ANNAI WOMEN`S COLLEGE, KARUR

(Arts & Science)

(Affiliated to Bharathidasan University Tiruchirappalli)

DEPARTMENT OF COMMERCE

COURSE MATERIAL

Name : T.Chitra .,M.Com.,M.Phil.,SET.,
Subject : Cost Accounting
Class : II – B.Com
Semester : IV
Subject Code : 16CCCCM5

COST ACCCOUNTING
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.

Limitations of Financial Accounting

1. **No clear idea of operating efficiency**: Sometimes profits in an organization may be less or more because of inflation or trade depression and not due to efficiency or inefficiency. But financial accounting does not give a clear reason for profit orloss.
2. **Weakness not spotted out by collective results**: Financial Accounting shows the net result of an organization. When the profit and loss account of an organization, shows less profit or a loss, it does not give the reason for it or it does not show where the weaknesslies.
3. **Does not help in fixing the price**: In Financial Accounting, we get the total cost of production but it does not aid in determining prices of the products, services, production order and lines ofproducts.
4. **No classification of expenses and accounts**: In Financial Accounting, we don't get data relating to costs incurred by departments, processes separately or per unit cost of product lines, or cost incurred in various sales territories. Further expenses are not classified as direct or indirect, controllable and uncontrollable overheads and the value added in each process is notreported.
5. **No data for comparison and decision making**: It does not supply useful data to management for comparison with previous period and for taking various financial deci sions as introduction of new products, replacement of labour by machines, price in normal or special circumstances, producing a part in the factory or buying it from outside market, production of a product to be continued or given up, priority accorded to different products, investment to be made in new products or notetc.
6. **No control on cost**: Financial Accounting does not help to control materials, supplies, wages, labour and overhead costs.
7. **Does not provide standards to assess the performance**: Financial Accounting does not help in developing standards to assess the performance of various persons ordepartments. It also does not help in checking that costs do not exceed a reasonable limit for a given quantum of work of the requisitequality.
8. **Provides only historical information**: Financial Accounting records only the historical costs incurred. It does not provide day-to-day cost information to the management for making effective plans for thefuture.

9. **No analysis of losses**: It does not provide complete analysis of losses due to defective material, idle time, idle plant and equipment etc.. In other words, no distinction is made between avoidable and unavoidablewastage.
10. **Inadequate information for reports**: It does not provide adequate information for reports to outside agencies such as banks, government, insurance companies and tradeassociations.
11. **No answer for certain questions**: Financial Accounting will not help to answer questions like:-
    (a) Should an attempt be made to sell more products or is the factory operating tocapacity?
    (b) ifanorderorcontractisaccepted,isthepriceobtainablesufficienttoshowaprofit?
    (c) if the manufacture or sale of product A were discontinued and efforts make to increase the sale of B, what would be the effect on the net profit? (d) Why the profit of last year is of such a small amount despite the fact that output was increased substantially?Etc.

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.

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 arerelated.
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 aresold.
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 anddistinctly".

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 normalconditions.

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 bedistorted.

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

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 remedialmeasures.
4. To provide data for periodical profit and loss accounts and balance sheets atsuch 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.
5. 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 constructiveaction.
6. 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 fixingpolicy.
7. 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 becompared.
8. 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 budgetarycontrol.
9. 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 forreplacement.
10. 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 andstores.

Cost Accounting and Financial Accounting-

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 decisionmaking.
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 manufacturingindustries.
3. Financial accounting emphasizes the measurement of profitability, while cost accounting aims at ascertainment of costs and accumulates data for this verypurpose.
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 profitableones.
5. Financial accounting provides operating results and financial position usually gives information through cost reports to the management as and whendesired.
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 objectivemanner.
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 ofcash.
9. The costs are reported in aggregate in financial accounts but costs are broken into unit basis in costaccounts.
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 andmachinery.
11. In financial accounts stocks are valued at cost or market price whichever is less, whereas stocks are valued at cost price in costaccounts.

Importance of Cost Accounting

a) **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 asfollows:

1. **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 facilitatesthis.
2. **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.
3. **Cost accounting helps in making estimates**. Adequate costing records provide a reliable basis for making estimates and quotingtenders.
4. **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-profitableones.
5. **Cost accounting eliminates wastages**. As cost accounting is concerned with detailed breakup of costs, it is possible to check various forms of wastages orlosses.
6. **Costaccountingmakescomparisonspossible**.Propermaintenanceofcostingrecords provides various costing data for comparisons which in turn helps the management in formulating future lines of action.
7. **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 themanagement.
8. **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 theefficiency.
9. **Cost accounting helps in inventory control**. Cost accounting furnishes control which management requires, in respect of stock of materials, work in progress and finishedgoods.

b) **Costing as an aid toCreditors**.

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.

c) **Costing as an aid toemployees**.

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.

d) Costing as an aid to NationalEconomy

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 unitbasis**
Automobile	Numbers
Brickworks	per 1000bricks
Cement	perTonne
Chemicals	Litre, gallon, kilogram,ton
Steel	Tonne
Sugar	Tonne
Transport	Passenger-kilometre, tonnekilometer

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.

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 thefactory
2. Conditions of incidence ofcost
3. Requirements of the costing system ie. Suitability of the units or centres for costpurposes.
4. Availability ofinformation
5. Management policy regarding making a particular choice from severalalternatives.

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 theirperformance.

Difference between Profit centre and Cost centre

(i) 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.

(ii) Cost centers are not autonomous whereas profit centres areautonomous.

(iii) 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 itstargets.

(iv) 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 acompany.

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 ofwork-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.

3. **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 staffetc.

4. **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 sameproportion.

5. **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.

6. **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 anundertaking".

7. **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 workersetc.

8. **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.

9. **By Time.,** Costs can be classified as 1) Historical cost and 2) PredeterminedCosts.

