

BBA 102 – Cost Accounting

Unit I: Meaning and Scope of Cost Accounting:

Cost Accounting is classifying, recording an appropriate allocation of expenditure for the determination of the costs of products or services, and for the presentation of suitably arranged data for the purpose of control and guidance of management.

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

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

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

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

It is a science because it is a systematic body of knowledge having certain principles which a cost accountant should possess for proper discharge of his responsibilities.

It is an art as it requires the ability and skill with which a Cost Accountant is able to apply the principles of Cost Accountancy to various managerial problems.

Practice includes the continuous efforts of a Cost Accountant in the field of Cost Accountancy.

Objectives of Cost Accounting

The following are the main objectives of Cost Accounting:-

- To ascertain the Costs under different situations using different techniques and systems of costing
- To determine the selling prices under different circumstances

- To determine and control efficiency by setting standards for Materials, Labour and Overheads
- To determine the value of closing inventory for preparing financial statements of the concern
- To ascertain the cost per unit of the different products manufactured by a business concern;
- To provide a correct analysis of cost both by process or operations and by different elements of cost;
- To disclose sources of wastage whether of material, time or expense or in the use of machinery, equipment and tools and to prepare such reports which may be necessary to control such wastage;
- To provide requisite data and serve as a guide for fixing prices of products manufactured or services rendered;
- To ascertain the profitability of each of the products and advise management as to how these profits can be maximized;
- To exercise effective control if stocks of raw materials, work-in-progress, consumable stores and finished goods in order to minimize the capital locked up in these stocks;
- To reveal sources of economy by installing and implementing a system of cost control for materials, labour and overheads;
- To advise management on future expansion policies and proposed capital projects;
- To present and interpret data for management planning, evaluation of performance and control;
- To help in the preparation of budgets and implementation of budgetary control;

Scope of cost accounting:

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

Cost Ascertainment: The main objective of Cost Accounting is to find out the Cost of product / services rendered with reasonable degree of accuracy.

Cost Accounting: It is the process of Accounting for Cost which begins with recording of expenditure and ends with preparation of statistical data.

Cost Control: It is the process of regulating the action so as to keep the element of cost within the set parameters.

Cost Reports: This is the ultimate function of Cost Accounting. These reports are primarily prepared for use by the management at different levels. Cost reports helps in planning and control, performance appraisal and managerial decision making.

Cost Audit: Cost Audit is the verification of correctness of Cost Accounts and check on the adherence to the Cost Accounting plan. Its purpose is not only to ensure the arithmetic accuracy of cost records but also to see the principles and rules have been applied correctly.

Advantages of Cost Accounting:

- 1. Fixation of responsibility:** Whenever a cost center is established, it implies establishing a kind of relationship between superior and subordinates. Thus, responsibilities are fixed on every individual who is concerned with incurrance of cost.
- 2. Measures economic performance:** By applying cost control techniques such as budgetary control and standard costing it helps in knowing the performance of business.
- 3. Fixation of price:** By providing cost data it helps management to fix the selling price in advance. Hence, quotations can be supplied to prospective customers to secure orders.
- 4. Aids in decision-making:** It helps management in making suitable decisions such as make or buy, replace manual labour by machines, shut down or continue operations based on cost reports.
- 5. Helps in the preparation of interim final accounts:** By the process of continuous stock taking it enables to know the value of closing stock of materials at any time. This facilitates preparation of final accounts wherever desired.
- 6. Helps in minimizing wastages and losses:** Cost accounting system enables to locate the losses relating to materials, idle time and underutilization of plant and machinery.
- 7. Facilitates comparison:** It facilitates cost comparison in respect of jobs, process, departments and also between two periods. This reveals the efficiency or otherwise of each job, process or department.
- 8. Assists in increasing profitability:** Costing reports provide information about profitable or unprofitable areas of operation. The management can discontinue that product line or those departments which are responsible for incurring losses and only profitable line of activities alone are retained.
- 9. Reconciliation with financial accounts:** A well maintained cost accounting system facilitates reconciliation with financial accounts to check the arithmetical accuracy of both the systems.

10. It guides future production policy: Cost data help management in determining future production policy. Any expansion or contraction of production for the future is based on past 1.

Limitations of Cost Accounting:

- **It is expensive:** The system of cost accounting involves additional expenditure to be incurred in installing and maintaining it. However, before installing it, care must be taken to ensure that the benefits derived is more than the investment made on this system of accounting.
- **The system is more complex:** As the cost accounting system involves number of steps in ascertaining cost such as collection and classification of expenses, allocation and apportionment of expenses, it is considered to be a complicated system of accounts. Moreover the system makes use of several documents and forms in preparing the reports. This will tend to delay in the preparation of accounts.
- **Inapplicability of same costing method and technique:** All business enterprises cannot make use of a single method and technique of costing. It all depends upon the nature of business and type of product manufactured by it. If a wrong technique and method is used, it misleads the results of business.
- **Not suitable for small-scale units:** A cost accounting system is applicable only to a large-sized business but not to a small-sized one. Hence, there is a limitation to its application to all types of business.
- **Lack of accuracy:** The accuracy of cost accounts gets distorted owing to the use of notional cost such as standard cost, estimated cost, etc.
- **It lacks social accounting:** Cost accounting fails to take into account the social obligation of the business. In other words, social accounting is outside the purview of cost accounts cost data.

Cost centres and cost units

Cost: Cost is a measurement, in monetary terms, of the amount of resources used for the purpose of production of goods or rendering services. Cost in simple words, means the total of all expenses. Cost is also defined as the amount of expenditure (actual or notional) incurred on or attributable to a given thing or to ascertain the cost of a given thing.

Thus it is that which is given or sacrificed to obtain something. The cost of an article consists of actual outgoings or ascertained charges incurred in its production and sale. Cost is a generic term and it is always advisable to qualify the word cost to show exactly what it meant, e.g.,

prime cost, factory cost, etc. Cost is also different from value as cost is measured in terms of money whereas value in terms of usefulness or utility of an article.

Cost Object

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

Cost Centre

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

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

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

Production Cost Centre: These centres are engaged in production work i.e engaged in converting the raw material into finished product, for example Machine shop, welding shops...etc

Service Cost Centre: These centres are ancillary to and render service to production cost centres, for example Plant Maintenance, Administration..etc

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

Responsibility Centre

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

Profit Centre

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

Cost Unit

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

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

Industry / Product	Cost Unit
Automobile	Number of vehicles
Cable	Metres / kilometres

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

Cost Allocation

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

Cost Apportionment

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

Cost Absorption

Ultimately the indirect costs or overhead as they are commonly known, will have to be distributed over the final products so that the charge is complete. This process is known as cost absorption, meaning thereby that the costs absorbed by the production during the period. Usually

any of the following methods are adopted for cost absorption - (i) Direct Material Cost Percentage (ii) Direct Labour Cost Percentage (iii) Prime Cost Percentage (iv) Direct Labour Hour Rate Method (v) Machine Hour Rate, etc. The basis should be selected after careful maximum accuracy of Cost Distribution to various production units. The basis should be reviewed periodically and corrective action whatever needed should be taken for improving upon the accuracy of the absorption.

