for the overtime also but if it is a rush job, then the overtime wages is added to the cost of labour. On the other hand if overtime arises due to any abnormal reason like breakdown of machinery or power failure, overtime premium is excluded from the cost of production and is debited to the Costing Profit and Loss Account.

**Illustration 8:** Calculate the normal and overtime wages payable to a workman from the following data:

*Days Hours Worked*

Monday 8 hrs.

Tuesday 10 hrs.

Wednesday 9 hrs.

Thursday 11 hrs.

Friday 9 hrs.

Saturday 4 hrs.

Total 51 hrs.

Normal Working Hours 8 hours per day

Normal rate Re.1 per hour

Overtime rate up to 9 hours in a day at single rate and over 9 hours in a day 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:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Days | Total Hours | Normal Working Hours | Overtime Hours | |
| At Single rate | At Double rate |
| Monday | 8 | 8 | - | - |
| Tuesday | 10 | 8 | 1 | 1 |
| Wednesday | 9 | 8 | 1 | - |
| Thursday | 11 | 8 | 1 | 2 |
| Friday | 9 | 8 | 1 | - |
| Saturday | 4 | 4 |  |  |
| Total | 51 | 44 | 4 | 3 |

|  |  |  |
| --- | --- | --- |
| Normal Wages for 44 hours @ Re.1  Overtime Wages:  At single rate for 4 hours @ Re.1 = Rs.4 |  | Rs.44 |
| At double rate for 3 hours @ Rs.2 = Rs.6 |  | Rs.10 |
| Total Wages |  | Rs.54 |
| Or |  |  |
| Normal Wages for 48 hours @ Re.1 per hour = |  | Rs.48 |
| Overtime Wages for 3 hours @ Rs.2 per hour= |  | Rs. 6 |
|  | Rs.54 |  |

Therefore, whichever method is followed, the amount of the wages payable to the worker is Rs.54.

#### System of Wage Payment

There is no single method of wage payment which is acceptable both to the employers and the workers. The system of wages should result into higher production, improved quality of output and a contented labour force.

There are two principal wage systems: (i) Payment on the basis of time spent in the factory irrespective of the amount of work done. This method is known as time wage system. (ii) Payment on the basis of the work done irrespective of the time taken by the worker. This method is called piece rate system.

Other methods called premium plans or bonus and profit sharing schemes are used with either of the two principal methods of wage payment.

#### Time Wage System

Under this method of wage payment, the worker is paid at an hourly, daily, weekly or monthly rate. This payment is made according to the time worked irrespective of the work done.

This method is highly suitable for following types of work:

1. Where highly skilled and apprentices are working.
2. Where quality of goods produced is of extreme importance eg., artistic goods
3. Where the speed of work is beyond the control of the workers.
4. Where close supervision of work is possible.
5. Where output cannot be measured. The disadvantages of this method are:
6. Workers are not motivated.
7. Workers will get payment for idle time.
8. Efficient workers will become inefficient in the long run as all of them get same wages.
9. Employer finds it difficult to calculate labour cost per unit as it varies as production increases and decreases.
10. Strict supervision is necessary to get the work done.
11. Inefficiency results in upsetting the production schedule and increases the cost per unit.
12. It will encourage a tendency among workers to go slow so as to earn overtime wages.

Thus this method does not establish a proportionate relationship between effort and reward and the result is that it is not helpful in increasing production and lowering labour cost per unit.

#### Piece Rate System (payment by result)

Under this system of wage payment, a fixed rate is paid for each unit produced, job completed or an operation performed. Thus, payment is made according to the quantity of work done no consideration is given to the time taken by the workers to perform the work.

There are four variants of this system.

1. Straight piece rate system
2. Taylor’s differential piece rate system
3. Merrick’s multiple piece rate system
4. Gant’s task and bonus plan

#### Straight piece rate system

Payment is made as per the number of units produced at a fixed rate per unit. Another method is piece rate with guaranteed time rate in which the worker is given time rate wages if his piece rate wages is less than the time rate.

#### Advantages

1. Wages are linked to output so workers are paid according to their merits.
2. Workers are motivated to increase production to earn more wages.
3. Increased production leads to decreased cost per unit of production and hence profit per unit increases.
4. Idle time is not paid for and is minimized.
5. The employer knows his exact labour cost and hence can make quotations confidently.
6. Workers use their tools and machinery with a greater care so that the production may not be held up on account of their defective tools and machinery.
7. Less supervision is required because workers get wages for only the units produced.
8. Inefficient workers are motivated to become efficient and earn more wages by producing more.

#### Disadvantages

1. Fixing of piece work rate is difficult as low piece rate will not induce workers to increase production.
2. Quality of output will suffer because workers will try to produce more quickly to earn more wages.
3. There may not be an effective use of material, because of the efforts of workers to increase the production. Haste makes waste. Thus there will be more wastage of material.
4. When there is increased production, there may be increased wastage of materials, high cost of supervision and inspection and high tools cost and hence cost of production might increase.
5. Increased production will not reduce the labour cost per unit because the same rate will be paid for all units. On the other hand, increased production will reduce the labour cost per unit under the time wage system.
6. Workers have the fear of losing wages if they are not able to work due to some reason.
7. Workers may work for long hours to earn more wages, and thus, may spoil their health.
8. Workers may work at a very high speed for a few days, earn good wages and then absent themselves for a few days, upsetting the uniform flow of production.
9. Workers in the habit of producing quality goods will suffer because they will not get any extra remuneration for good quality.
10. The system will cause discontentment among the slower workers because they are not able to earn more wages.

This method can be successfully applied when:

* 1. The work is of a repetitive type.
  2. Quantity of output can be measured.
  3. Quality of goods can be controlled.
  4. It is possible to fix an equitable and acceptable piece rate
  5. The system is flexible and rates can be adjusted to changes in price level.
  6. Materials, tools and machines are sufficiently available to cope with the possible increase in production.
  7. Time cards are maintained so that workers are punctual and regular so that production may not slow down.

#### Taylor’s Differential Piece Rate system

This system was introduced by Taylor, the father of scientific management to encourage the workers to complete the work within or less than the standard time. Taylor advocated two piece rates, so that if a worker performs the work within or less than the standard time, he is paid a higher piece rate and if he does not complete the work within the standard time, he is given a lower piece rate.

**Illustration 9** : Calculate the earnings of workers A and B under Straight Piece-rate System and

Taylor’s Differential Piece-rate System form the following particulars. Normal rate per hour = Rs.1.80

Standard time per unit = 20 seconds Differentials to be applied:

80 % of piece rate below standard 120% of piece rate at or above standard.

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

#### SOLUTION

Standard production per 20 seconds = 1 unit Standard production per minute = 60/20= 3 units Standard production per hour = 3 x 60 = 180 units

Standard production per day of 8 hrs(assumed) = 180 x 8 = 1440 units Normal rate per hour = Rs.1.80

Normal piece rate = Rs.1.80/ 180 units = 1 paisa

Low piece rate below standard production 1P x 80 = 0.8 paise

100

High piece rate at or above standard 1P x 120 = 1.2 paise

100

*Earning of worker A*

Under straight piece rate system

1300 units @ 1P = 1300 x 1 = Rs.13

100

Under Taylor’s Differential Piece-rate System

1300 units @ 0.8 P =1300 x 0.8 =Rs.10.40

100

Low piece rate has been applied because worker A’s daily production of 1300 units is less than the

standard daily production of 1,440 units.

*Earnings of Worker B*

Under Straight Piece-rate System

1500 units @ 1P = 1500 x 1 = Rs.15

100

Under Taylor’s Differential Piece-rate System 1500 units @ 1.2P = 1500 x 1.2= Rs.18

100

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

#### c) Merrick’s Multiple Piece Rate System

This method seeks to make an improvement in the Taylor’s differential piece rate system. Under this method, three piece rates are applied for workers with different levels of performance. Wages are paid at ordinary piece rate to those workers whose performance is less than 83% of the standard output, 110% of the ordinary piece rate is given to workers whose level of performance is between 83% and 100% of the standard and 120% of the ordinary piece rate is given to workers who produce more than 100% of the standard output.

This method is not as harsh as Taylor’s piece rate because penalty for slow workers is relatively

lower.

**Illustration 10**: Calculate the earnings of workers A, B and C under straight piece rate system and

Merrick’s multiple piece rate system from the following particulars:

Normal rate per hour Rs.1.8 Standard time per unit 1 minute Output per day is as follows:

Worker A : 384 units Worker B : 450 units Worker C : 552 units Wording hours per day are 8

#### SOLUTION

Standard output per minute = 1 unit

Standard production per hour = 60 units Standard production per day of 8 hours= 480 units( 8 x 60) Normal rate per hour = Rs.1.80

Normal output per hour = 60 units

Normal piece rate = Rs. 1.80 = 3 paise

60

*Calculation of level of performance:*

Standard output per day = 480 units

Worker A’s output per day = 384 units

Worker A’s level of performance = 384 x 100 = 80%

480

Worker B’s output per day = 450 units

Worker B’s level of performance = 450 x 100 = 93.75%

480

Worker C’s output per day = 552 units

Worker C’s level of performance = 552 x 100 = 115%

480

*Earnings of Worker A*

Under straight piece rate system:

For 384 units @ 3 paise per unit = 384 x 0.03 = Rs.11.52

Under Merrick’s multiple piece rate system:

For 384 units @ 3 paise per unit =384 x 0.03 = Rs.11.52

*Earnings of Worker B*

Under straight piece rate system:

For 450 units @ 3 paise per unit = 450 x 0.03 = Rs.13.50

Under Merrick’s multiple piece rate system:

For 450 units @ 3.3 paise per unit =450 x 0.033= Rs.14.85

*Earnings of Worker C*

Under straight piece rate system:

For 552 units @ 3 paise per unit = 552 x 0.03 = Rs.16.56

Under Merrick’s multiple piece rate system:

For 552 units @ 3.6paise per unit =552 x 0.036 = Rs.19.87

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

#### Premium and Bonus Plan

The object of a premium plan is to increase the production by giving an inducement to the workers in the form of higher wages for less time worked.