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 futurecorrection.

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) Processcosting.

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 ofcosting:

(a) ***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 buildingconstruction.

(b) ***Bach 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 manufacturingoperations.

(c) ***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 particularjob.

(d) ***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 variousoperations.

2. **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.

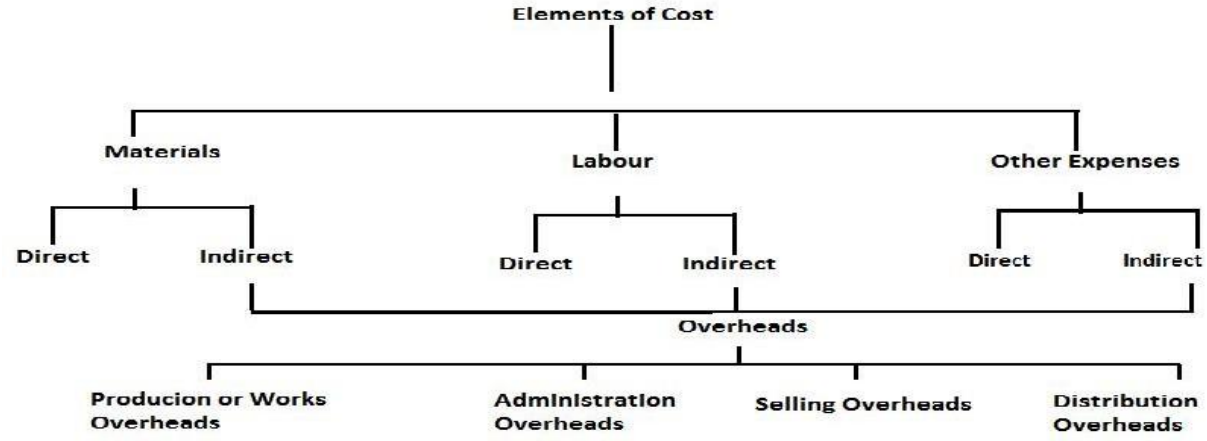
3. **Unit or single or output or single output costing:** This method is used where a single article is produced or service is rendered by continuous manufacturing activity. The cost of the whole production cycle is ascertained as a process or series of processes and the cost per unit is arrived at by 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.

4. **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.
5. **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.
6. **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 ofanother.
7. **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 unitcosting.

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:

a) Standard or PredeterminedCosts.
b) MarginalCosts

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. Primecost = Direct Materials + Direct Labour+ DirectExpenses
2. Works orFactoryCost = Prime Cost + Works or FactoryOverheads
3. CostofProduction = Works Cost + AdministrationOverheads
4. Total Cost or Cost of Sales = Cost of Production + Selling and DistributionOverheads

The difference between the cost of sales and selling price represents profit orloss.

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:

PrimeCost=DirectMaterials+DirectLabour=Rs.20,000+Rs.10,000=Rs.30,000.

WorksCost=PrimeCost+FactoryExpenses=Rs.30,000+Rs.7,000=Rs.37,000.

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

TotalCostorCostofsales=CostofProduction+SellingExpenses=Rs.42,000+Rs.7,000=Rs.49,000.

Profit=Sales-TotalCost=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 directmaterials.
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 generatorsetc.
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 directlabour.
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 jobetc.
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.

1. UNIT COSTING

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.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 ofproduction."

Features:

1. It is used where output can be measured in convenient physicalunit
2. It is followed in concern s engaged in the production of a singleproduct
3. It is followed in industries where manufacturing process iscontinuous
4. It is followed where all units of production areidentical

Cost sheet:

Cost sheet is a device used to determine and present the cost under unit costing. It is a statement of costs incurred at each level of manufacturing a product or service. In a Cost sheet all the elements of cost is taken into consideration. It includes Prime cost, Factory/manufacturing cost, cost of production, cost of sale Profit/loss etc.

Items excluded from Cost Sheet:

1. Pure financial expenses like interest on capital, interest on loan, discount on debentures, loss on sale of fixed asset provision for bad debts and doubtful debts, writing off goodwill, copyright, preliminary expensesetc.
2. Pure financial incomes like interest received, profit on sale of investment, dividend received, rent received, commission received, discount receivedetc.
   In addition to the above, no appropriation items will include in cost sheet

Form of a Cost Sheet: Cost sheet for the period ending ----------

	Total	Per Unit
Direct material	Xx	X
Direct wages	x	x
Direct	Xx	X
Expenses	x	x
Prime	Xxx	Xx

Cost	Xxx	Xx
Add Factory OH	xx	Xx
Factory	xxx	Xx
Cost Add Administration OH	xx	Xx
Cost of	xx	X
Production Add selling and	x	x
distribution OH	xx	X
	xx	x
Total Cost /Cost of sale	x	X
	=========	x
		=========

Treatment of Stock:

While preparing a cost sheet we have to consider the opening and closing stocks of the following three items

1. Stock of Rawmaterials
2. Stock of finishedgoods
3. Stock of work inprogress

Stock of Raw materials: In order to get the cost of material consumed, opening stock of material is added to the cost of raw materials purchased and closing stock of raw materials is deducted from it.

Opening stock ofrawmaterials	xxx
Add PurchaseofRM	xxx
	---
	xxx
Less closing stockofRM	xx

Cost ofmaterialsconsumed	xxx
	=====

Stock of Work – in – progress: The Cost of work in progress are adjusted at the work cost stage

Primecost	xxx
AddworksOH	xxx

	Xxx
Add opening stockofWIP	xx
	---
	xxx
Less closing stockofWIP	xx

Workscost	xxxx
	=====

Stock of finished goods: It is adjusted immediately after ascertaining the cost of production.

Costofproduction	xxx
Add opening stockofFG	xx

	Xxxx
Less closing stockofFG	xxx

Cost ofGoods sold	xxxx
	=====

Illustration 1

From the following particulars prepare a cost sheet for the month of March 2008.