Conversion Cost

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

Cost Control

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

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

- **Planning:** First step in cost control is establishing plans / targets. The plan/target may be in the form of budgets, standards, estimates and even past actual may be expressed in physical as well as monetary terms. These serves as yardsticks by which the planned objective can be assessed.
- **Communication:** The plan and the policy laid down by the management are made known to all those responsible for carrying them out. Communication is established in two directions; directives are issued by higher level of management to the lower level for compliance and the lower level executives report performances to the higher level.
- **Motivation:** The plan is given effect to and performances starts. The performance is evaluated, costs are ascertained and information about results achieved are collected and

reported. The fact that costs are being complied for measuring performances acts as a motivating force and makes individuals endeavor to better their performances.

- **Appraisal and Reporting:** The actual performance is compared with the predetermined plan and variances, i.e deviations from the plan are analyzed as to their causes. The variances are reported to the proper level of management.
- **Decision Making:** The variances are reviewed and decisions taken. Corrective actions and remedial measures or revision of the target, as required, are taken.

Advantages of Control Cost

The advantages of cost control are mainly as follows

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

Cost Reduction

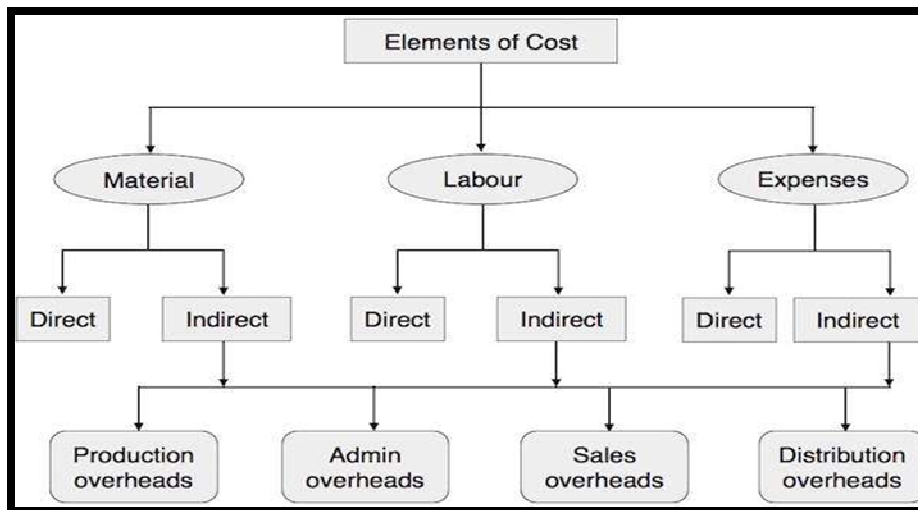
Profit is the resultant of two varying factors, viz., sales and cost. The wider the gap between these two factors, the larger is the profit. Thus, profit can be maximized either by increasing sales or by reducing costs. In a competition less market or in case of monopoly products, it may perhaps be possible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

- In short, cost reduction would mean maximization of profits by reducing cost through economics and savings in costs of manufacture, administration, selling and distribution.
- Cost reduction may be defined as the real and permanent reduction in the unit costs of goods manufactured or services rendered without impairing their suitability for the use intended. As will be seen from the definition, the reduction in costs should be real and permanent. Reductions due to windfalls, fortuitous receipts, changes in government policy like reduction in taxes or duties, or due to temporary measures taken for tiding over the financial difficulties do not strictly come under the purview of cost reduction. At the same time a programme of cost reduction should in no way affect the quality of the products nor should it lower the standards of performance of the business.
- Broadly speaking reduction in cost per unit of production may be affected in two ways viz.,
 1. By reducing expenditure, the volume of output remaining constant, and
 2. By increasing productivity, i.e., by increasing volume of output and the level of expenditure remains unchanged.

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

Bases of difference	Cost control	Cost reduction
1. purpose	Cost control aims at maintaining the cost in accordance with the established target or standards	Cost reduction is directed to explore the possibilities of producing goods or providing services at lower costs.
2. process	The process under cost control compares the fixation of standard, comparing the standard with the actual and taking corrective action for any unfavorable deviation.	It does not have any specific process. Under it, the ways of reduction in materials, labor and other overheads are adopted.
3. assumption	Cost control assumes the existences of certain standers or norms which are not challenged.	Cost reduction assumes existence of concealed potential savings in the standards or norms which are therefore subject to constant challenge or improvement. As a matter of fact, it will not be incorrect say that cost control is only a means to achieve the end of cost reduction.
4. approach	Cost control lacks dynamism since it aims to attain lower possible cost under existing circumstances	Cost reduction is a continuous process and recognizes no conditions as permanent. It involve
5. function	Cost control lacks dynamism since it aims to attain lower possible cost under existing circumstances	Cost reduction is a corrective function. It operates even when efficient cost control system exists. It pre-supposes that there is always a room for reduction in the achieved costs.
6. time	Under this, attempts are made before the actual expenditures.	Under this, attempts to reduce costs might be made at any time.
7. application	It can be applied in the sectors where some comparable measure can be developed.	It can be applied even in the absence of some comparable measures.
8. emphasis	In case of cost control the emphasis is one the past. It aims at keeping the cost within the limits already set.	In case of cost reduction, the emphasis is on the present and the function. The emphasis is not of what have been costs but what could be the possible improvement in the costs. Thus, there is no end to cost reduction.

Cost classification and elements of cost



Direct Material + Direct Labour + Direct Expenses = Prime Cost

Indirect Material+ Indirect Labour + Indirect Expenses = Overheads

Direct Material Cost:

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

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

Indirect Material Cost

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

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

Direct Labour Cost

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

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

Indirect Labour Cost

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

Direct or Chargeable Expenses

Direct expenses are expenses relating to manufacture of a product or rendering a service which can be identified or linked with the cost object other than direct material cost and direct employee cost.

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

Overhead

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

operating supplies and services used by the undertaking and includes the maintenance of capital assets.

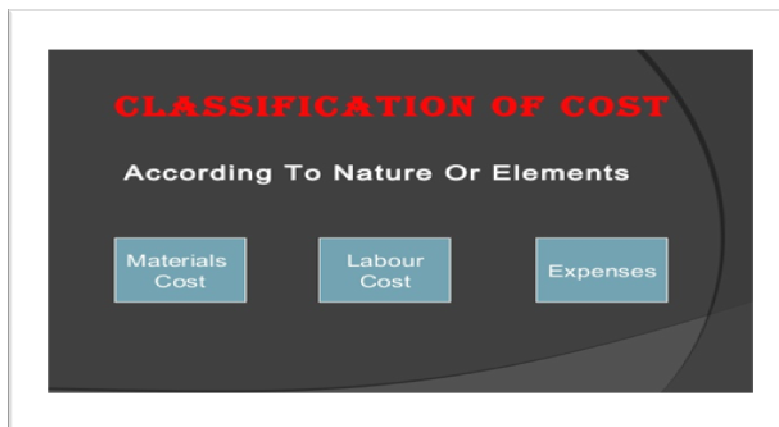
Prime Cost: The aggregate of Direct Material, Direct Labour and Direct Expenses.