Under a premium plan, a standard time is fixed for the completion of a specific job or operation at an hourly rate plus wages for a certain fraction of the time saved by way of a bonus. The plan is also known as incentive plan because a worker has the incentive to earn more wages by completing the work in less time.

This system of wage payment is in between the time wage system and piece work system. In time wage system, worker does not get any reward for the time saved and in piece work system, the worker gets full payment for time saved whereas in a premium plan both the worker and the employer share the labour cost of the time saved.

The following are some of the important premium plans.

1. Halsey Premium Plan: Under this method, the worker is given wages for the actual time taken and a bonus equal to half of wages for time saved. The standard time for doing each job or operation is fixed. In practice the bonus may vary from 33⅓ % to 66⅔ % of the wages of the time saved.

Thus if S is the standard time, T the time taken, R the labour rate per hour, and % the percentage of the wages of time saved to be given as bonus, total earnings of the worker will be:

T x R + % (S-T) R

Under Halsey-Weir plan, the premium is set at 30% of the time saved.

#### Illustration 11:

Rate per hour = Rs.1.50 per hour Time allowed for job = 20 hours Time taken = 15 hours

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

SOLUTION:

Standard time (S) = 20 hours Time taken (T) = 15 hours

Rate per hour (R)= Rs.1.50 per hour

Total Earnings = T x R + 50% (S-T) x R

= 15 X Rs. 1.50 + 50 (20-15) x Rs.1.50

100

=Rs.26.25

Total wages for 15 hours = Rs.26.25 Therefore, effective rate of earning per hour

= Total Wages = Rs.26.25 = Rs.1.75 Actual Time Taken

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

The advantages of the Halsey Premium Plan are:

It is simple to understand and relatively simple to calculate.

1. It guarantees time wages to workers.
2. The wages of time saved are shared by both employers and workers, so it is helpful in reducing labour cost per unit.
3. It motivates efficient workers to work more as there is increasing incentive to efficient workers.
4. Fixed overhead cost per unit is reduced with increase in production.
5. The employer is able to reduce cost of production by having reduction in labour cost and fixed overhead cost per unit. So, he is induced to provide the best possible equipment and working conditions.

#### Disadvantages

1. Quality of work suffers because workers are in a hurry to save more and more time to get more and more bonus.
2. Workers criticize this method on the ground that the employer gets a share of wages of the time saved.
3. **Rowan Plan:** The difference between Halsey plan and Rowan Plan is the calculation of the bonus. Under this method also the workers are guaranteed the time wages but the bonus is that proportion of the wages of the time taken which the time saved bears to the standard time allowed.

**Total Earnings = T x R + S-T x T x R**

**S**

#### Illustration 12:

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

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

Standard time allowed 10 hours

Less: Time Saved 4 hours

Time Taken 6 hours

*Earnings under the Rowan Premium Plan*

Earnings =T x R + S-T x T x R

S

Where, T = 6 hours

S = 10 hours

R = Re.1 per hour Earnings = 6 x 1 + 10-6 x 6 x 1

10

= 6 + Rs.2.40 = Rs.8.40

#### Advantages

1. It guarantees time wages to workers
2. The quality of work does not suffer as they are not induced to rush through production as bonus increases at a decreasing rate at higher levels of efficiency.
3. Labour cost per unit is reduced because wages of time saved are shared by employer and employee.
4. Fixed overhead cost is reduced with increase in production.

#### Disadvantages

1. The Rowan plan is criticized by workers on the ground that they do not get the full benefit of the time saved by them as they are paid bonus for a portion of the time saved.
2. The Rowan plan suffers from another drawback that two workers, one very efficient and the other not so efficient, may get the same bonus.

#### UNIT IV

#### Overheads

Cost related to a cost center or cost unit may be divided into two ie. Direct and Indirect cost. The Indirect cost is the overhead cost and is the total of indirect material cost, indirect labour cost, indirect expenses. CIMA defines indirect cost as ***“expenditure on labour, materials or services which cannot be economically identified with a specific salable cost per unit”***. Indirect costs are those costs which are incurred for the benefit of a number of cost centers or cost units. So any expenditure over and above prime cost is known as overhead. It is also called **‘burden’, ‘supplementary costs’, ‘on costs’, ‘indirect expenses’.**

#### Classification of Overheads

Overheads can be classified on the following basis:

1. **Function-wise classification**: Overheads can be divided into the following categories on functional basis.
   1. Manufacturing or production overheads eg:- indirect materials like lubricants, cotton wastes, indirect labour like salaries and wages of supervisors, inspectors, storekeepers, indirect expenses like rent, rates and insurance of factory, power, lighting of factory, welfare expenses like canteen, medical etc.
   2. Administration overheads eg:- indirect materials like office stationery and printing, indirect labour salaries of office clerks, secretaries, accountants, indirect expenses rent, rates and insurance of office, lighting heating and cleaning of office, etc.
   3. Selling and Distribution overheads eg:- indirect materials like catalogues, printing, stationery, price list, indirect salary of salesmen, agents, travellers, sales managers, indirect expenses like rent, rates and insurance of showroom, finished goods, godown etc., advertising expenses, after sales service, discounts, bad debts etc.
2. **Behavior-wise classification**: Overheads can be classified into the following categories as per behavior pattern.
   1. Fixed overheads like managerial remuneration, rent of building, insurance of building, plant etc.
   2. Variable overheads like direct material and direct labour.
   3. Semi-variable overheads like depreciation, telephone charges, repair and maintenance of buildings, machines and equipment etc.
3. **Element-wise classification**: Overheads can be classified into the following categories as per element.
   1. Indirect materials
   2. Indirect labour
   3. Indirect expenses

#### Allocation and Apportionment of Overhead to Cost Centres (Depart-mentalisation of Overhead)

When all the items are collected properly under suitable account headings, the next step is allocation and apportionment of such expenses to cost centres. This is also known as departmentalization or primary distribution of overhead.

A factory is administratively divided into different departments like Manufacturing or Producing department, Service department, partly producing departments.

#### Allocation of Overhead Expenses

Allocation is the process of identification of overheads with cost centres. An expense which is directly identifiable with a specific cost centre is allocated to that centre. Thus it is allotment of a whole item of cost to a cost centre or cost unit. For example the total overtime wages of workers of a department should be charged to that department. The electricity charges of a department if separate meters are there should be charged to that particular department only.

#### Apportionment of Overhead Expenses

Cost apportionment is the allotment of proportions of cost to cost centres or cost units. If a cost is incurred for two or more divisions or departments then it is to be apportioned to the different departments on the basis of benefit received by them. Common items of overheads are rent and rates, depreciation, repairs and maintenance, lighting, works manager’s salary etc.

#### Basis of Apportionment

Suitable bases have to be found out for apportioning the items of overhead cost to production and service departments and then for reapportionment of service departments costs to other service and production departments. The basis selected should be correlated to the expenses and the expense should be measurable by the basis. This process of distribution of common expenses over the departments on some equitable basis is known as ‘Primary Distribution’.

The following are the main bases of overhead apportionment utilized in manufacturing concerns:

**Direct Allocation.** Under direct allocation, overheads are directly allocated to the department for which it is incurred. Example overtime premium of workers engaged in a particular department, power, repairs of a particular department etc.

1. **Direct Labour/Machine Hours.** Under this basis, overhead expenses are distributed to various departments in the ratio of total number of labour or machine hours worked in each department. Majority of general overhead items are apportioned on this basis.
2. **Value of materials passing through cost centres.** This basis is adopted for expenses associated with material such as material handling expenses.
3. **Direct wages.** Expenses which are booked with the amounts of wages eg:- worker’s insurance, their contribution to provident fund, worker’s compensation etc. are distributed amongst the departments in the ratio of wages.

**Illustration 13**: The Modern Company is divided into four departments: A, B and C are producing departments, and D is a service departments. The actual costs for a period are as follows:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Rent | Rs.1000 | Repairs to Plant | | | Rs.600 |
| Supervision | Rs.1500 | Fire Insurance in respect of Stock | | | Rs.500 |
| Depreciation of Plant | Rs.450 | Power | | | Rs.900 |
| Light | Rs.120 | Employers’ liability for insurance | | | Rs.150 |
| The following information is available in respect of the four departments; | | | | | |
|  | Dept.A | | Dept.B | Dept.C | Dept.D |
| Area (sq.mtrs) | 1,500 | | 1,100 | 900 | 500 |
| Number of Employees | 20 | | 15 | 10 | 5 |
| Total Wages (Rs.) | 6,000 | | 4,000 | 3,000 | 2,000 |
| Value of Plant (Rs.) | 24,000 | | 18,000 | 12,000 | 6,000 |
| Value of stock (Rs.) | 15,000 | | 9,000 | 6,000 | - |
| H.P. of Plant | 24 | | 18 | 12 | 6 |

Apportion the costs to the various departments on the most equitable basis.