	Rs.
Stock in hand 1st March	
Rawmaterials	26,000
Finished goods	18,300

Work in Progress	9,200
Stock on hand – 31st March	
Raw materials	27,200
Finished goods	16,700
Work in Progress	10,100
Purchase of Raw materials	23,000
Carriage on purchases	1,500
Direct wages	18,500
Indirect wages	1,000
Sale of finished goods	76,000
Chargeable expenses	2,200
Factory overheads	9,500
Administration OH	4,000
Selling and Distribution OH	5,200

Solution

Cost sheet for the month of March 2008

	Rs.	Rs.
Opening stock of materials	26,000	
Add Purchases	23,000	
Add carriages on Purchases	1,500	
	50,500	
Less closing stock of materials	27,200	
Cost of materials consumed		
, ,Direct wages		23,300
Chargeable expenses		18,500
PRIME COST		2,200
Factory OH		44,000
Indirect wages		9,500
Add opening stock of WIP		1,000
		9,200
Less closing stock of WIP		63,700
Factory Cost		10,100
Add Administration OH		53,600
Cost of Production		4,000
Add opening stock of finished goods		57,600
		18,300
Less closing stock of finished goods		75,900
Cost of goods sold		16,700
Add selling and distribution OH		59,200
Totalcost		5,200
Profit		64,400
Sales		11,600
		76,000
		=========

Specimen of Cost Sheet or Statement of Cost

	TotalCost Rs.	Cost perUnit Rs.
Direct Materials	xxx	xxx
Direct Labour	xxx	xxx
Primecost	xxx	xxx
Add: Works Overheads	xxx	xxx
Works Cost	xxx	xxx
Add:AdministrativeOverheads	xxx	xxx
CostofProduction	xxx	xxx
Add: Selling and Distribution Overheads	xxx	xxx
TotalCostorCostofSales	xxx	xxx

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:

(i) 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 materialcosts.

(ii) 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 materialcosts.

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.

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".

Methods of Purchasing

(a) ***Centralized Purchasing***: In a large organization, manufacturing units are many. In such cases centralized purchasing is beneficial. The advantages of centralized purchasingare:

1. Specialized and expert knowledge isavailable.
2. Advantages arise due to bulkpurchases.
3. The cost of purchasing can be reduced and selling price can belowered.
4. As there is good knowledge of market conditions, greater control can beexercised.
5. When materials have to be imported, it is advantageous to centralize thebuying.
6. Economy and ease in compilation and consultation ofresults.
7. It can take advantage of marketchanges.
8. Investment in inventories can bereduced.
9. Other advantages include undivided responsibility, consistent buyingpolicies.
   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.

(b) ***Decentralization of Purchases:***The advantages of localized purchasing or decentralization of purchasesare:-

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

Purchase Procedure:

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 productiondepartment.

XYZ Co. Ltd.
MATERIAL PURCHASE INDENT
Date: For thePeriod:
IndentNo: Demand NoteNo:
Regular/Special

Sl. No.	Description	Stores Code No.	Quantity	Last Pur. Order No.	Special remarks

Store Keeper

For Purchase Dept. Use

Tender Nos.				
Issued on.				

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 theoriginal.

INVITATION TO TENDER

Indent No: TenderNo:

Date: Date:

To

XYZCo.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.

2. **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 copyeach.

A.B.C. CO. LTD.

MATERIALS PURCHASE ORDER

OrderNo: Indent No: Store ReceiptNo:

Date: QuotationNo: 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: Terms of Payment: Special Conditions:

Please send bill to:

For A.B.C. Co. Ltd.

3. **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) isintimated.
4. Receiving Stores: The stores department prepares a Stores Receipt Note for the quantity of stockacceptedininspection.AfterissuingoftheStoresReceipt,theStorekeeperis 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 purchaseorder.

ABC CO. Ltd.

STORES RECEIPT NOTE

S.R.No: P.O.No: Inspection Note

No: Date: Date: Date:

ReceivedformM/s_____under their deliverychallanno:_____dated _____the following items of stores against the above purchaseorder:

Stores Code No:	Description	Unit	Quantity	Price	Value

Posted in:-

Bin Card ……. Stores Ledger…… Signature of Storekeeper…….

5. **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 forpayment.

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 keepingare:-

i) To protect stores againstlosses
ii) To keep goods ready fordelivery/issue
iii) To provide maximum service at minimumcost.

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

i) 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 properbooks.

ii) 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 variousdepartments.

iii) The stores should provide maximum protection and safety and accessibility and utilize minimum space. Suitable storage devices should beinstalled.

iv) The materials should be given special covering to prevent damage due to atmospheric conditions.

v) All issues should be properly recorded, efficiently, promptly and accurately. All issues should be duly authorized and procedures laid down should be dulyfollowed.

vi) The storekeeper is responsible for co-ordination with materials control according to the type of production, size of the company, the organization structureetc.

vii) Ensure that all transactions are posted in the Bin Card see that the Bin Card is up-to-date.

viii) All items should be in its properplace.

ix) Maintenance of stores at requiredlevels.

x) Neatness in stores to facilitate physicalverification.

xi) Co-ordination and supervision of staff in the storesdepartment.

xii) Periodical review of various scales, measuring instruments, conversion ratiosetc.

xiii) Protect stores from fires, rust, erosion, dust, theft, weather, heat, cold, moisture and deteriorationetc.

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 ofmaterial.

(a) 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: 1. Calculate the ordering level of material A from the following particulars:
Minimum Limit 1,000 units.
Maximum Limit 5,000 units.
Dailyrequirementofmaterial200units.
Timerequiredforfreshdelivery10days.