Cost Classification:

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

(a) Classification by Nature of Expense

Costs should be gathered together in their natural grouping such as Material, Labour and Other Direct expenses. Items of costs differ on the basis of their nature. The elements of cost can be classified in the following three categories. 1. Material 2.Labour 3. Expenses



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

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

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

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

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

Cost Classification by relation to cost centre:

- 1) Direct Material Cost: Cost of material which can be directly allocated to a cost centre or a cost object in an economically feasible way.
- 2) Direct labour Cost: Cost of wages of those workers who are readily identified or linked with a cost centre or cost object.
- 3) Direct Expenses: Expenses other than direct material and direct labour which can be identified or linked with cost centre or cost object.

Direct Material + Direct labour + Direct Expenses = Prime Cost

- 1) Indirect Material: Cost of material which cannot be directly allocable to a particular cost centre or cost object
- 2) Indirect Labour :Cost of wages of employees which are not directly allocable to a particular cost centre.
- 3) Indirect expenses: Expenses other than of the nature of material or labour and cannot be directly allocable to a particular cost centre.

Indirect Material + Indirect Labour + Indirect Expenses = Overheads

(c) Classification by Functions:

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

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

Production or Manufacturing Costs

Administration Costs

Selling & Distribution cost

Research & Development costs

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

The followings are considered as Production or Manufacturing Costs:-

Direct Material

Direct Labour

Direct Expenses and

Factory overhead, i.e., aggregate of factory indirect material, indirect labour and indirect expenses.

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

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

Formulation of policy

Directing the organization and

Controlling the operations of an organization.

But administrative function will not include control activities concerned with production, selling and distribution and research and development.

Therefore, administration cost is the cost of administrative function, i.e., the cost of formulating policy, directing, organizing and controlling the operations of an undertaking (Administrative

cost will include the cost of only those control operations which are not related to production, selling and distribution and research and development). In most of the cases, administration cost includes indirect expenses of following types:

- Salaries of office staff, accountants, directors
- Rent, rates and depreciation of office building
- Postage, stationery and telephone
- Office supplies and expenses
- General administration expenses.

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

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

Following are the examples of selling and distribution costs:

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

(iv) Research & Development Costs:

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

R&D Costs comprises of the following:-

- Development of new product.
- Improvement of existing products.
- Finding new uses for known products.
- Solving technical problem arising in manufacture and application of products.

Development cost includes the costs incurred for commercialization / implementation of research findings.

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

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

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

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

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

(e) Classification based on Costs for Management Decision Making

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

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

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

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

Similarly when a building leased out on rent to a party is got vacated for own purpose or a vacant space is not leased out but used internally, say, for expansion of the production programme, the rent so forgone is the opportunity cost.

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

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

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

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

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

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

Operating Cost: Operating cost is the cost incurred in conducting a business activity.

Operating cost refer to the cost of undertakings which do not manufacture any product but which

provide services. Industries and establishments like power house, transport and travel agencies, hospitals, and schools, which undertake services rather than the manufacture of products, ascertain operating costs. The cost units used are Kilo Watt Hour (KWH), Passenger Kilometer and Bed in the hospital....etc. Operation costing method constitutes a distinct type of costing but it may also be classed as a variant of Process

Cost since costs in this method are usually compiled for a specified period.

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

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

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

Cost behavior pattern

Cost behaviour pattern is the manner in which a cost will react to changes in the level of activity. Costs may be viewed as variable, fixed, or mixed (semi-variable). A mixed cost is one that contains both variable and fixed elements. For planning, control, and decision purposes, mixed costs need to be separated into their variable and fixed components,

The way a specific cost reacts to changes in activity levels is called **cost behavior**. Costs may stay the same or may change proportionately in response to a change in activity. Knowing how a cost reacts to a change in the level of activity makes it easier to create a budget, prepare a

forecast, determine how much profit a new product will generate, and determine which of two alternatives should be selected.

Fixed costs

Fixed costs are those that stay the same in total regardless of the number of units produced or sold. Although total fixed costs are the same, fixed costs per unit changes as fewer or more units are produced. Straight-line depreciation is an example of a fixed cost. It does not matter whether the machine is used to produce 1,000 units or 10,000,000 units in a month; the depreciation expense is the same because it is based on the number of years the machine will be in service.

Fixed costs enable a business firm to do a business, but they are not purely incurred for manufacturing. Examples of fixed costs are rent, property taxes, supervising salaries, depreciation on office facilities, advertising, insurance, etc. They accrue or are incurred with the passage of time and not with the production of the product or the job. This is the reason why fixed costs are expressed in terms of time, such as per day, per month or per year and not in terms of unit. It is totally illogical to say that a supervisor's salary is so much per unit.

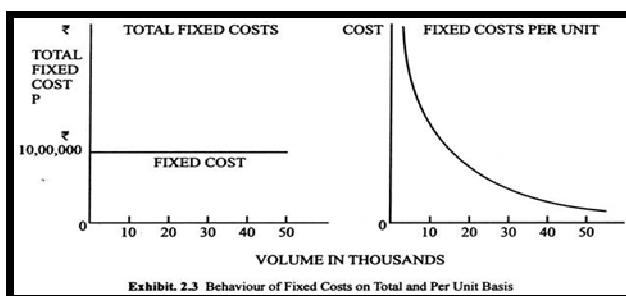


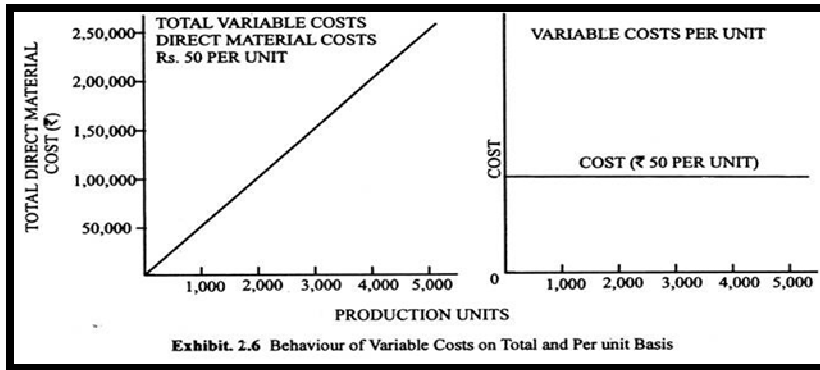
Exhibit 2.3 Behaviour of Fixed Costs on Total and Per Unit Basis

Variable costs

Variable costs are the costs that change in total each time an additional unit is produced or sold. With a variable cost, the per unit cost stays the same, but the more units produced or sold, the higher the total cost. Direct materials is a variable cost. If it takes one yard of fabric at a cost of Rs. 5 per yard to make one chair, the total materials cost for one chair is Rs. 5. The total cost for 10 chairs is Rs. 50 (10 chairs × Rs. 5 per chair) and the total cost for 100 chairs is Rs. 500 (100 chairs × Rs. 5 per chair).