SOLUTION

**OVERHEADS DISTRIBUTION SUMMARY**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Items | Basis of apportionment | Total Amount  Rs. | Product Departments | | | Service Department D  Rs. |
| A  Rs. | B  Rs. | C  Rs. |
| Rent | Floor Area | 1,000 | 375 | 275 | 225 | 125 |
| Supervision | No. of Employees | 1,500 | 600 | 450 | 300 | 150 |
| Depreciation | Plant Value | 450 | 180 | 135 | 90 | 45 |
| Light | Floor area | 120 | 45 | 33 | 27 | 15 |
| Repairs to Plant | Plant Value | 600 | 240 | 180 | 120 | 60 |
| Fire Insurance | Stock Value | 500 | 250 | 150 | 100 | - |
| Power | HP. Of Plant | 900 | 360 | 270 | 180 | 90 |
| Employer’s Liability | No. of Employees | 150 | 60 | 45 | 30 | 15 |
| Total | | 5,220 | 2,110 | 1,538 | 1,072 | 500 |

#### Re-apportionment of Service Department Costs to Production Departments

Service department costs are to be reapportioned to the production departments or the cost centres where production is going on. This process of re-apportionment of overhead expenses is known as ‘**Service Distribution**’. The following is a list of the bases of apportionment which may be accepted for the service departments noted against

|  |  |
| --- | --- |
| **Service Department Cost** | **Basis of Apportionment** |
| 1. Maintenance Department 2. Payroll or time-keeping department 3. Store keeping department 4. Employment or Personnel epartment. 5. Purchase Department 6. Welfare, ambulance, canteen service, recreation room expenses. 7. Building service department 8. Internal transport service or overhead crane service 9. Transport Department 10. Power House (Electric power cost) | -Hours worked for each department  -Total labour or Machine hours or number of employees in each department   * no. of requisitions or value of materials of each department. * Rate of labour turnover or number of employees in each department.   -no. of purchase orders or value of materials  -No. of employees in each department.  -Relative are in each department  -Weight, value graded product handled, weight and distance travelled.  -crane hours, truck hours, truck mileage, truck tonnage, truck tonne-hours, tonnage handled, number of packages.  –wattage, horse power, horse power machine  hours, number of electric points etc. |

The following are the various methods of re-distribution of service department costs to production departments.

1. Direct re-distribution method
2. Step distribution method
3. Reciprocal Services method
   1. Simultaneous Equation Method
   2. Repeated Distribution Method
   3. Trial and Error Method

#### Direct re-distribution method

Under this method, the costs of service departments are directly apportioned to production departments without taking into consideration any service from one service department to another service department. Thus, proper apportionment cannot be done on the assumption that service departments do not serve each other and as a result the production departments may either be overcharged or undercharged. The share of each service department cannot be ascertained accurately for control purposes. Budget for each department cannot be prepared thoroughly. Therefore, Department Overhead rates cannot be ascertained correctly.

**Illustration 14**:In an Engineering factory, the following particulars have been collected for the three months’ period ended on 31st March, 2007. You are required to prepare Production Overheads Distribution Summary showing clearly the basis of apportionment where necessary.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | | Production Departments | | | Service Departments | |
|  | | A | B | C | D | E |
| Direct Wages | Rs. | 2000 | 3000 | 4000 | 1000 | 2000 |
| Direct Material | Rs. | 1000 | 2000 | 2000 | 1500 | 1500 |
| Staff | Nos. | 100 | 150 | 150 | 50 | 50 |
| Electricity | Kwh. | 4000 | 3000 | 2000 | 1000 | 1000 |
| Light Points | No. | 10 | 16 | 4 | 6 | 4 |
| Asset Value | Rs. | 60,000 | 40,000 | 30,000 | 10,000 | 10000 |
| Area | Occupied | 150 | 250 | 50 | 50 | 50 |
| Sq.m. |  |  |  |  |  |  |

The expenses for the period were:

Motive power Rs.550; Lighting Power Rs.100; Stores Overheads Rs.400; Amenities to Staff Rs.1500; Depreciation Rs.15,000; Repairs and Maintenance Rs.3,000; General Overheads Rs.6000; and Rent and Taxes Rs. 275.

Apportion the expenses of service department E in proportion of 3:3:4 and those of service department D in the ratio of 3:1:1 to departments A, B and C respectively.

**SOLUTION**

PRODUCTION OVERHADS DISTRIBUTION SUMMARY

*For the quarter ending 31st March, 2007*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Production Departments | | | Service Departments | | Total Rs. |
| A  Rs. | B  Rs. | C  Rs. | D  Rs. | E  Rs. |
| Direct Wages |  |  |  | 1000 | 2000 | 3000 |
| Direct Materials |  |  |  | 1500 | 1500 | 3000 |
| Motive Power @ 5p.per Kwh | 200 | 150 | 100 | 50 | 50 | 550 |
| Lighting Power @ Rs.2.50per Point | 25 | 40 | 10 | 15 | 10 | 100 |
| Stores Overhead @ 5% of Direct Material | 50 | 100 | 100 | 75 | 75 | 400 |
| Amenities to staff @ Rs.3 per employee | 300 | 450 | 450 | 150 | 150 | 1500 |
| Depreciation @ 10% of the value of asset. | 6000 | 4000 | 3000 | 1000 | 1000 | 15000 |
| Repairs and maintenance @ 2% of value | 1200 | 800 | 600 | 200 | 200 | 3000 |
| General Overheads @ 50% of Direct | 1000 | 1500 | 2000 | 500 | 1000 | 6000 |
| Wages | 75 | 125 | 25 | 25 | 25 | 275 |
| Rent and Taxes @Re.0.50 per sq.meter |  |  |  |  |  |  |
| Total | 8,850 | 7,165 | 6,285 | 4,515 | 6,010 | 32,825 |
| Dept. E ( 3: 3 : 4) | 1,803 | 1,803 | 2,404 |  | (6,010) |  |
| Dept. D (3 : 1 : 1) | 2,709 | 903 | 903 | (4,515) |  |  |
| Total | 13,362 | 9,871 | 9,592 |  |  | 32,825 |

#### Step Distribution Method

Under this method, the cost of most serviceable department is first apportioned to other service departments and production departments. The next service department is taken up and its cost is apportioned and this process goes on till the cost of the last service department is apportioned. Thus, the cost of last service department is apportioned only to production departments.

**Illustration 15:** A manufacturing company has two Production Departments, P1 and P2 and three Service Departments, Time-keeping, Stores and Maintenance. The Departmental Summary showed the following expenses for July, 2007 .

*Production Departments Service Departments (in order of their importance)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P1 | P2 | S1  (Time-keeping) | S2  (Stores) | S3  (Maintenance) |
| Rs. | Rs. | Rs. | Rs. | Rs. |
| 16,000 | 10,000 | 4,000 | 5,000 | 3,000 |

The other information relating to departments were:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Service Departments | | | Production Departments | |
| S1 (Time-  keeping) | S2  (Stores) | S3(Main-  tenance) | P1 | P2 |
| No. of Employees | - | 20 | 10 | 40 | 30 |
| No. of Stores requisitions | - | - | 6 | 24 | 20 |
| Machine Hours | - | - | - | 2400 | 1600 |

Note: basis of apportionment

1. Time-keeping – No. of employees (ie. 2:1:4:3)
2. Stores – No. of stores requisitions ( ie. 3:12:10)
3. Maintenance- Machine Hours (ie. 3:2)

The most important limitation of this method is that the cost of one service centre to other service cost centres is ignored and thus the cost of individual cost centres are not truly reflected.

#### Reciprocal Services Method

In order to avoid the limitation of Step Method, this method is adopted. This method recognizes the fact that if a given department receives service from another department, the department receiving such service should be charged. If two departments provide service to each other, each department should be charged for the cost of services rendered by the other. There are three methods available for dealing with inter-service departmental transfer:

1. Simultaneous Equation Method
2. Repeated Distribution Method
3. Trial and Error Method

#### Simultaneous Equation method

Under this method, the true cost of the service departments are ascertained first with the help of simultaneous equations; these are then redistributed to production departments on the basis of given percentage. The following illustration may be taken to discuss the application of this method.

#### Illustration 16:

A company has three production departments and two service departments, and for a period the departmental distribution summary has the following totals.

|  |  |
| --- | --- |
|  | Rs. |
| Production Departments |  |
| P1- Rs. 800; P2- Rs. 700; P3- Rs.500 | 2000 |
| Service Departments: |  |
| S1 – Rs. 234; S2- Rs.300 | 534 |
|  | 2534 |

The expenses of the service departments are charged out on a percentage basis as follows;

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | P1 | P2 | P3 | S1 | S2 |
| Service Department S1 | 20% | 40% | 30% | - | 10% |
| Service Department S2 | 40% | 20% | 20% | 20% | - |

Prepare a statement showing the apportionment of two service departments expenses to production departments by Simultaneous Equation Method.