Solution

OrderingLevel=Minimumlimit+Consumptionduringthetimerequiredforfreshdelivery =1000 units+200unitsx10days=3000units

Orderforthepurchaseofmaterialshouldbeplacedwhenthematerialinstockreaches3,000units.

Illustration:2.Calculatethere-orderinglevelfromthefollowinginformation:

Maximumconsumption=500unitsperday

Minimumconsumption=400unitsperday Re-orderperiod = 10 to 12 days

Solution

Re-order Level = Maximum consumption x maximum re-order period
= 500 units x 12 days = 6000 units.

(b) Economic OrderingQuantity

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 otherpurpose.
2. Cost of bins andracks
3. Cost of maintaining the materials to avoiddeterioration.
4. Amount of interest payable on the amount of money locked up in thematerials.
5. Cost of spoilage in stores andhandling.
6. Transportation cost in relation tostock.
7. Cost of obsolescence of materials due to change in the process orproduct.
8. Insurancecost
9. Clerical costetc.

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 telephonecharges.

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.

$$Q = \sqrt{\frac{2CO}{I}}$$

Q = Quantity to be ordered
C = Consumption of the material concerned in units during a year.
O=Costofplacingoneorderincludingthecostofreceivingthegoodsi.e.thecostofgettinganitem into the firmsinventory
I=Interestpaymentincludingvariablecostofstoringperunitperyeari.eholdingcostsofinventory.

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

$$EOQ = \sqrt{2COI}$$

WhereC=Annualusageofmaterialie6,000units
O=CostofplacingoneorderieRs.60
I = Annual carrying cost of one unit ieRs. $\frac{20 \times 10}{100}$ = Rs. 2

$$EOQ = \sqrt{\frac{2 \times 6{,}000 \text{ units} \times 60}{Rs.2}} = \sqrt{3{,}60{,}000} = 600 \text{ units}$$

Theformula $\sqrt{\frac{2CO}{I}}$ ofeconomicorderingquantityisapplicableonlyifannualconsumptionofrawmaterial in unitsisgiven.Butiftheconsumptionofmaterialisgiveninvalue,theformula $\sqrt{2CO}$ ofeconomicordering I quantitywillremainthesame;however,themeaningofsignswilldifferasgiven:

C=Annualrequirementofmaterialinrupees
O= Cost of placing one order
I = % carrying Cost.

c) Minimum Level or Safety Stocklevel

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 beconsidered:

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 leadtime.
3. Natureofthematerial.Minimumlevelisnotrequiredincaseofaspecialmaterialwhichis 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)

d) MaximumLevel

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 somewhereelse.
2. Overstocking will need more godown space, so more rent will have to bepaid.
3. It may also lead to obsolescence on account ofoverstocking.
4. There are chances that the quality of materials will deteriorate because large stock will require more time before they areconsumed.
5. There may be fear of depreciation in market values of the overstockedmaterials.

According toWheldon,

Maximum Stock level = Reordering level + Re-ordering Quantity–
(Minimumconsumptionx Minimum re-orderingperiod)

e) DangerLevel

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.

f) Average StockLevel

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

(i) Minimum consumption = 100 units perday
(ii) Maximum consumption = 150 units perday
(iii) Normal consumption = 120 units perday
(iv) Re-order period = 10-15days
(v) Re-order quantity = 1,500units
(vi) 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.

(a) 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 intime.

(b) 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 ofstores.

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 ofconsumption.

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.

1) **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 ofpurchases.

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 thismethod.

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

Jan. 1	OpeningBalance:	500 units @ Rs.4 Jan. 5
	Receivedfromvendor:	200 units @ Rs.4.25
Jan.12	Receivedfromvendor:	150 units @ Rs.4.10
Jan.20	Receivedfromvendor:	300 units @ Rs.4.50
Jan.25	Receivedfromvendor:	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:

2) Last in Last Out(LILO)

Under this method, issues are priced in the reverse order of purchase i.e., the prices of the latest available consignment is taken. This method is suitable in times of rising prices because material will be issued from the latest consignment at a price which is closely related to the current price levels. Valuing material issues at the price of the latest available consignment will help the management in fixing the competitive selling prices of the products.

3) Simple AverageMethod

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:

$$\frac{Rs.10 + Rs.11 + Rs.12}{3} = Rs.11$$

4) Weighted AverageMethods

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:

$$\frac{1000 \times Rs.10 + 2000 \times Rs.11 + 3000 \times Rs.12}{1000+2000+3000} = Rs.11.33$$

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.

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.

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

- To use direct labour cost as a basis for increasing the efficiency ofworkers.
- To identify direct labour cost with products, orders, jobs or processes for ascertaining the cost of every product, order, orprocess.
- 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 ofoverhead.
- To determine indirect labour cost to be treated as overheadand
- To reduce the labourturnover.
  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-paidworkers.
2. Meeting the statutoryrequirements.
3. Ensuring discipline inattendance.
4. Recordingofeachworker'stime'in'and'out'ofthefactorymakingdistinctionbetween normal time, overtime, late attendance, early leaving.
5. For overhead distribution when overheads are absorbed on the basis of labourhour

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:

a) Attendance Register Method,and
b) Metal DiscMethod

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.

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 RollDepartment.

Mechanical Methods

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

(a) Time RecordingClocks

(b) Dial TimeRecords

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 thismethod.

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 workorders.
2. To ascertain the labour cost of each individual job or workorder.
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 differentjobs.
4. To ascertain unproductive time or idle time so as to make efforts to keep it inlimit.
5. To know the time taken to complete a particular job so that bonus can be paid as per the incentiveschemes.
6. To know the efficiency of workers, it is necessary to make the comparison of actual time taken with time allowed for completing a particulartask.

Following documents are generally used for time booking:

1. Daily TimeSheets

2. Weekly TimeSheets
3. Job Tickets or JobCards.

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.

(a) Normal Idle Time

(b) Abnormal IdleTime

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.