For example, if direct material cost is Rs 50 per unit, then for producing each additional unit, a direct material cost of Rs 50 per unit will be incurred. Let us see the behaviour pattern of direct material cost. For the every increase in the units produced there is a proportionate increase in the

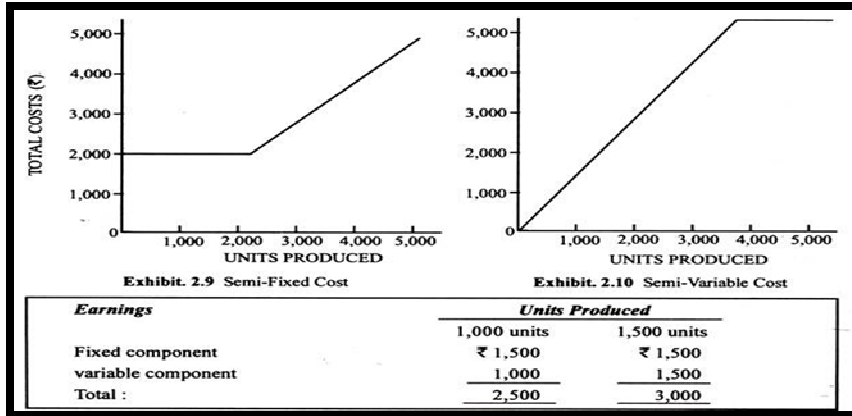
cost when production increases in direct proportion at the constant rate of Rs 50 per unit. The variable cost line is shown as linear rather than curvilinear. That is, on a graph paper, a variable cost line appears as unbroken straight line in place of a curve. Variable cost per unit is shown by constant.



Semi-Variable/ Mixed costs

Some costs, called **mixed costs**, have characteristics of both fixed and variable costs. For example, a company pays a fee of Rs. 1,000 for the first 800 local phone calls in a month and Rs. 0.10 per local call made above 800. During March, a company made 2,000 local calls. Its phone bill will be Rs.1, 120 (Rs.1,000 +(1,200 × Rs. 0.10)).

Semi-variable cost is the cost which is basically variable but whose slope may change abruptly when a certain output level is reached as shown in Exhibit 2.10. An example of a mixed cost is the earnings of a worker who is paid a salary of Rs 1,500 per week (fixed) plus Re. 1 for each unit completed (variable). If he increases his weekly output from 1,000 units to 1,500 units, his earnings increase from Rs 2500 to Rs 3,000.



Mathematically, mixed costs can be expressed as follows:

$$\text{Total Mixed Cost} = \text{Total Fixed Cost} + (\text{Units} \times \text{Variable Cost per Unit})$$

Separating the components of semi-variable costs.

Several methods are used for segregating semi-variable costs into fixed and variable. There are four major techniques that are found in practice and they may be listed as follows:

1. High and low points method
2. Scatter graph method
3. Least squares regression method.
4. Accounting or analytical approach

1. High and Low Points Methods:

This approach considers the difference in total cost between two different volumes, and divides the incremental cost by the volume. As the words 'high' and 'low' imply, the two levels of volume chosen are the highest and the lowest for the periods under review. The result of this division is the estimated variable cost per unit.

Then, the average activity level is computed together with the average cost for the periods in the data base. The fixed cost is estimated by taking the total average cost and subtracting the

variable cost for the average activity level. The variable cost is computed by multiplying the average activity level by the variable cost per unit as determined above.

As an illustration, assume that a company incurred the following costs in two periods (high and low) in which 5,000 units and 10,000 units were produced:

	<i>Cost incurred</i>	
	5,000 units	10,000 units
	₹	₹
Insurance on factory building	3,00,000	3,00,000
Depreciation of machinery (units of output method @ ₹ 80 per unit)	4,00,000	8,00,000
Indirect Material	4,50,000	7,00,000

Since insurance remained constant at the two volumes, there is no variable component. Since a 100% increase in volume resulted in a 100% increases in depreciation, there is no fixed component. Indirect materials contain both a fixed and variable component.

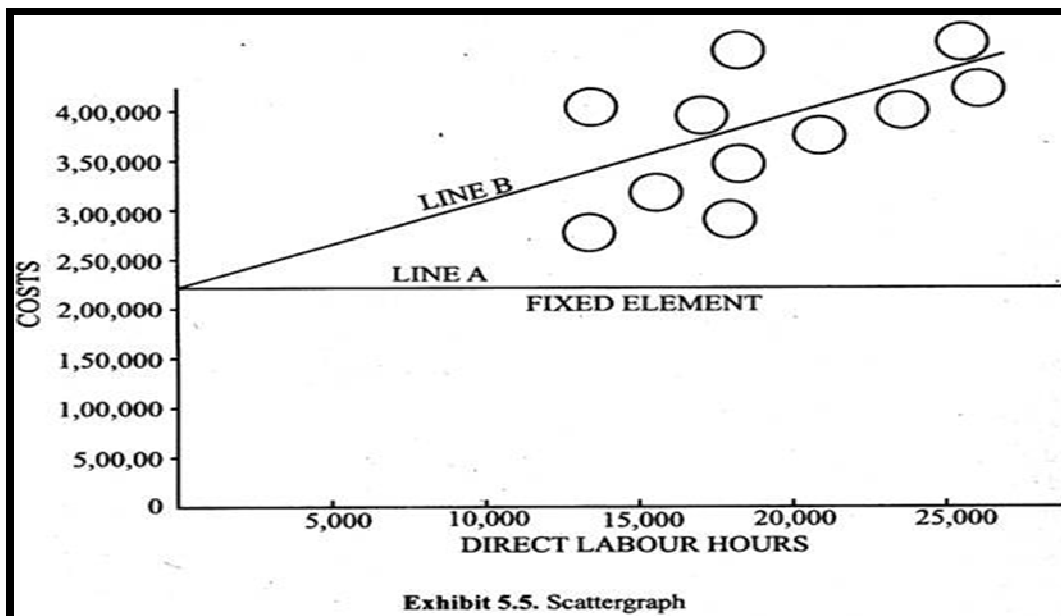
Separation is made as follows:		
Variable component :		₹
Indirect material cost of 10,000 units		7,00,000
Indirect material cost 5000 units		<u>4,50,000</u>
Cost of production of additional 5,000 units		2,50,000
Variable cost per unit ₹ 2,50,000 ÷ 5,000 units		50.0
Fixed components;	5,000 units	10,000 units
Total indirect materials cost	4,50,000	7,00,000
Variable components @ ₹ 50 per unit	<u>2,50,000</u>	<u>5,00,000</u>
Fixed components	<u>2,00,000</u>	<u>2,00,000</u>

2. Scatter-Graph Method:

Another approach to the estimation of the fixed and variable components of a mixed cost is the scatter-graph method. With this procedure, various costs are plotted on a vertical line, the y-axis, and measurement figures (activity levels such as direct labour hours, units of output, percentage of capacity or direct labour cost) are plotted along a horizontal line, the x-axis. A straight line is fitted to this scatter of points by visual approximation. The slope of the line is used to estimate the variable costs and the intercept of the line with the vertical axis is considered as the estimated fixed cost. The following examples illustrates the scatter-graph method.