#### SOLUTION:

By Simultaneous Equation Method

Let x = total overheads of department S1 y = total overheads of department S2

Then,

x=Rs.234+. 2y y=Rs.300+. 1x

Rearranging and multiplying to eliminate decimals; 10x-2y=Rs.2,340 (1)

-x+10y=Rs.3,000 (2)

Multiplying equation (1) by 5 and add result to (2), we get 49x=Rs.14,700

x=Rs.300

Substituting this value in equation (1), we get y=Rs.330

All that now remains to be done is to take these values x=Rs.300 and y=Rs.330 and apportion them on the basis of the agreed percentage to the three production departments; thus:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Total | P1 | P2 | P3 |
| Per distribution summary | 2,000 | 800 | 700 | 500 |
| Service department S1 | 270 | 60 | 120 | 90 |
| Service department S2 | 264 | 132 | 66 | 66 |
|  | 2,534 | 992 | 886 | 656 |

This method is recommended in more than two service departments if the data is processed with computers and in two service departments only where the data is processed manually.

#### Repeated Distribution Method

Under this method, the totals are shown in the departmental distribution summary, are put out in a line, and then the service department totals are exhausted in turn repeatedly according to the agreed percentages until the figures become too small to matter.

By solving illustration 16 by Repeated Distribution Method, we get the Secondary Distribution Summary which is given as follows:

SECONDARY DISTRIBUTION SUMMARY

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | P1 | P2 | P3 | S1 | S2 |
|  | Rs. | Rs. | Rs. | Rs. | Rs. |
| As per summary | 800 | 700 | 500 | 234 | 300 |
| Service Department S1 | 47 | 94 | 70 | (234) | 23 |
| Service Department S2 | 129 | 65 | 65 | 64 | (323) |
| Service Department S1 | 14 | 25 | 19 | (64) | 6 |
| Service Department S2 | 2 | 2 | 2 |  | (6) |
|  | 992 | 886 | 656 | - | - |

#### Trial and Error Method

Under this method, the cost of one service department is apportioned to another centre. The cost of another centre plus the share received from the first centre is again apportioned to the first cost centre and this process is repeated till the balancing figure becomes negligible.

By solving illustration 16 by Trial and Error Method, we get the following:

|  |  |  |
| --- | --- | --- |
|  | Service Departments | |
| S1 | S2 |
|  | Rs. | Rs. |
| Original apportionment | 234 | 300 |
|  | (23) | 23 (10% of 234) |
|  | 65(20% of 323) | (323) |
|  | (65) | 7 (10% of 65) |
|  | 1(20% of 7) | (7) |
| Total of positive figures | 300 | 330 |

ABSORPTION OF OVERHEAD

Absorption means the distribution of the overhead expenses allotted to a particular department over the units produced in that department. Overhead absorption is accomplished by overhead rates.

#### Methods of Absorption of Manufacturing Overhead

The following are the main methods of absorption of manufacturing or factory overheads.

1. **Direct Material Cost Method**. Under this method percentage of factory expenses to value of direct materials consumed in production is calculated to absorb manufacturing overheads.

The formula is Overhead Rate = Production Overhead Expenses (Budgeted)

Anticipated Direct Material Cost

If in a factory the anticipated cost of direct material is Rs. 4,00,000 and the over head budgeted expenses are Rs. 1,00,000, then the overhead rate will be 25% ie.( Rs.1,00,000 ÷ Rs.4,00,000) of the materials used. It is assumed that relationship between materials and factory expenses will not change. This method is simple and can be adopted under the following circumstances:

1. Where the proportion of overheads to the total cost is significant.
2. Where the prices of materials are stable.
3. Where the output is uniform ie. Only one kind of article is produced.
4. **Direct Labour Cost (or Direct Wages) Method**. This is a simple and easy method and widely used in most of the concerns. The overhead rate is calculated as under:

Overhead Rate= Production Overhead Expenses Direct Labour Cost

If from past experience, the percentage of factory expenses to direct wages is 50%, then the factory expenses in the next year is taken as 50% of the direct wages.

This method is suitable under the following situations:

1. Where direct labour constitutes a major proportion of the total cost of production.
2. Where production is uniform.
3. Where labour employed and types of work performed are uniform.
4. Where the ratio of skilled and unskilled labour is constant.
5. Where there are no variations in the rates of pay ie., the rates of pay and the methods are the same for the majority of the workers in the concern.

In some concerns a separate rate is calculated for the fringe benefits and applied on the basis of direct labour cost.

1. **Prime Cost Method.** Under this method the recovery rate is calculated dividing the budgeted overhead expenses by the aggregate of direct materials and direct labour cost of all the products of a cost centre. The formula is

Overhead Recovery Rate = Production Budgeted Overhead Expenses

Anticipated Direct Materials and Direct Labour Cost

Suppose if the budgeted overheads are Rs.50,000 and the estimated values of direct materials and direct labour are Rs.30,000 and Rs.20,000, then overhead recovery rate will be 100%

i.e., 50000 x 100.

30000+20000

1. **Direct Labour (or Production) Hour Method.** This rate is obtained by dividing the overhead expenses by the aggregate of the productive hours of direct workers. The formula is

Overhead rate = Production Overhead Expenses

Direct Labour Hours

If in a particular period the overhead expenses are Rs.50,000 and direct labour hours are 1,00,000, then overhead labour rate will be Re.0.50 (i.e., Rs.50,000 ÷1,00,000).

This rate is suitable where:

* 1. The production is done using more of labour and less technology is used.
  2. It is desired to taken into consideration the time factor.
  3. The rate may not be affected by the method of wage payment or the grade or the rate of workers.

**Illustration17:** From the following particulars find out “Direct Labour Rate”.

1. Total number of labourers working in the department. 400
2. Total working days in a year 300
3. Number of working hours per day 8
4. Total departmental overheads per year Rs.1,82,400
5. Normal idle time allowed. 5%

#### SOLUTION:

CALCULATION OF DIRECT LABOUR RATE FOR DEPARTMENTAL OVERHEADS

Total working days in a year 300

Number of working hours per day 8

Total working hours available per worker per year 2,400 (300 x 8)

Less: normal idle time allowed (5% of 2,400hrs) 120

Effective working hours per worker per year (2400-120) 2,280 Number of workers working in the department 400

Total effective working hours in the department(2280 x 400) 9,12,000 Total departmental overheads per year Rs.1,82,000

Direct Labour Rate for absorption of overheads per hour Re.0.20 (Rs.182,400÷9,12,000hrs=Rs.0.20)

1. **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 is a basic similarity between the machine hour and the direct labour hour rate methods, in so far as both are based on the time factor. The choice of one or the other method depends on the actual circumstances of the individual case. In respect of departments or operations, in which

machines predominate and the operators perform a relatively a passive part, the machine hour rate is more appropriate. This is generally the case for operations or processes performed by costly machines which are automatic or semi-automatic and where operators are needed merely for feeding and tending them rather than for regulating the quality or quantity of their output. In such cases, the machine hour rate method alone can be depended on to correctly apportion the manufacturing overhead expenses to different items of production. What is needed for computing the machine hour rate is to divide overhead expenses for a specific machine or group of machines for a period by the operating hours of the machine or the group of machines for the period. It is calculated as follows:

Machine hour rate = Amount of overheads

Machine hours during a given period

The following steps are required to be taken for the calculation of machine hour rate:

* 1. Each machine or group of machine should be treated as a cost centre.
  2. The estimated overhead expenses for the period should be determined for each machine or group of machines.
  3. Overheads relating to a machine are divided into two parts i.e., fixed or standing charges and variable or machine expenses.
  4. Standing charges are estimated for a period for every machine and the amount so estimated is divided by the total number of normal working hours of the machine during that period in order to calculate an hourly rate for fixed charges. For machine expenses, an hourly rate is calculated for each item of expenses separately by dividing the expenses by the normal working hours.
  5. Total of standing charges and machines expenses rates will give the ordinary machine hour rate.

Some of the bases which may be adopted for apportioning the different expenses for the purpose of calculation of machine hour rate are given below.

Some of the expenses and the basis of apportionment are given below.

* + 1. Rent and Rates - Floor area occupied by each machine including the surrounding space.
    2. Heating and Lighting - The number of points used plus cost of special lighting or heating for any individual machine, alternatively according to floor area occupied by each machine.
    3. Supervision – estimated time devoted by the supervisory staff to each machine.
    4. Lubricating Oil and Consumable Stores – On the basis of past experience.
    5. Insurance – Insurable value of each machine
    6. Miscellaneous Expenses – Equitable basis depending upon facts.

#### Machine Expenses

1. Depreciation – cost of machine including cost of stand-by equipment such as spare motors, switchgears etc., less residual value spread over its working life.
2. Power – Actual consumption as shown by meter readings or estimated consumption ascertained from past experience.
3. Repairs – Cost of repairs spread over its working life.