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.

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.

Illustration 8: Calculate the normal and overtime wages payable to a workman from the followingdata:

Days	*HoursWorked*
Monday	8hrs.
Tuesday	10hrs.
Wednesday	9hrs.
Thursday	11hrs.
Friday	9hrs.
Saturday	4hrs.
Total	51hrs.
NormalWorkingHours	8 hours perday
Normalrate	Re.1 perhour
Overtimerate	upto9hoursinadayatsinglerateandover9hoursinadayat doublerate;orupto48hoursinaweekatsinglerateandover48 hoursatdoubleratewhicheverismorebeneficialtotheworkman.

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

NormalWagesfor44hours@Re.1 Rs.44
OvertimeWages:
At single rate for 4 hours @ Re.1 = Rs.4
Atdoubleratefor3hours@Rs.2=Rs.6

Rs.10

TotalWages Rs.54

Or

NormalWagesfor48hours@Re.1perhour= Rs.48
OvertimeWagesfor3hours@Rs.2perhour= 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 wagepayment.

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 areworking.
2. Where quality of goods produced is of extreme importance eg., artisticgoods
3. Where the speed of work is beyond the control of theworkers.
4. Where close supervision of work ispossible.
5. Where output cannot bemeasured.

The disadvantages of this methodare:

1. Workers are notmotivated.
2. Workers will get payment for idletime.
3. Efficient workers will become inefficient in the long run as all of them get samewages.
4. Employer finds it difficult to calculate labour cost per unit as it varies asproduction increases anddecreases.
5. Strict supervision is necessary to get the workdone.
6. Inefficiency results in upsetting the production schedule and increases the cost perunit.
7. It will encourage a tendency among workers to go slow so as to earn overtimewages.

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.

a) Straight piece ratesystem
b) Taylor's differential piece ratesystem
c) Merrick's multiple piece ratesystem
d) Gant's task and bonus plan

(a) Straight piece ratesystem

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 theirmerits.
2. Workers are motivated to increase production to earn morewages.
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 isminimized.
5. The employer knows his exact labour cost and hence can make quotationsconfidently.
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 andmachinery.
7. Less supervision is required because workers get wages for only the unitsproduced.
8. Inefficient workers are motivated to become efficient and earn more wages by producingmore.

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 ofmaterial.

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 mightincrease.
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 wagesystem.
6. Workers have the fear of losing wages if they are not able to work due to somereason.
7. Workers may work for long hours to earn more wages, and thus, may spoil theirhealth.
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 ofproduction.
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 morewages.

This method can be successfully applied when:

1. The work is of a repetitivetype.
2. Quantity of output can bemeasured.
3. Quality of goods can becontrolled.
4. It is possible to fix an equitable and acceptable piecerate
5. The system is flexible and rates can be adjusted to changes in pricelevel.
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 slowdown.

(b) Taylor's Differential Piece Ratesystem

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 abovestandard.

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 $\frac{1P \times 80}{100}$ = 0.8 paise

High piece rate at or above standard $\frac{1P \times 120}{100}$ = 1.2paise

Earning of worker A

Under straight piece rate system

1300 units @ 1P = $\frac{1300 \times 1}{100}$ = Rs.13

Under Taylor's Differential Piece-rate System

1300 units @ 0.8 P =$\frac{1300 \times 0.8}{100}$ =Rs.10.40

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

Earnings of Worker B

Under Straight Piece-rate System

1500 units @ 1P = $\frac{1500 \times 1}{100}$ = Rs.15

Under Taylor's Differential Piece-rate System

1500 units @ 1.2P = $\frac{1500 \times 1.2}{100}$= Rs.18

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

c) **Merrick's Multiple Piece RateSystem**

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 standardoutput.

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 unit1 minute

Output per day is asfollows:

Worker A :384 units

Worker B :450 units Worker

C :552 units Wording hours

per day are8

SOLUTION

Standard outputperminute = 1unit
Standard productionper hour = 60 units
Standard production per day of 8 hours= 480 units(8 x 60)
Normal rateperhour =Rs.1.80
Normal outputperhour = 60units
Normal piece rate =$\frac{Rs.1.80}{60}$ = 3paise

Calculation of level of performance:

Standard outputperday = 480units
Worker A's outputperday = 384units
Worker A's levelofperformance = $\frac{384 \text{ x } 100}{480}$ =80%
Worker B's outputperday = 450units
Worker B's levelofperformance = $\frac{450 \text{ x } 100}{480}$ =93.75%

Worker C's outputperday = 552units
Worker C's levelofperformance = $\frac{552 \text{ x } 100}{480}$ =115%

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 lesstime.

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.

(i) 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 timesaved.

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

$$= 15 \text{ X Rs. } 1.50 + \frac{50}{100} (20\text{-}15) \text{ x Rs.} 1.50$$

=Rs.26.25

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

$$= \frac{\text{TotalWages}}{\text{Actual TimeTaken}} = \text{Rs.}26.25 = \text{Rs.}1.75$$

(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 toworkers.

2. The wages of time saved are shared by both employers and workers, so it is helpful in reducing labour cost perunit.
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 inproduction.
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 workingconditions.

Disadvantages

1. Quality of work suffers because workers are in a hurry to save more and more time to get more and morebonus.
2. Workers criticize this method on the ground that the employer gets a share of wages of the timesaved.

(ii) **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 timeallowed.

Total Earnings = T x R + $\frac{S-T}{}$ x T x R

Illustration :1

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.

Standardtimeallowed	10 hours
Less:TimeSaved	4hours
TimeTaken	6hours

Earnings under the Rowan Premium Plan

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

Where, T = 6 hours
S = 10 hours
R = Re.1 per hour

$$\text{Earnings} = 6 \times 1 + \frac{10-6}{10} \times 6 \times 1$$

= 6 + Rs.2.40 = Rs.8.40

Advantages

1. It guarantees time wages toworkers
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 ofefficiency.
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 inproduction.