Month	Direct labour hours	Costs (₹)
January	17,000	3,20,000
February	15,000	3,10,000
March	17,000	3,10,000
April	19,500	2,95,000
May	21,000	2,50,000
June	16,000	2,65,000
July	13,000	2,50,000
August	13,000	2,50,000
September	15,500	2,65,000
October	17,500	2,75,000
November	21,500	2,90,000
December	24,000	3,40,000
	2,10,000	34,20,000

The first step in constructing a scatter-graph requires plotting each of the observation on graph paper. The second step is fitting a regression line or trend line to the data. In the chart, line B is plotted by visual inspection. Ideally, there should be as many dots above as below the line. Another line is drawn parallel to the base line from the point of inter section on the y-axis, which is at Rs 2,20,000. This line A represents the fixed portion of the expenses for all levels of activity within a reasonable range. The triangle formed by line A and B shows the increase in the expenses as direct labour hours increase.



Fixed expenses per month = Rs 2, 20,000

Fixed expenses per year = 2, 20,000 x 12 = Rs 26, 40,000

Subtracting the fixed portion from the total expenses = Rs 34, 20,000 – 26, 40,000 = Rs 7, 80,000

Rs 7, 80,000 is the total variable portion of the expenses.

Variable cost per direct labour = Rs 7, 80,000/2, 10,000= Rs 3.7 per Hour.

Thus, expenses consist of Rs 2, 20,000 fixed expenses and variable factor Rs 3.7 per unit direct labour hour.

3. Least Squares Regression Method:

The method of least squares uses the equation for a straight line: $Y = a + bx$, with a as the fixed element, and b the degree of variability. For many accounting application, regression provides an accurate estimate of fixed and variable costs.

The answer under regression differs from the scatter-graph method because observation does not offer so accurate an answer as this mathematical procedure. Individuals cannot differ in their separation of fixed and variable components. However, this method has drawbacks; it fits a straight line to any set of cost data no matter how erratic the cost behaviour pattern may be. Further, unless a computer is available for this work, the calculations required by the method of least squares are laborious and time-consuming.

4. Accounting or Analytical Approach:

This approach to cost behavior analysis is close scrutiny of the chart of accounts and a classification of costs into their fixed and variable components according to their basic characteristics determined by the accountant using good judgment, knowledge, and experience. This approach is simple and inexpensive but in its simplicity lies its inherent weakness.

The results obtained are not accurate and may happen to be mere guesses. To improve this method, costs over a period of time can be watched. The time selected must be long enough to provide valuable data over a wide range of activity. Having collected cost data at different production levels, the accountant then proceeds to identify fixed and variable costs. Costs which appear to be semi -variable must be set aside for further analysis into fixed and variable components.

Example:

The following are the Maintenance Costs incurred in a Machine shop for the six month with corresponding machine hours:

Month	Machine Hours	Maintenance Costs ₹
January	2,000	3,00,000
February	2,200	3,20,000
March	1,700	2,70,000
April	2,400	3,40,000
May	1,800	2,80,000
June	1,900	2,90,000
Total :	12,000	18,00,000

Analyze the Maintenance Cost which is semi -variable into fixed and variable element.

Solution: Computation of Variable Cost and Fixed Cost has been done according to Range Method.

	Machine Hours	Maintenance Costs ₹
Highest point, April	2,400	3,40,000
Lowest point, March	1,700	2,70,000
	<u>700</u>	<u>70,000</u>
Variable Cost per Machine hour = $\frac{\text{Change in Maintenance Costs}}{\text{Change in Hours}}$		
$\text{₹ } 70,000 / 700 = \text{₹ } 100$		
Total Variable Cost for 2,400 machine hours will be		
$2,400 \times \text{₹ } 100 = \text{₹ } 2,40,000$		
Hence, Fixed Cost is $(\text{₹ } 3,40,000 - \text{₹ } 2,40,000) = \text{₹ } 1,00,000$		
Analysis of Maintenance Cost into Fixed and Variable Element		

	Machine Hours	Maintenance Cost	Fixed Cost	Variable Cost
January	2,000	3,00,000	1,00,000	2,00,000
February	2,200	3,20,000	1,00,000	2,20,000
March	1,700	2,70,000	1,00,000	1,70,000
April	2,400	3,40,000	1,00,000	2,40,000
May	1,800	2,80,000	1,00,000	1,80,000
June	1,900	2,90,000	1,00,000	1,90,000

Materials Control: Meaning

Material is any substance (Physics term) that forms part of or composed of a finished product. i.e material refers to the commodities supplied to an undertaking for the purpose of consumption in the process of manufacturing or of rendering service or for transformation into products. The

term 'Stores' is often used synonymously with materials, however, stores has a wider meaning and it covers not only raw materials consumed or utilized in production but also such other items as sundry supplies, maintenance stores, fabricated parts, components, tools, jigs, other items, consumables, lubricants. etc. Finished and partly finished products are also often included under the term 'Stores'. Materials are also known as Inventory. The term Materials / Inventory covers not only raw materials but also components, work-in-progress and finished goods and scrap also.

Objectives of Material Control System:

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

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

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

Requisites of Material Control System:

- Coordination and cooperation between the various departments concerned viz purchase, receiving, inspection, storage, issues and Accounts and Cost departments.

- Use of standard forms and documents in all the stages of control.
- Classification, coordination, standardization and simplification of materials.
- Planning of requirement of material.
- Efficient purchase organization.
- Budgetary control of purchases.
- Planned storage of materials, physical control as well as efficient book control through satisfactory storage control procedures, forms and documents.
- Appropriate records to control issues and utilization of stores in production.
- Efficient system of Internal Audit and Internal Checks.
- System of reporting to management regarding material purchase, storage and utilization.

Steps in Material Control

The material control is guaranteed through laying down proper methods for Storing, Purchasing, Issuing and minimizing material losses through identifying slow moving, obsolete, dormant material and also through minimizing scrap, wastages, spoilages and defectives. These steps are discussed below.

A. Purchasing and Receiving: Purchase procedure different from business to business, but all of them follow a usual pattern or technique. There should be an appropriate Purchase Procedure to make sure that at right time right type of material is purchased, and that should be in right quantity, at right place and at right prices.

B. Storing of Materials: Through the purchase department, the material purchased is sent to stores before it is issued for production. So storing of material can be termed as an intermediate step in the material control. there is no requirement for storing the materials, If an organization practices Just in Time inventory system, if not there is a requirement that there is a well-organized stores department in the company which will take care of the storing material.

C. Issue Control: other significant aspect of material control is the issue control. Material is issued to production and greatest care is to be taken when issuing the material. The first thing is that material should not be issued to any department with no authorization. A Material Requisition Note is prepared through the department that is in requirement of the material and sent to the stores department. It is a written request created to the stores department for sending the material. The details of the material required like the quantity, quality, date through which it is needed etc, in the Material Requisition Note.

D. Material Losses: One of the major reasons of increasing material costs is the loss of material within the production process. It is of paramount significance that there should be fixed control over the material losses failing that it will be very hard to keep the material costs in check.