**Illustration 18:** A machine is purchased for cash at Rs.9,200. Its working life is estimated to be 18,000 hours after which its scrap value is estimated at Rs.200. it is assumed from past experience that:

1. The machine will work for 1,800 hours annually.
2. The repair charges will be Rs.1,800 during the whole period of life of the machine.
3. The power consumption will be 5 units per hour at 6 paisa per unit.
4. Other annual standing charges are estimated to be: Rs.

|  |  |
| --- | --- |
| (a) Rent of department (machine occupies 1/5th of total space) | 780 |
| (b) Light (12 points in the department-2 points engage d in the machine) | 288 |
| (c) Foreman’s salary (1/4th of his time is occupied in the machine) | 6000 |
| (d) Insurance premium (fire) for machinery | 36 |
| (e) Cotton waste | 60 |

Find out the machine hour rate on the basis of above data for allocation of the works expenses to all jobs for which the machine is used.

#### SOLUTION:

CALCULATION OF MACHINE HOUR RATE

|  |  |  |
| --- | --- | --- |
| Standing Charges:  Rent[ Rs.780 ÷Rs.5]  Light [ 2/12 x Rs.288] Insurance Charges Cotton waste  Total Standing Charges Hourly rate of standing charges Rs.1800  1800  Machine Expenses:  Depreciation (Rs.9,200-Rs.200)÷18,000 = Rs.9000 ÷18,000  Repairs and Maintenance (Rs.1,080÷18,000) Power (0.06 x 5) | *Per Annum* | *Per Hour* |
| *Rs.* | *Rs.* |
| 156 |  |
| 48 |  |
| 36 |  |
| 60 |  |
| 1,500 |  |
| 1,800 |  |
|  | 1.00 |
|  | 0.50 |
|  | 0.06 |
|  | 0.30 |
| Machine Hour Rate |  | 1.86 |

1. **Rate Per Unit of Production**. This method is simple, direct and easy. It is suitable for mining and other extractive industries, foundries and brick laying industries, where the output is measured in convenient physical units like number, weight, volume etc. the rate is calculated as under:

Overhead Rate= Overhead expenses (budgeted)

Budgeted production

For example, if the overhead expenses (budgeted) are Rs. 30,000 and the budgeted production is 10,000 tonnes, then overhead rate according to this method will be Rs. 3 per tonne.

The main limitation of this method is that it is restricted to those concerns which produce only one item of product or a few sizes, qualities or grades of the same product. If more than one item are produced, then it is essential to express dissimilar units against a common denominator on weightage or point basis.

1. **Sale Price Method**: Under this method, budgeted overhead expenses are divided by the sale price of units of production in order to calculate the overhead recovery rate. The formula is sale price of units of production in order to calculate the overhead recovery rate, the formula is

Overhead Recovery Rate= Budgeted overhead expenses

Sale value of units of production

The method is more suitable for apportioning of administration, selling and distribution, research, development and design costs of products. It can also be used with advantage for the appropriation of joint products costs.

# UNIT- V Methods of Costing

**1. UNIT COSTING**

It is an important method of costing. It is also known as output costing or single costing. It is used to ascertain the cost of producing a unit of output.. This method is called ‘unit’ costing since every unit of production is identical in all respects and the cost unit is a standard product.

According to J.R Batliboi, “Single or output cost system is used in business where a standard product is turned out and it is desired to find out the cost of a basic unit of production.”

**Features:**

1. It is used where output can be measured in convenient physical unit
2. It is followed in concern s engaged in the production of a single product
3. It is followed in industries where manufacturing process is continuous
4. It is followed where all units of production are identical

#### JOB COSTING

It means ascertaining costs of an individual job, work order or project separately. According to ICMA London, “job costing is that form of specific order costing which applies where work is undertaken to customer’s specific requirements and each order is of comparatively of short duration.” Under this method of costing, each job is considered to be a distinct cost unit. As such, each job is separately identifiable.

In the case of a job, work is usually carried out within the factory or workshop. Sometimes, a job is accomplished even in the customer’s premises. This method of costing is applicable to ship building, printing, engineering, machine tools, readymade garments, shoes, hats, furniture, musical instruments, interior decorations etc.

#### Features:

1. Each job has its own characteristics, depending up on the special order placed by the customer.
2. Each job is treated as a cost unit.
3. A separate job cost sheet is made out for each job on the basis of distinguishing numbers.
4. A separate work in progress ledger is maintained for each job.
5. The duration of the job is normally a short period.
6. Profit or loss is determined for each job independently of others

#### Advantages of Job costing:

1. It helps to distinguish profitable jobs from unprofitable jobs
2. It helps to identify defective work and spoilage with a department or person
3. Selling price of special orders can easily be fixed.
4. It helps to prepare estimates of cost for submitting quotations and tender for similar jobs
5. It helps to control future cost.

#### Requisites of Job costing system:

1. A sound system of production control
2. An effective time booking system
3. Clearly defined cost centre
4. Appropriate overhead absorption rate, and
5. Proper material issue pricing method.

#### Procedure for Job order costing system:

The Procedure for job order costing system may be summarized as follows:-

1. Receiving an enquiry from the customer regarding price, quality etc
2. Make an estimation of the price of the job after considering the cost incurred for the execution of similar job in the previous year
3. Receiving an order, if the customer is satisfied with the quotation price and other terms of execution.
4. If the job is accepted, a production order is made by the Planning department.
5. The costs are collected and recorded for each job under separate production order Number, and a Job Cost Sheet is maintained for that purpose.
6. On completion of job, a completion report is sent to costing department.

#### Illustration I

From the following particulars calculate the cost of Job No.505 and price for the job to give a profit of 25% on the selling price.

Material : Rs. 6820

Wage details:

Department X : 60 hrs @ Rs. 3 per hr

1. : 50 hrs @ Rs. 3 per hr
2. : 30 hrs @ Rs. 5 per hr The variable Overheads are as follows:

Department X : Rs. 5000 for 5000 hrs

1. : Rs. 4000 for 2000 hrs
2. : Rs. 2000 for 500 hrs

The total fixed expenses amounted to Rs. 20,000 for 10,000 working hours.

Calculate the cost of Job No. 505 and price for the job to give a profit of 25% on selling price

#### Solution:

**Job Cost Sheet No. 505**

|  |  |  |  |
| --- | --- | --- | --- |
| Direct Material |  | Rs. 6,820 |  |
| Wages:  Department X | 60x3=180 |  |  |
| Department Y Department Z | 50x3=150  30x5=150 | 480 |  |
| Prime Cost Overheads: - Variables  Department X | 60 x1 = 60 | 7,300 |  |
| Department Y Department Y | 50 x2= 100  30x 4= 120 | 280 |  |
|  |  | 7,580 |  |
| Fixed OH 140 x 2 = 280(60+50+30 x 2) |  | 280 |  |
|  | Total cost | 7,860 |  |

Profit 25% on selling price ie 1/3 of cost 7860 x1/3 2, 620

Selling price 10,480

#### Practical problem 1

The following information is extracted from the Job ledger in respect of Job No. 205 Materials Rs. 8,500

Wages : 80 hours @ Rs. 6 per hour

Variable OH incurred for all jobs is Rs. 10,000 for 4,000 labour hours. Find the profit if the job is billed for Rs. 8,400.

Practical Problem 2

From the following information, ascertain the work cost of Job No. 505

The job was commenced on 10th January 2011 and completed on 1st Feb.2011. Materials used were Rs. 2,400 and labour charges were Rs. 1,600. Other details were as follows:

1. Indirect labour cost in the factory amounted to Rs. 1,200
2. Machine X was used for 50 hours @ Rs. 20 per hour
3. Machine Z was used for 40 hours @ Rs. 22 per hour

#### CONTRACT COSTING

**Meaning**

It is a special form of job costing and it is the most appropriate method to be adopted in such industries as building and construction work, civil engineering, mechanical fabrication and ship building. In other words, it is a form of specific order costing which applies where the work is undertaken to customer’s requirements and each order of long duration as compared to job costing. It is also known as terminal costing.

The official CIMA terminology defines contract costing as “ a form of specific order costing in which costs are attributed to individual contracts.”

#### Basic features:

1. Each contract itself a cost unit.
2. Work is executed at customers site
3. The existence of sub contract
4. Most of the expenses incurred upon the contracts are direct.
5. Cost control is very difficult in contract costing.

#### Types of contracts

Generally there are three types of contracts:

1. Fixed price contracts: Under these contracts both parties agree to a fixed contract price.
2. Fixed price contract with Escalation clause
3. Cost plus contract: Under this contract no fixed price could be settled for a contract.

#### Contract Account

A contract account is a nominal account in nature. It is prepared to find out the cost of contract and to know profit or loss made on the contract. A contractor may undertake a number of contracts at a time. For each contract a separate account is opened. In the contract account all direct cost such as material, labour and other direct expenses incurred during an accounting period are debited and the indirect expenses are apportioned on an equitable basis. The differences between the two sides are known as Notional profit or notional loss.