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 timesaved.
2. The Rowan plan suffers from another drawback that two workers, one very efficient and the other not so efficient, may get the samebonus.

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:

i) **Function-wise classification**: Overheads can be divided into the following categories on functionalbasis.

   (a) 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, medicaletc.

   (b) 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.

   (c) 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 debtsetc.

ii) **Behavior-wise classification**: Overheads can be classified into the following categories as per behaviorpattern.

   (a) Fixed overheads like managerial remuneration, rent of building, insurance of building, plantetc.

   (b) Variable overheads like direct material and direct labour.

   (c) Semi-variable overheads like depreciation, telephone charges, repair and maintenance of buildings, machines and equipmentetc.

iii) **Element-wise classification**: Overheads can be classified into the following categories as perelement.

   (a) Indirectmaterials
   (b) Indirectlabour
   (c) Indirectexpenses

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.

(i) **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 thisbasis.

(ii) **Value of materials passing through cost centres.** This basis is adopted for expenses associated with material such as material handlingexpenses.

(iii) **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 ofwages.

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	RepairstoPlant	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.ofEmployees	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.ofEmployees	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. MaintenanceDepartment	-Hours worked for each department
2. Payroll or time-keepingdepartment	-Total labour or Machine hours or number of employees in each department
3. Store keepingdepartment	- no. of requisitions or value of materials of eachdepartment.
4. Employment or Personnelepartment.	- Rate of labour turnover or number of employees in eachdepartment.
5. PurchaseDepartment	-no. of purchase orders or value of materials
6. Welfare, ambulance, canteen service, recreation roomexpenses.	-No. of employees in each department.
7. Building servicedepartment	-Relative are in each department
8. Internal transport service or overhead crane service	-Weight, value graded product handled, weight and distance travelled.
9. TransportDepartment	-crane hours, truck hours, truck mileage, truck tonnage, truck tonne-hours, tonnage handled, number ofpackages.
10. Power House (Electric powercost)	–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-distributionmethod
2. Step distributionmethod
3. Reciprocal Servicesmethod
    a. Simultaneous EquationMethod
    b. Repeated DistributionMethod
    c. Trial and ErrorMethod

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 wherenecessary.

		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 Sq.m.		150	250	50	50	50

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 Wages	1000	1500	2000	500	1000	6000
Rent and Taxes @Re.0.50 per sq.meter	75	125	25	25	25	275
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

(a) Simultaneous Equationmethod

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.

A Repeated DistributionMethod

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.

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.

(a) **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:

(i) Where the proportion of overheads to the total cost is significant.

(ii) Where the prices of materials are stable.

(iii) Where the output is uniform ie. Only one kind of article is produce

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 circumstancesoftheindividualcase.Inrespectofdepartmentsoroperations,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:

$$\text{Machine hourrate} = \frac{\text{Amount ofoverheads}}{\text{Machine hours during a given period}}$$

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 costcentre.
2) The estimated overhead expenses for the period should be determined for each machine or group ofmachines.
3) Overheads relating to a machine are divided into two parts i.e., fixed or standing charges and variable or machineexpenses.
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 workinghours.

5) Total of standing charges and machines expenses rates will give the ordinary machine hourrate.

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 surroundingspace.
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 eachmachine.
3. Supervision – estimated time devoted by the supervisory staff to eachmachine.
4. Lubricating Oil and Consumable Stores – On the basis of pastexperience.
5. Insurance – Insurable value of eachmachine
6. Miscellaneous Expenses – Equitable basis depending uponfacts.

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 workinglife.
2. Power – Actual consumption as shown by meter readings or estimated consumption ascertained from pastexperience.
3. Repairs – Cost of repairs spread over its workinglife.

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:

(i) The machine will work for 1,800 hoursannually.

(ii) The repair charges will be Rs.1,800 during the whole period of life of themachine.

(iii) The power consumption will be 5 units per hour at 6 paisa perunit.

(iv) Other annual standing charges are estimatedto be:

	Rs.
(a) Rent of department (machine occupies $1/5^{th}$ of total space)	780
(b) Light (12 points in the department-2 points engage d in the machine)	288
(c) Foreman's salary ($1/4^{th}$ 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

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

(f) **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 asunder:

$$\text{Overhead Rate} = \frac{\text{Overhead expenses (budgeted)}}{\text{Budgeted production}}$$

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 pointbasis.

(g) **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

$$\text{Overhead Recovery Rate} = \frac{\text{Budgeted overhead expenses}}{\text{Sale value of units of production}}$$

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.

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.

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:

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

Y : 50 hrs @ Rs. 3 per hr

Z : 30 hrs @ Rs. 5 per hrThe variable Overheads are as follows:

Department X : Rs. 5000 for 5000 hrs

Y : Rs. 4000 for 2000 hrs

Z : 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

		Rs.
Direct Material		6,820
Wages:		
Department X	60x3=180	
Department Y	50x3=150	
Department Z	30x5=150	480
Prime Cost		7,300
Overheads: - Variables		
Department X	60 x1 = 60	
Department Y	50 x2= 100	
Department Y	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.

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

2. **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 maybe
   a. Work not sufficient enough to be certified
   b. Work has not reached the stipulated stage to qualify forcertification

   It is always valued at cost and credited to the contractaccount.

3. **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 'retentionmoney'.

4. **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 contractaccount.

5. **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 decreasedefficiency.