E. Inventory Turnover Ratio: There are various items in the store that are slow moving the meaning of that is they are issued to the production after a long time gap. A few items are like that they are never issued to the production because they have become obsolete or outdated and require to be disposed off. For make out these items, it is essential to calculate the inventory turnover ratio. Inventory turnover ratio allows the management to prevent the capital being locked in such types of items. This ratio points out the inefficiency or efficiency by which inventories are maintained.

INVENTORY CONTROL

Inventory control is the systematic control and regulation of purchase, storage and usage of materials in such a way as to maintain an even flow of production and at the same time avoiding excessive investment in inventories. Efficient material control reduces loses and wastages of materials that otherwise pass unnoticed. Inventory control is the core of materials management. The need and importance of inventory varies in direct proportion to the idle time cost of men and machinery, and the urgency of requirements. If men and machinery in the factory could wait and

so could customers, materials would not lie in wait for then and no inventories, need be carried. But it is highly uneconomical to keep men and machines waiting and the requirements of modern life are so urgent that they cannot wait for materials to arrive after the need for them has arisen. Hence firms must carry inventories because materials constitute a significant part of the total production cost of a product and since this cost is control able to some extent, proper planning and controlling of inventories are of great importance. Inventory control is a planned method of determining what to indent, so that purchasing and storing cost are minimum without affecting production or sales. Without proper control, inventories have a tendency to grow beyond economic limits. Funds are tied up unnecessarily in surplus stores and stocks, productive operations are stalled, and finances of the plant are severely strained. Lack of control over inventory also leads to excessive consumption and wastage as operatives are liable to become careless with irrational supply of materials.

OBJECTIVES OF INVENTORY CONTROL

Scientific control of inventories should serve the following purposes:

- To provide continuous flow of required materials, parts and components for efficient and uninterrupted flow of production.
- To minimize investment in inventories keeping in view operating requirements.
- To provide for efficient store of materials so that inventories are protected from loss by fire and theft and handling time and cost are kept at a minimum.
- To keep surplus and obsolete items to minimum.

It might seem axiomatic that inventory control is efficient as long as inventory level is going down. But the fact is that if inventories are minimized without guaranteeing adequate operations, inventories have been mismanaged rather than controlled efficiently. Thus the two basic objectives of inventory control appear to be conflicting in nature. Inventories should increase or decrease in amount and time as related to sales requirements and production schedules.

TECHNIQUES OF INVENTORY CONTROL

The following are the common techniques of inventory control:

1. Min-max plan
2. The two-bin system
3. Order cycling system
4. ABC analysis

5. Fixation of various levels
6. Use of perpetual inventory system and continuous verifications
7. Use of control ratios
8. Review of slow and non-moving items.

1. Min-max plan

It is one of the oldest methods of inventory control. Under this plan the analyst lays down a maximum and minimum for each stock item keeping in view its usage, requirements and margin of safety required to minimize risks of stock-outs. The minimum level establishes the reorder point and order is placed for that quantity of material which will bring it to the maximum level. The method is very simple and based upon the premise that minimum and maximum quantity limits for different items can fairly be well defined and established.

2 The two-bin system

The basic procedure used under this system is that for each item of stock, two piles, bundles, or bins are maintained. The first bin stocks that quantity of inventory which is sufficient to meet its usage during the period that elapses between receipt of an order and the placing of the next order. The second bin contains the safety stock and also the normal amount used from order to delivery date. The moment stock contained in the first bin is exhausted and the second bin is tapped, a requisition for new supply is prepared and submitted to the purchasing department. Since no bin-

tag (quantity record of materials) card is maintained, there is absence of perpetual inventory record under this bin.

3 Order cycling system

In the order cycling system, quantities in hand of each item or class of stock is reviewed periodically say, 30, 60 or 90 days. If in the course of a scheduled periodic review it is observed that the stock level of a given item will not be sufficient till the next scheduled review keeping in view its probable rate of depletion, an order is placed to replenish its supply. Review period will vary from firm to firm and also among different materials in the same firm. Critical items of stock usually require a short review cycle. Order for replenishing a given stock item, is placed to bring it to some desired level which is often expressed in relation to number of days or week's supply. The scheduled periodic review plan does not consider differences in rates of usage for different items of stock with the result that items whose usage has declined will have surplus stock whereas for some items rate of depletion might have increased to the extent that their stock

is exhausted much before the next review date. Moreover, the system tends to make procurement and purchasing activities reach their peak around the review dates.

4.The ABC Analysis-

With the numerous parts and materials that enter into each and every industrial product, inventory control lends itself, first and foremost, to a problem of analysis. Such analytical approach is popularly known as ABC analysis (Always Better Control), which is believed to have originated in the General Electric Company of America. The ABC plan is based upon segregation of materials for selection control. It measures the money value, i.e., cost significance of each material item in relation to total cost and inventory value. The logic behind this kind of analysis is that the management should study each item of stock in terms of its usage, lead time, technical or other problems and its relative money value in the total investment in inventories. Critical, i.e., high value items deserve very close attention, and low value items need to be devoted minimum expense and effort in the task of controlling inventories. Under ABC analysis, the different items of stock may be ranked in order of their average inventory investment or on the basis of their annual rupee usage

5. Fixation of various levels:

Certain stock levels are fixed up for every item of stores so that stocks and purchases can be efficiently controlled. These are:

- (a) Maximum Level: This represents the minimum quantity above which stocks should not be held at any time.
- (b) Minimum Level: This represents the minimum quantity of stock that should be held at all times.
- (c) Danger Level: Normal issues of stock are usually stopped at this level and made only under specific instructions.
- (d) Ordering Level: It is the level at which indents should be placed for replenishing stocks.
- (e) Ordering Quantity: It is the quantity that is ordered.

Maximum Level:

It is normally a matter of policy. The various factors that should be taken into consideration are:

- (a) Capital Outlay: Investment to be made in stores, raw materials and other bulk items is an important consideration.
- (b) Storage space available.
- (c) Storage and insurance cost.

- (d) Certain materials deteriorate if stored over a long period. This limits the quantity of maximum stock kept.
- (e) If certain goods are subject to obsolescence, the spare parts and components etc. of such products stocked should be limited.
- (f) Consumption per annum.
- (g) The lead time.
- (h) Certain goods are seasonal in nature and can be purchased only during specific period. Hence maximum level will be fixed for each season.
- (i) Price advantage arising out of bulk purchases should be availed.
- (j) The Economic Order Quantity also influences the maximum level.

Maximum stock level can be computed as follows:-

Maximum stock level = Re-order level + Re-ordering quantity – (Minimum consumption x Minimum re-order period).

Minimum Level

The minimum level is also a matter of policy and is based on :

- (a) Consumption per annum
- (b) The lead time
- (c) The production requirement
- (d) The minimum quantity that could be advantageously purchased.
- (e) If an item is made to order then no minimum level is necessary.

Minimum level = Re-order level - (Normal consumption x Normal reorder period).

Danger or Safety Level

Material consumption varies from day to day, week to week and hence accurate forecasting is not possible. A safety or reserve stock is kept to avoid stock-out. The desirable safety stock level is that amount which minimizes stock-out costs and also the carrying costs. This level is a level of stock between the minimum level and nil stock. It is calculated for those items which can be utilized for multiple orders or products. The store-keeper usually does not issue once the danger level is reached. Usually priority is given to some order/product for the use of these items. This level is fixed up especially for control of production so that priority items can be produced. This level is sometimes fixed above the minimum level. In this case, this level is preventive. If the level is below the minimum level, this level is corrective.