#### SPECIAL TERMS IN CONTRACT ACCOUNT

1. **Work in Progress:** It is the unfinished contract at the end of the accounting period and it includes amount of work certified and amount of work uncertified. Work in progress is an asset, shown in the balance sheet by deducting there from any advance received from the contractee.
2. **Work certified:** The sales value of work completed as certified by the architect is known as ‘work certified’. In the case of contracts of long duration, the amount payable by the customer to the contractor is based on the sales value of work done as certified by the architect. At the end of the financial year, the total sales value of work done and certified by the architect is credited to the contract account.
3. **Work Uncertified:** It means work which has been carried out by the contractor but has not been certified by the architect. Sometimes, work which is complete remains uncertified at the end of the financial year. The reasons for the same may be
   1. Work not sufficient enough to be certified
   2. Work has not reached the stipulated stage to qualify for certification It is always valued at cost and credited to the contract account.
4. **Retention money:** - Regardless of the amount of work certified, the contractor is paid a specified percentage of the same and the balance is held or retained by the contractee. This is because of the fact that the contractee has to safe guard himself against any contingency arising from the non fulfillment of the terms of the contract by the contractor. The unpaid balance of work certified or the amount held back or retained by the contractee is known as ‘retention money’.
5. **Sub contract:** Sometimes the contractor enters into contracts with another contractor to give a portion of work undertaken by him. In such cases the work performed by the subcontractor s forms a direct charge to the contract concerned. Sub contract cost will be shown on the debit side of the contract account.
6. **Escalation clause**: This is clause which is provided in the contract to cover up any increase in the price of the contract due to increase in the prices of raw material or labour or in the utilization of any other factors of production. If material and labour utilization exceeds a particular limit, the customer agrees to bear the additional cost occasioned by excessive utilization. Here, the contractor has to satisfy the customer that excessive utilization is not the result of decreased efficiency.

#### SPECIMEN FORM OF CONTRACT ACCOUNT (Unfinished contract)

Contract A/C

|  |  |  |  |
| --- | --- | --- | --- |
| To materials To Labour To Plant  To Overheads  To cost of sub contracts  To Notional Profit c/d(B/F)  To Profit and Loss A/C To WIP (B/F) | Xxx Xxx Xxx Xxx Xxx Xxx  Xxx  Xxx Xxx | By work in progress:  Work certified  xxx  Work uncertified  xxx  By material returned  By plant  xxx  Less:Depreciation xx  By material lying at site | Xxx Xxx  Xxx  Xxx Xxx  Xxx |
|  | Xxx  ======= | By Notional profit B/d | Xxx  ======== |

#### Treatment of Plant and Machinery:

One of the distinguishing features of a contract is the use of special plant and machinery. The cost of these is capital expenditure, but yet, the usage of these should be reflected in the form of depreciation. There are two distinct methods of charging depreciation.

1. At the time of issue of plant to contract the contract account is debited with the full value of the plant. At the end of the period contract account is credited with the depreciated value. This method is used when plant and machinery is used at the contract site for a long period.
2. In the second method, contract account is debited with an hourly rate of depreciation for the number of hours the plant is used on the contract. A cost centre is set up for each machine. An estimate is made is made of the cost such as maintenance, depreciation, driver’s wage etc to be incurred. The total of this cost is divided by the number of hours that the machine is expected to be used.

#### Profit on Incomplete Contract:

In the case of a small contract extending over the financial period, profit or loss on the same may be ascertained by crediting it with the contract price due by the contractee. This procedure cannot be adopted in the case of contracts extending beyond the accounting period, and taking a long time for completion. If there is any profit upon the incomplete contract, it cannot be taken as actual profit. The profit upon the incomplete contract is called notional profit.

For the purpose of determining the amount of profit to be transferred to profit and loss account and making provision for future contingencies, the following guidelines may be kept in mind.

1. **When the work has not reasonably advanced (1/4 or less than ¼)** : - No profit should be taken to the credit of p/L account in the case of contracts which have just commenced and a small portion of the work is complete.
2. **Where the work is complete more than ¼ but less than ½ of contract price:** In this case 1/3 of the notional profit as reduced by the percentage of cash received may be credited to profit and loss account. The usual formula is

Notional profit x1/3 x Cash received

Work certified

The balance of notional profit shall be kept as reserve till the completion

1. **If the contract completed is more than 1/2 but less than 90%**: Here 2/3 rd of the notional profit should be taken to profit and loss account.

Notional profit x2/3 x Cash received

Work certified

The balance of notional profit shall be transferred to work in progress as reserve. It is to be noted that in order to find out how much portion of contract is completed, work certified should be compared with contract price.

1. **If the contract is nearing completion:** Here, estimated profit may be ascertained by deducting the total cost of contract to date plus estimated additional expenses to complete the contract , from the contract price. It is calculated by using the following formula

Estimated profit x Cash received

Contract price

The loss on incomplete contract should be fully transferred to profit and loss account.

#### Example 1

The following was the expenditure on a contract for Rs. 6,00,000

|  |  |
| --- | --- |
| Material | 1,20,000 |
| Wages | 1,64,000 |
| Plant | 20,000 |
| Overheads | 8,600 |

Cash received on account of the contract was Rs. 2,40,000 being 80% of the work certified. The Value of material in hand was Rs. 10,000. The plant has undergone 20% depreciation.

#### Solution:

CONTRACT ACCOUNT

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Rs. |  | Rs. |  |
| To materials | 1,20,000 | By material in hand | 10,000 |  |
| To Wages | 1,64,000 | By plant on hand | 16,000 |  |
| To Plant | 20,000 | By work certified |  |  |
| To overheads | 8,600 | (2,40,000x100/80) | 3,00,000 |  |
| To Notional profit | 13,400 |  |  |  |
|  | 3,26,000  ====== |  | 3,26,000  ===== |  |
| To P/L account To Balance c/d | 7,147 By notional profit b/d 6,253 | | 13,400 |  |
|  | 13, 400 | | 13,400 |  |

#### Example 2

XY Ltd undertook a contract, the following was the expenditure on a contract for Rs. 6,00,000. Material issued to contract Rs. 1,02,000

Plant issued for contract Rs. 30000 Wages Rs.1,62,000

Other expenses Rs. 10,000

Cash received on account of contract up to 31st march 2011 amounted to Rs. 2,56,000 being 80% of work certified. Of the plant and material charged to the contract plant costing Rs. 3000 and material costing Rs. 4000/ were lost. On Ist March 2011, Plant which cost Rs. 2,000 was returned to the store, the cost of work done but not certified was Rs. 3000 and material costing Rs. 2,500 were in hand on site. Provide 10% depreciation on plant, reserve 1/3 of profit received and prepare contract account from the above particulars.

#### Solution

CONTRACT ACCOUNT

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| To materials |  |  | 1,02,000 | By work in progress: Work certified 256000x100/80 3,20000  Work uncertified 3000 By P & L Account  Plant lost 3000  Material lost 4000  By plant returned: 2,000  Less: depreciation 200  By material in hand  By plant at site(30000-3000- 2000) 25000  Less: depr 2500 By notional profit B/d |  |
| To Plant |  |  | 30,000 |  |
| To wages |  |  | 1,62,000 | 3,23,000 |
| To other expenses |  |  | 10,000 |  |
|  |  |  |  | 7000 |
|  |  |  |  | 1,800 |
|  |  |  |  | 2,500 |
| To Notional profit | c/d | (B. F) | 52800 |  |
|  |  |  |  | 22500 |
|  |  |  | 356800 | 356800 |
| To P/L  52800x2/3x80/100 |  | Account | 28160 | =========  52 800 |
| Reserve BF |  |  | 24640  52 800 | 52 800 |
|  |  |  | ======== | ========= |

WORK IN PROGRESS ACCOUNT

|  |  |  |  |
| --- | --- | --- | --- |
| To contract A/c | 3 23,000 | By Contract A/c (reserve) | 24640 |
|  |  | By Balance c/d | 2,98,360 |
|  | 3,23,000 |  | 3,23,000 |
|  | ========== |  | ========== |

Note: It is assumed that the contract has begun on 1/4/10.

#### Example- 3

Mr. A has undertaken several contract works. He maintains a separate record for each contract. From the records for the year ending 31-12-98, Prepare contract account for Contract No.50 and find the amount transferred to profit and loss account.

|  |  |
| --- | --- |
| Direct purchase of material | 1,80,000 |
| Material issued from stores | 50,000 |
| Wages | 2,44000 |
| Direct expenses | 24,000 |
| Machinery purchased | 1,60,000 |
| Establishment charges | 54,000 |

The contract price was Rs. 15,00,000. Cash received up to 31-12-2008 was Rs. 6,00,000 which is 80% of work certified . Material at site Rs. 16,000. Depreciation for Machine Rs. 16,000.

#### Solution:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| To materials: |  | By material at site  Machinery on hand 16000)  Work certified  By notional profit b/d | (1,60,000- | 16,000 |
| Direct purchase | 1,80,000 | 1, 44,000 |
| Issued from stores | 50,000 |  |
| Wages | 2,44,000 | 7, 50,000 |
| Direct expenses | 24,000 |  |
| Machinery purchased | 1,60,000 |  |
| Establishment | 54,000 |  |
| Notional profit | 1,98,000 |  |
|  | 9,10,000 | 9, 10,000 |
|  | ======= | ======= |
| To P/L account | 1,05,600 | 1,98,000 |
| Work in progress A/c | 92,400 | 1,98,000 |
|  | 1,98,000 | ======= |
|  | ======== |  |

**PROCESS COSTING**

Process costing is the method of costing applied in the industries engaged in continuous or mass production. Process costing is a method of costing used to ascertain the cost of a product at each process or stage of manufacturing.

According to ICMA terminology, “Process Costing is that form of operation costing which applies where standardized goods are produced”.