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

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 iscomplete.
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 formulais

   $$\text{Notional profit} \times 1/3 \times \frac{\text{Cash received}}{\text{Work certified}}$$

   The balance of notional profit shall be kept as reserve till the completion
3. **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.

   $$\text{Notional profit} \times 2/3 \times \frac{\text{Cash received}}{\text{Work certified}}$$

   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.
4. **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 followingformula

   $$\text{Estimated profit} \times \frac{\text{Cashreceived}}{\text{Contractprice}}$$

   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	7,147	By notional profit b/d	13,400
To Balance c/d	6,253		
	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 issuedtocontract	Rs. 1,02,000
Plant issuedforcontract	Rs. 30000
Wages	Rs.1,62,000
Otherexpenses	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 aboveparticulars.

Solution

CONTRACT ACCOUNT

To materials	1,02,000	By work in progress:	
To Plant	30,000	Work certified	
		256000x100/80 3,20000	
To wages	1,62,000	Workuncertified 3000	3,23,000
To other expenses	10,000	By P & LAccount	
		Plantlost 3000	
		Material lost 4000	7000
		Byplant returned: 2,000	
		Less:depreciation 200	1,800
		By material in hand	2,500
To Notional profit c/d (B. F)	52800	By plant at site(30000-3000-2000) 25000	
		Less:depr 2500	22500
	356800		356800
To P/L Account	==========	By notional profitB/d	=========
52800x2/3x80/100	28160		52 800
	24640		
Reserve BF	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	16,000
Direct purchase	1,80,000	Machinery on hand (1,60,000-16000)	1, 44,000
Issued from stores	50,000		
Wages	2,44,000	Work certified	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	By notional profit b/d	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".

Characteristics of Process Costing

1. Production iscontinuous
2. Products pass through two or more distinct processes ofcompletion.
3. Products are standardized andhomogeneous.
4. Products are not distinguishable in processingstage.
5. The finished product of one process becomes the raw material of the subsequentprocess.
6. Cost of material, labour and overheads are collected for each process and chargedaccordingly.

Advantages of Process Costing

1. It is easy to compute average cot because the products are homogeneous in ProcessCosting.
2. It is possible to ascertain the process costs at shortintervals.
3. Process Costing is simple and less expensive in relation o jobcosting.
4. By evaluating the performance of each process effective managerial control ispossible.

Disadvantages of Process Costing

1. Valuation of work in progress isdifficult.
2. It is not easy to value losses, wastes, scrapsetc.

3. The apportionment of total cost among joint products and by-products isdifficult.
4. Process cost are not accurate, they are only averagecosts
5. Process costs are only historical.

Principles of ProcessCosting

1. Production activity should be divided into different processes ordepartments.
2. A separate account is opened for eachprocess.
3. Both direct and indirect costs are collected for eachprocess.
4. The quantity of output and costs are recorded in the respective processaccounts.
5. The cost per unit is determined by dividing the total cost at the end of each process by the number of output of eachprocess.
6. Normal loss and abnormal loss are credited in the processaccount
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 minprocess.
9. When there is work in progress at the end of the period the computation of inventory is made I terms of completeunits.

Difference between Process Costing and Job Costing

Process Costing	Job Costing
1. Production iscontinuous	1. Production is accordingto customers' orders
2. Production is forstock	2. Production is not forstock
3. All units produced are identical or homogeneous	3. Each job is different from theother
4. There is regular transfer of cost of one process to subsequent processes	4. There is no regular transfer of cost from one job toanother
5. Work in progress always exists	5. Work in progress may or maynot exist

Procedure for Process Costing

1. Each process is separately identified. Separate process account is opened for eachprocess.
2. Alongwith'ParticularsColumn',twocolumnsareprovidedonbothsidesoftheprocess account – units (quantity) and amount (Rupees).
3. All the expenses are debited in the respective processaccount.
4. Wastage, sale of scrap, by-products etc are reordered on the credit side 0f the process account.
5. The difference between debit and credit side shows the cost of production and output of that particular process which is transferred to the nextprocess.
6. The cost per unit in every process is calculated by dividing the net cost by theoutput.
7. The output of last process is transferred to the Finished StockAccount.
8. Incomplete units at the end of the each period ion every process s converted in terms of completedunits.

Specimen of Process Account

Process Account

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

Preparation of Process Accounts

The preparation of Process Account depends upon the following situations

1. Simple ProcessAccount
2. Process costing with normal processloss
3. Process costing with abnormal processloss
4. Process costing with abnormal process gains
5. Inter – processprofits.

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 ofunits.

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)	200	8250
To Direct Wages		1500			
To Direct Expenses		500	Cost per unit 8250 = 41.25		
To Production overheads (1500x150%)		2250			
	200	8250	200	200	8250

Process II Account

	Units	Rs.		Units	Rs.

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

Process III Account

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

	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 BAccount

	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 CAccount

	Units	Rs.		Units	Rs.
To Opening Stock (Rs.1.50 p.u) To Process B A/c(transfer) To Wages and Materials To WorksOverhead	16500 37500	24750 56250 29250 6000	By loss in weight (Bal. fig) By Closing 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

UNIT V

OPERATING COSTING (SERVICE COSTING)

It is the costing procedure used for determining the cost of per unit of service rendered. It is a method of costing applied to undertaking which provides service rather than production of commodities. The services may be in the form of transport, supply service, welfare service, etc. There is a difference between operating costing and operation costing. Operating costing is a method of costing designed to find out the cost of operating or rendering a service. On the other hand, operation costing is a method of costing applied to determine the total cost and unit costof

eachoperation. Though service undertakings are of different types, but here we discuss only transport operatingcosting.

Transport costing:

Transport industries include Air, Water, Rail and Road. They render services to the community at

large. We have to give utmost care while selecting the cost unit. The cost unit of other forms operation costing is quite different from that of a service undertaking. The cost unit of a service organization is a composite unit. The important factors to be considered includes the number of passengers, tonnage carried, distance covered etc.

Classification of Costs:

Operating costs of a transport undertaking comprising different items, which are classified under the following threegroups.