The safety stock level can be computed as follows:

Safety stock level = Ordering level - (Average rate of consumption Re-order period)

OR

(Maximum rate of consumption - Average rate of consumption) X Lead time

Ordering Level

The annual consumption of an item and the time lag between ordering and receiving can be collected from past records. Based on these facts and policies, the ordering level and ordering quantity can be calculated, as follows:

Ordering level =

Minimum level + Consumption during time lag period

OR

Maximum consumption x Maximum re-order period.

The ordering level should be fixed so that when an indent is placed at the ordering level, the stock reaches the minimum level when the replenishment is received. The ordering level is calculated from the following factors:

- (a) The expected usage
- (b) The minimum level
- (c) The lead time.

The order point is calculated keeping in mind the worst conditions so that minimum stock is always maintained.

Economic Ordering Quantity

The basic problems of inventory control are two viz., what quantity of an item should be ordered at a time and when should an order be placed. While deciding economic ordering quantity, the efforts are directed to ascertain the ideal order size. While deciding the ideal order size, factors such as inventory carrying charges and the ordering cost associated with the placement of purchase orders are to be considered; the total of both has to be minimised. The inventory carrying charges include interest on the capital invested in the stores of materials, rent for the storage space, salaries and wages of the store-keeping department, any loss due to pilferage and deterioration, stores insurance charges, stationery, etc. used by the stores, taxes on inventories, etc. Ordering costs may include rent for the space used by the purchasing department, the salaries and wages of officers and staff in the purchasing department, the depreciation on the equipment and furniture used by the department, postage, telegraph charges and telephone bills,

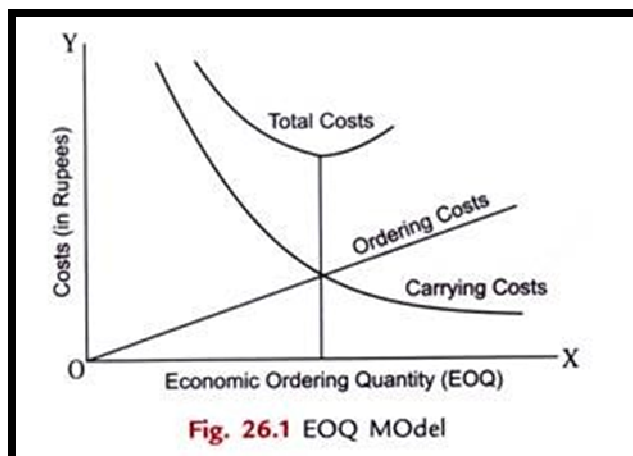
the stationery and other consumables required by the purchasing department, any travelling expenditure incurred, and the costs of inspection etc., on receipt of material.

The optimum ordering quantity, i.e., the quantity for which the cost of holding plus the cost of purchasing is the minimum is known as Economic ordering Quantity and is calculated by the following formula:

ALGEBRAIC METHOD

$$EOQ = \sqrt{\frac{2 a b}{c s}}$$

a = Annual consumption
 b = Buying cost per order
 c = Cost per unit
 s = Storage cost
 (It include inventory carrying cost)



6. Use of perpetual inventory system and continuous verification: The perpetual inventory system records changes in materials, work-in-progress on a daily basis. Hence managerial control and preparation of interim financial statements is easier. Perpetual inventory derived its name because it indicates the amount of stock in hand at all times. It facilitates verification of stocks at any time and helps to authenticate the correctness of stock records.

The two main functions of perpetual inventory are:

- (a) It records the quantity and value of stock in hand.
- (b) There is continuous verification of physical stock.

Chartered Institute of Management Accountants, London has defined it as “the recording as they occur of receipts, issues and the resulting balances of individual items of stock in either quantity or quantity and value”.

A perpetual inventory is usually checked by a programme of continuous stock-taking and the two terms are sometimes loosely considered synonymous. Perpetual inventory means the system of records, whereas continuous stocktaking means the physical checking of those records with actual stocks.

The perpetual inventory method has the following advantages:

- (a) The inventory of various items can be easily ascertained. Hence profit and loss account and balance sheet can be easily prepared.
- (b) Information regarding material on hand eliminates delays and stoppage in production.
- (c) The investment in stock can be reduced to the minimum keeping in view the operational requirements.
- (d) Because of internal check, the activities of various departments are checked. Hence stores records are reliable.
- (e) Production need not be stopped when stock-taking is carried out.
- (f) These records give the cost of materials. Hence management can exercise control over costs.

7. Use of control ratios

- (a) Inventory turnover ratio: It helps management to avoid capital being locked up unnecessarily. This ratio reveals the efficiency of stock-keeping.

Inventory turnover ratio is given by the formula:

$$\text{Inventory Turnover Ratio} = \frac{\text{cost of goods sold}}{\text{inventory}}$$

8. Review of slow and non-moving items

The money locked up in inventory is money lost to the business. If more money is locked up, lesser is the amount available for working capital and the cost of carrying inventory also increases. Stock turnover ratio should be as high as possible. Loss due to obsolescence should be eliminated or these items used in some profitable work. Slow moving stocks should be identified and speedily disposed of. The speed of movement should be increased. The turnover of different

items of stock can be analyzed to find out the slow moving stocks. The percentage of slow-moving stores is given by the formula:

Slow moving stores/Total Inventory

Materials become useless or obsolete due to changes in product, process, design or method of production, slow moving stocks have a low turnover ratio. Capital is locked up and cost of carrying have to be incurred. Hence management should take effective steps to minimize losses.

Valuation of inventory

The two most widely used inventory Valuation systems are the periodic and the perpetual.

Perpetual: The perpetual inventory system requires accounting records to show the amount of inventory on hand at all times. It maintains a separate account in the subsidiary ledger for each good in stock, and the account is updated each time a quantity is added or taken out.

Periodic: In the periodic inventory system, sales are recorded as they occur but the inventory is not updated. A physical inventory must be taken at the end of the year to determine the cost of goods

Regardless of what inventory accounting system is used, it is good practice to perform a physical inventory at least once a year.

The weighted average cost method uses the average of the costs of the goods to assign costs. In other words, weighted average uses the formula: Total cost of items in inventory available for sale divided by total number of units available for sale.

In contrast, FIFO (first in, first out) accounting means that the costs assigned to goods are the costs for the first goods bought. In other words, the company assumes that the first goods sold are the oldest or the first goods bought. On the other hand, LIFO (last in first out) assumes that the last or latest items bought are the first items to be sold.

Unit-2-Labour Cost and Overheads

Labour cost after material cost is another significant element of cost not only because the wage bill in a modern organisation is generally substantial but also because it has certain peculiar characteristics which other elements of cost do not have. A good cost accountant must understand the special features of labour cost, the most important of which is that there is almost no limit to the increase of output of this most important and wonderful factor of production.