So it is a basic method to ascertain the cost at each stage of manufacturing. Separate accounts are maintained at each process to which expenditure incurred. At the end of each process the cost per unit is determined by dividing the total cost by the number of units produced at each stage. Hence, this costing is also called as “Average Costing” or “Continuous Costing”. Process Costing is used in the industries like manufacturing industries, chemical industries, mining works and public utility undertakings.

Characteristics of Process Costing

1. Production is continuous
2. Products pass through two or more distinct processes of completion.
3. Products are standardized and homogeneous.
4. Products are not distinguishable in processing stage.
5. The finished product of one process becomes the raw material of the subsequent process.
6. Cost of material, labour and overheads are collected for each process and charged accordingly.

Advantages of Process Costing

* 1. It is easy to compute average cot because the products are homogeneous in Process Costing.
  2. It is possible to ascertain the process costs at short intervals.
  3. Process Costing is simple and less expensive in relation o job costing.
  4. By evaluating the performance of each process effective managerial control is possible. Disadvantages of Process Costing

1. Valuation of work in progress is difficult.
2. It is not easy to value losses, wastes, scraps etc.
3. The apportionment of total cost among joint products and by-products is difficult.
4. Process cost are not accurate, they are only average costs
5. Process costs are only historical. Principles of Process Costing

The following points are considered while determining the cost under Process Costing.

1. Production activity should be divided into different processes or departments.
2. A separate account is opened for each process.
3. Both direct and indirect costs are collected for each process.
4. The quantity of output and costs are recorded in the respective process accounts.
5. The cost per unit is determined by dividing the total cost at the end of each process by the number of output of each process.
6. Normal loss and abnormal loss are credited in the process account
7. The accumulated cost of each process is transferred to subsequent process along with output. The output of the last process along with cost is transferred to the finished goods account.
8. In case of by-products and joint products their share in joint cost should be estimated and credited to the min process.
9. When there is work in progress at the end of the period the computation of inventory is made I terms of complete units.

#### Difference between Process Costing and Job Costing

|  |  |
| --- | --- |
| Process Costing | Job Costing |
| 1. Production is continuous 2. Production is for stock 3. All units produced are identical or homogeneous 4. There is regular transfer of cost of one process to subsequent processes 5. Work in progress always exists | 1. Production is according to   customers’ orders   1. Production is not for stock 2. Each job is different from the other 3. There is no regular transfer of cost from one job to another 4. Work in progress may or may not exist |

**Procedure for Process Costing**

1. Each process is separately identified. Separate process account is opened for each process.
2. Along with ‘Particulars Column’, two columns are provided on both sides of the process

account – units (quantity) and amount (Rupees).

1. All the expenses are debited in the respective process account.
2. Wastage, sale of scrap, by-products etc are reordered on the credit side 0f the process account.
3. The difference between debit and credit side shows the cost of production and output of that particular process which is transferred to the next process.
4. The cost per unit in every process is calculated by dividing the net cost by the output.
5. The output of last process is transferred to the Finished Stock Account.
6. Incomplete units at the end of the each period ion every process s converted in terms of completed units.

#### Specimen of Process Account

Process Account

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Units | Rs. |  | Units | Rs. |
| To Direct materials To Direct Wages To Direct Expenses  To Indirect expenses  To Other Expenses (if any) |  |  | By Loss in weight (Normal  Loss)  By sale of Scrap By Next Process  Account(Transfer) |  |  |
|  |  |  |  |

#### Preparation of Process Accounts

The preparation of Process Account depends upon the following situations

1. Simple Process Account
2. Process costing with normal process loss
3. Process costing with abnormal process loss
4. Process costing with abnormal process gains
5. Inter – process profits.

#### Simple Process Account

Under this case it is very easy to prepare process account. A separate account is opened for each process. All costs are debited to the process account. The total cost of the process is transferred to the next process. At the end of each process the cost per unit is obtained by dividing the total cost by the number of units.

**Illustration 1:** Product A requires three distinct processes and after the third process the product is transferred to finished stock. Prepare various process accounts from the following information.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Total | P1 | P2 | P3 |
| Direct Materials | 5000 | 4000 | 600 | 400 |
| Direct Labour | 4000 | 1500 | 1600 | 900 |
| Direct Expenses | 800 | 500 | 300 |  |
| Production overheads | 6000 |  |  |  |

Production overheads to be allocated to different processes on the basis of 150% of direct wages. Production during the period was 200 units. Assume 5here is no opening or closing stock.

#### Solution:

Process I Account

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Units | Rs. |  | Units | Rs. |
| To Direct materials | 200 | 4000 | By Process II Account(Transfer)  Cost per unit 8250 = 41.25  200 |  |  |
| To Direct Wages |  | 1500 | 200 | 8250 |
| To Direct Expenses |  | 500 |  |  |
| To Production overheads |  | 2250 |  |  |
| (1500x150%) | 200 | 8250 | 200 | 8250 |

Process II Account

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Units | Rs. |  | Units | Rs. |
| To Process I A/c To Direct materials To Direct Wages To Direct Expenses  To Production overheads (1600x150%) | 200 | 8250  600  1600  300  2400 | By Process III Account(Transfer)  Cost per unit 13150 = 65.75  200 | 200 | 13150 |
| 200 | 13150 | 200 | 13150 |

Process III Account

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Units | Rs. |  | Units | Rs. |
| To Process II A/c To Direct materials To Direct Wages  To Production overheads (900x150%) | 200 | 13150  400  900  1350 | By Finished stock A/c (Output Transferred ) Cost per unit 15800 = 79  200 | 200 | 15800 |
| 200 | 15800 | 200 | 15800 |

#### Process losses

The process loss is classified into two- normal process loss and abnormal process loss.

#### Normal process loss

This is the loss which is unavoidable on account of inherent nature of production process. It arises under normal conditions. It is usually calculated as a certain percentage of input. Normal process los includes either waste or scrap r both. Waste is unsalable and has no value. Loss in weight is an example of waste. Loss in weight should be credited to the concerned process account. It should be recorded only in terms of quantity.

Loss in weight = Opening Stock + output from the preceding process – (output of the Concerned process + closing stock)

Illustration 2: From the following figures, show the cost of three processes of manufacture. The production of each process is passed on to the next process immediately on completion.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Process  A | Process  B | Process  C |
| Wages and Materials | 30400 | 12000 | 29250 |
| Works Overhead | 5600 | 5250 | 6000 |
| Production ion units | 36000 | 37500 | 48000 |
| Stock on 1 July 2012 (units from preceding |  |  |  |
| process) |  | 4000 | 16500 |
| Stock on 31 July 2012 (units from preceding |  |  |  |
| process) |  | 1000 | 5500 |

Solution:

Process A Account

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Units | Rs. |  | Units | Rs. |
| To Wages and Materials To Works Overhead | 36000 | 30400  5600 | By Process B A/c (Transfer )  Cost per unit 36000 = 1  36000 | 36000 | 36000 |
| 36000 | 36000 | 36000 | 36000 |

Process B Account

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Units | Rs. |  | Units | Rs. |
| To Opening Stock (Re.1 p.u) To Process A A/c (transfer) To Wages and Materials  To Works Overhead | 4000  36000 | 4000  36000  12000  5250 | By loss in weight (Bal. fig) By Closing stock @ Re.1 p.u  By Process C A/c (Transfer ) Cost per unit 56250 = 1.50  37500 | 1500  1000  37500 | 1000  56250 |
| 40000 | 57250 | 40000 | 57250 |

Process C Account

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Units | Rs. |  | Units | Rs. |
| To Opening Stock (Rs.1.50 p.u)  To Process B A/c (transfer) To Wages and Materials To Works Overhead | 16500  37500 | 24750  56250  29250  6000 | By loss in weight (Bal. fig)  By Closing  [stock@Rs.1.5p.u](mailto:stock@Rs.1.5p.u)  By Finished stock A/c (Transfer)  Cost per unit108000 = 2.25  48000 | 500  5500  48000 | 8250  108000 |
| 54000 | 116250 | 54000 | 116250 |

Illustration 3: Bihar Chemicals Ltd produced three chemicals during the month of July 2012 by three consecutive processes. In each process 2% of the total weight put in is lost and 10 % is scrap which from process 1 and 2 realizes Rs.100 a ton and from process 3Rs.20 a ton.