1. **Standing or fixed charges**: These charges are incurred in spite of the kilometers run. It is fixed in nature. Eg. Insurance, Motor vehicle tax, license fee, rent, salary of operating manager etc.
2. **Maintenance charges**: It includes semi variable expenses Eg. Tyres and tubes, repairs and paintingsetc.
3. **Operating and running charges**: These charges vary more or less in direct proportion to kilometers. All the variable charges of running vehicles are included in this group. Generally it includes, petrol, oil,, grease etc., wages of driver, attendant if payment is related to time or distance of tripetc.

   In the place of the above classification, all expenses can be divided into two – fixed cost and variable costs. Here, both maintenance charges and running charges are considered as variable charges.

Selection of Unit:

In transport costing, a composite unit such as passenger mile or passenger kilometer or tone kilometer is often selected. Such unit takes into account both the number of passengers or weight of goods carried and distancerun.

Absolute passenger or commercial passenger/ tone km:

It is calculated by multiplying every part of distance travelled/covered with either weight carried or passenger carried.. After getting the product of each journey we add all the products. The total is absolute ton/quintal km

In the case of goods transport the equation is
Distance of each part of journey x weight carried
In the case of passenger transport, the following formula is used
Distance of each part of journey x No. of passengers taken for the same distance

Commercial method:

The following steps are used to find out the commercial tone km

a. Find out average triploa d
b. Find out total distance ofjourney
c. Multiply a and b , the resultant figure is commercial tonekm

Example 1

A truck starts with a load of 10 tonnes of goods from station P. It unloads 4 tonnes at station Q and rest of the goods at station R. It reaches back directly to station P after getting reloaded with 8 tonnes of goods at station R. The distance between P to Q, Q to R and then from R to P are40 kms, 60 kms, and 80 kms respectively. Compute absolute tone kms and commercial tone-km.

Absolute ton/ km = Total distance x weight carried

$$= (40x10) + (60x6) + (80x8) = 400+360+640 = 1400$$

Commercial tone/km = Distance x average load= [40+60+80] x{10+6+8/3}= 180x8=1440

Example 2

A bus with a capacity of 50 passengers makes a return trip from P to Q via station X every day. The distance between P and X is 60 kmswhere as between X and Q is 40 40 km. During the onward journey, the bus is full to capacity up to station X but only 60% full between X and Q. On the other hand, on return trip it is full from Q to X but only comes 40% of the capacity between X and P.

Compute the total passenger kms of service the bus renders every day.

Solution:

Total passenger kms per day:

Onward journey:

P to X	60kms X 50	=3000
X to Q	40kmsX50X60%	=1200

	Total (A)	4200

Return Trip:

Q to X	40 kms X 50 X 100%	=2000
X to P	60 kms X 50 X 40 %	=1200

	Total (B)	3200

Total passenger kms every day= (A)+(B) =4200+3200= 7400kms

Preparation of Operating Cost sheet:

An operating cost sheet is prepared periodically in order to ascertain the cost per unit. Here, the total fixed, maintenance and running costs are collected and allocated under respective heads and these are then divided by totalunits.

The Performa of a operating cost sheet is given below:

OPERATING COST SHEET

Particulars	Total cost	Cost per unit

A. Fixed or standingcharges:		
Garage rent		
License fee		
Insurance		
Motor vehicle tax		
Interest oncapital		
Supervision		
Office establishment		
Administrative overheads		
Salary of foreman , manager etc		
Total		
B. Maintenancecharges:		
Repairs and renewals		
Tyres and tubes		
Paintings		
Overhauling		
Cleaning		
Gas and electric charges		
Spare parts and accessories		
Total		
C. Operatingcharges:		
Petrol		
Engine oil		
Lubricating oil, grease etc		
Wages of operators		
Depreciation		
Salaries of running staff		
Water		
Total		

Calculation of Depreciation:

If the rate of depreciation is not given, depreciation is calculated as follows:

$$\text{Depreciation} = \frac{\text{Cost - scrap}}{\text{Life in years}}$$

$$\text{Depreciation per mile, or km} = \frac{\text{Depreciation p.a}}{\text{Kms/miles run p.a}}$$

Example 1

From the following data calculate the cost per mile of a vehicle:

Value of vehicle	Rs. 15,000
Road license for the year	500
Insurance charges per year	100
Garage rent per year	600
Drivers' wages per month	200
Cost of petrol per litre	0.80
Miles per litre	8
Proportional charge for tyre and maintenance per mile	0.20

Estimated life 1,50, 000 miles

Ignore interest on capital.

Solution:

Operating cost statement

Particulars	Annual cost	Cost per unit
Fixed expenses:		
Road license fee	500	0.08
Insurance charge	100	0.02
Garage rent	600	0.10
Maintenance charges:		
Cost of tyre and maintenance of per mile	0.20	0.20
Operating /running charges:		
Cost of petrol per mile80p/8		0.10
Driverswage per mile2400/6000		0.40
Depreciation of vehicle 15000X6000/1,50,000		0.10
		1.00 =========

Practical problem 1

Work out in appropriate cost sheet form the unit cost per passenger km for the year 2009-10 for a fleet of passenger buses run by a transport company from the following figures extracted from its books:-
5 passenger buses costing Rs.60,000, Rs.1,20,000, Rs.50,000, Rs. 65,000 and Rs. 45,000.
respectively. Yearly depreciation of vehicles is 20% of cost.

Annual repairs, maintenance and spare parts is 80% of depreciation. Wages of 10 drivers @Rs.100 each per month, wages of 20 cleaners @ Rs. 50 each per month.Yearly rate of interest @ 4% on capital. Rent of 6 garages @ Rs. 50 each per month. Directors fees @ Rs.400 per month, office establishment @ Rs. 1000 per month, license and taxes@ Rs.1000 every six months, realization by sale of old tyres and tubes @ Rs. 3,200 every six months, 900 passengers were carried over 1,600 kms during the year.