The product of three processes is dealt with as follows:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Process 1 | Process 2 | Process 3 |
| Passed on to the next process | 75% | 50% |  |
| Sent to warehouse for sale | 25% | 50% | 100% |

Expenses incurred:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Rs | Tons | Rs | Tons | Rs | Tons |
| Raw materials | 120000 | 1000 | 28000 | 140 | 107840 | 1348 |
| Manufacturing wages | 20500 |  | 18520 |  | 15000 |  |
| General expenses | 10300 |  | 7240 |  | 3100 |  |

Prepare Process Cost Accounts showing the cost per ton of each product. Solution:

Process 1 Account

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Tons | Rs. |  | Tons | Rs. |
| To Raw materials | 1000 | 120000 | By loss in weight (2%) By Sale of scrap (10%)  By Warehouse - transfer (880x25%)  By Process 2  A/c(Transfer )  Cost per unit 140800 = 160  880 | 20 |  |
| To Manufacturing wages |  | 20500 | 100 | 10000 |
| To General expenses |  | 10300 |  |  |
|  |  |  | 220 | 35200 |
|  |  |  | 660 | 105600 |
|  | 1000 | 150800 | 1000 | 150800 |

Process 2 Account

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Tons | Rs. |  | Tons | Rs. |
| To Process 1 A/c(Transfer ) | 660 | 105600 | By loss in weight (2%) By Sale of scrap (10%)  By Warehouse - transfer (704x50%)  By Process 2  A/c(Transfer )  Cost per unit 151360 = 215  704 | 16 |  |
| To Raw materials | 140 | 28000 | 80 | 8000 |
| To Manufacturing wages |  | 18520 |  |  |
| To General expenses |  | 7240 | 352 | 75680 |
|  |  |  | 352 | 75680 |
|  | 800 | 159360 | 800 | 159360 |

Process 3 Account

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Tons | Rs. |  | Tons | Rs. |
| To Process 2 A/c(Transfer ) To Raw materials  To Manufacturing wages To General expenses | 352  1348 | 75680  107840  15000  3100 | By loss in weight (2%) By Sale of scrap (10%) By Warehouse - transfer Cost p unit 198220  =132.5  1496 | 34  170  1496 | 3400  198220 |
| 1700 | 201620 | 1700 | 201620 |

Abnormal Process Loss

Any loss caused by unexpected or abnormal conditions such as plant break don, substandard materials, carelessness, accident etc. or loss in exceeds of the margin anticipated for normal process loss can be called as abnormal process loss. It is controllable and avoidable. When actual loss in the process is greater than the estimated normal loss, it is a case of abnormal loss. It may also be determined by comparing actual output with expected or normal output. If actual output is les than the normal output, the difference is abnormal loss.

Value of Abnormal loss = Normal cost of normal output x Units of Abnormal loss

Normal output

Normal cost of normal output = Total expenditure (i.e., total debit of process A/c) – Sale

Proceeds of scrap (i.e. Value of normal loss)

Normal output = Input – Units of normal loss

Illustration 4: In process A 100 units of raw materials were introduced at a cost of Rs.1000. the other expenditure incurred by the process was Rs. 602. Of the units introduced 10% are normally lost in the course of manufacture and them posses a scrap value of Rs.3 each. The output of process A was only 75 units. Prepare Process A A/c and Abnormal loss A/c.

Solution:

Process A A/c

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Units | Rs. |  | Units | Rs. |
| To Raw Materials | 100 | 1000 | By Normal loss- |  |  |
| To Other expenses |  | 602 | [100x10% @Rs.3](mailto:100x10%25@Rs.3) each | 10 | 30 |
|  |  |  | By Abnormal loss | 15 | 262\* |
|  |  |  | (Bal.Fig)  By Process B A/c (transfer) | 75 | 1310 |
|  | 100 | 1602 | 100 | 1602 |

Working Note:

Normal cost of normal output = Total expenditure – Sale Proceeds of scrap

= 1602-30= 1572

Normal output = Input – Units of normal loss

= 100 – 10 = 90

Value of Abnormal loss = Normal cost of normal output x Units of Abnormal loss

Normal output

= 1572 x 15 = Rs. 262

90

Abnormal Loss A/c

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Units | Rs. |  | Units | Rs. |
| To Process A | 15 | 262 | By Cash (scrap value of loss @ Rs.3)  By Costing P&L A/c | 15 | 45  217 |
| 15 | 262 | 15 | 262 |

#### Abnormal Gain (or Abnormal Effective)

Sometimes actual loss or wastage in a process is less than expected normal loss. In this case the difference between actual loss and expected loss is known as abnormal gain or abnormal effective. It is the excess of actual production over normal output.

Abnormal gain is valued in the same manner as abnormal loss. The value of abnormal gain is debited to process A/c and credited to abnormal gain A/c. the value of scrap is debited to abnormal gain A/.c and credited to normal loss A/c. finally abnormal loss A/c is closed by transferring the credit balance to Costing P&L A/c.

Value of Abnormal Gain = Normal cost of normal output x Units of Abnormal gain

Normal output

Normal cost of normal output = Total expenditure– Sale Proceeds of scrap Normal output = Input – Units of normal loss

Units of Abnormal gain = Normal loss- Actual loss

Or = Actual output - Normal output

**Illustration 5:** Product X is obtained after it passes through three distinct processes. 2000 kg of materials at Rs.5 per kg were issued to the first process. Direct wages amounted to Rs.900 and production overhead incurred was Rs.500. Normal loss is estimated at 10% of input. This wastage is sold at Rs.3 per kg. The actual output is 1850 kg. Prepare process I A/c and Abnormal Gain/ Abnormal loss A/c as the case may be.

Solution:

Process I Account

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Kg | Rs. |  | Kg | Rs. |
| To Materials | 2000 | 10000 | By Normal loss (Sale of |  |  |
| To Direct wages |  | 900 | scrap ) | 200 | 600 |
| To Production OH |  | 500 | By Process II - transfer | 1850 | 111002 |
| To Abnormal gain (Bal.) | 501 | 3003 |  |  |  |
|  | 2050 | 11700 |  | 2050 | 11700 |

Abnormal Gain A/c

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Kg | Rs. |  | Kg | Rs. |
| To Normal loss (loss of income)  To Costing P&L A/c (Bal.) | 50 | 150  150 | By Process I A/c | 50 | 300 |
| 50 | 300 | 50 | 300 |

Working note:

1. (200+1850)-2000=50

2. (10000+900+500)-600 = Rs.6

1850-50

1850x6=11100

3. 50x6=30

**Illustration 6:** The product of a company passes through three distinct processes to completion – A,B and C. from the past experience it s ascertained that los s incurred in each process as – A-2%, B-5% and C-10%.

In each case the percentage of loss is computed on te number of units entering the process concerned. The loss of each process possesses a scrap value. The los of processes A and B sold at Rs.5 per 100 units and that of C at Rs.20 per 100 units.

The output of each process passes immediately to the next process and the finished units are passed from process C into stock.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Process A | Process B | Process C |
| Materials consumed | 6000 | 4000 | 2000 |
| Direct labour | 8000 | 6000 | 3000 |
| Manufacturing expenses | 1000 | 1000 | 1500 |

20000 units have been issued to process A at a cost of Rs.10000. the output of each process has been as under:

A-19500, B- 18800 and C - 16000.

There is no work in progress in any process. Prepare process accounts. Calculations should be made to the nearest rupee.

#### Solution:

Process A Account

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Units | Rs. |  | Units | Rs. |
| To Units introduced | 20000 | 10000 | By Normal loss | 400 | 20 |
| To Materials |  | 6000 | By Abnormal loss (Bal.) | 100 | 127 |
| To Direct labour |  | 8000 | By Process B - transfer | 19500 | 24853 |
| To Manufacturing Expenses |  | 1000 |  |  |  |
|  | 20000 | 25000 |  | 20000 | 25000 |

Process B Account

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Units | Rs. |  | Units | Rs. |
| To Process A A/c To Materials  To Direct labour  To Manufacturing Expenses To abnormal gain | 19500  275 | 24853  4000  6000  1000  532 | By Normal loss  By Process C - transfer | 975  18800 | 49  36336 |
| 19775 | 36385 | 19775 | 36385 |

Process C Account

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Units | Rs. |  | Units | Rs. |
| To Process B A/c | 18800 | 36336 | By Normal loss | 1880 | 376 |
| To Materials |  | 2000 | By To abnormal loss | 920 | 2309 |
| To Direct labour  To Manufacturing Expenses |  | 3000  1500 | By Finished stock A/c - transfer | 16000 | 40151 |
|  | 18800 | 42836 |  | 18800 | 42836 |

Finished Stock A/c

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Units | Rs. |  | Units | Rs. |
| To Process C A/c | 16000 | 40151 |  |  |  |
| 16000 | 40151 | 16000 | 40151 |

Abnormal Loss A/c

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Units | Rs. |  | Units | Rs. |
| To Process A | 100 | 127 | By Cash [(100@Rs.5](mailto:(100@Rs.5) per |  |  |
| To Process C | 920 | 2309 | [100+920@Rs.20per](mailto:100%2B920@Rs.20per) 100)  By Costing P&L A/c | 1020 | 189  2247 |
|  | 1020 | 2436 |  | 1020 | 2436 |

Normal loss A/c

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Units | Rs. |  | Units | Rs. |
| To Process A | 400 | 20 | By Abnormal Gain | 275 | 14 |
| To Process B  To Process C | 975 | 49 | By Cash/Debtors A/c | 2980 | 431 |
|  | 1880 | 376 |  |  |  |
|  | 3255 | 445 |  | 3255 | 445 |

Abnormal Gain A/c

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Units | Rs. |  | Units | Rs. |
| To Normal loss (loss of | 275 | 14 | By Process C A/c | 275 | 532 |
| income)  To Costing P&L A/c (Bal.) |  | 538 |  |  |  |
|  | 275 | 532 |  | 275 | 532 |

Working note:

Process A:

Value of Abnormal loss = Rs.24980/19600 units x 100 units = Rs. 127. Process B:

Value of Abnormal gain = Rs.35804/18525 units x 275 units = Rs. 532. Process C:

Value of Abnormal loss = Rs.42460/16920 units x 920 units = Rs. 2309.