Labour cost may be broadly classified as direct labour cost and indirect labour cost.

1. **Direct Labour Cost:** Labour cost that is expended in production of a product and easily identified and allocated to a cost unit i.e. a specific job, contract, work order or any other unit of cost.
2. **Indirect Labour Cost:** Labour cost that is expended on the wages of workmen who are not directly engaged in the production process and can be easily identified with a cost unit.

Distinction between Direct and Indirect Labour Cost:

Direct Labour cost	Indirect Labour Cost
It is the cost incurred in payment of labour who are directly engaged in the production process	Cost incurred for payment of labour who are not directly engaged in the production process
Direct labour cost can be easily identified and allocated to cost unit..	Indirect labour cost is apportioned on some appropriate basis.
Direct labour cost varies with the volume of production and has positive relationship with the volume	Indirect labour cost may not vary with the volume of production.

Attendance And Payroll Procedure:

Attendance procedure is also known as Time Keeping.: It refers to correct recording of the employees' attendance time.

Objectives of Time-keeping : Correct recording of employees' attendance time is of utmost importance where payment is made on the basis of time worked.

Where payment is made by results viz; straight piece work, it would still be necessary to correctly record attendance for the purpose of ensuring that proper discipline and adequate rate of production are maintained.

In fact the various objectives of time-keeping are as follows:

- For the preparation of payrolls.
- For calculating overtime.
- For ascertaining and controlling labour cost.
- For ascertaining idle time..

- For disciplinary purposes.
- For overhead distribution.

Methods of Time-keeping: There are two methods of time-keeping. They are the manual methods and the mechanical methods. The choice of a particular method depends upon the requirements and policy of a firm. But whichever method is followed, it should make a correct record of the time incurring the minimum possible expenditure and should minimize the risk of fraudulent payments of wages.

(a) Attendance Register Method: It is the oldest method of recording time. Under this method, an attendance register is kept in the time office adjacent to the factory gate or in each department for workers employed therein. The time of a arrival and departure, may be noted down by an employee know as time-keeper. This method is simple and inexpensive and can be used in small firms where the number of workers is not large. This method may lead to dishonest practice of recording wrong time because there is possibility of collusion between some of the workers and the time-keeper. However, for recording the time of workers who work at customers' premises and places which are situated at a distance from the factory, this may be the only suitable method.

(b) Metal Disc Method: Under this method, each worker is allotted a metal disc or a token with a hole bearing his identification number. As the workers enter the factory gate, they remove their respective discs or tokens and place them in a box or tray kept near the board. Immediately after the scheduled time for entering the factory, the box is removed and the late comers will have to give their tokens to the time- keeper personally so that the exact time of their arrival could be recorded.

(c) 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 and are serially arranged 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 process is repeated for recording time of departure for lunch, return from lunch and time of leaving the factory in the evening. Late arrivals, early leavings and overtime are printed in red to attract the attention of the management.

(d) Dial Time Records: The dial time recorder is a machine which has a dial around the clock. This dial has a 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

thedral. 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.

(e) Punch Card attendance system: One of the most popular time clock attendance systems is punch card attendance system. A punch card is a flat and stiff paper with notches cut in it and contains digital information. In punch card attendance system, employees use this punch or proximity card for in and/or out. To use a punch card, employees just need to wave the card near a reader, which then ensures whether the correct person is logging in and/or out.

(f) Bio Metric Attendance: Biometrics has unique recognizing features which are based on physical or behavioral traits of an individual. Recognizing an individual on the basis of physical traits include identification based on his fingerprint, face, DNA, eyes, iris, palm, etc while behavioral traits identification refers to voice or rhythm recognition. Based on this technology different recognition systems have been designed depending on different traits.

Fingerprint recognition system - An automated method of verifying a match between human fingerprints. As fingerprint of every person is unique, it offers a very secure and reliable attendance monitoring. No buddy punching/ proxy attendance is possible.

Face recognition- Based on automatic identification and verification of face by digital image or video frame and matching it with facial database present in it software.

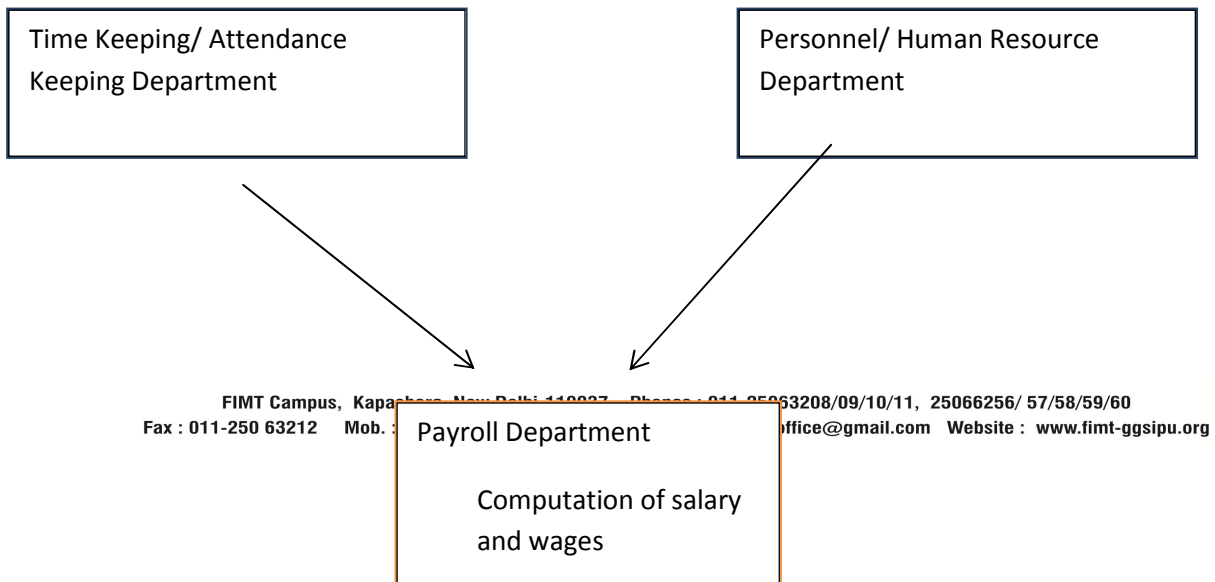
Requisites of a Good Time-keeping System:

A good time-keeping system should have following requisites:

1. System of time-keeping should be such which should not allow proxy for another worker under any circumstances.
2. There should also be a provision of recording of time of piece workers so that regular attendance and discipline may be maintained. This is necessary to maintain uniformity of flow of production.
3. Time of arrival as well as time of departure of workers should be recorded so that total time of workers may be recorded and wages may be calculated accordingly.

4. Late-comers should record late arrivals. Any relaxation by the time-keeper in this regard will encourage indiscipline.
5. The system should be simple, smooth and quick. Unnecessary queuing at the factory gate should be avoided.

Payroll procedure: Steps included in this process are as under:



1. Attendance and Time details: A detailed sheet of number of days or hours worked by each employee (in case of time based payment) and units or percentage of work (in case of piece rate) as reflected by the time keeping methods are sent to the payroll department by the time keeping department. Further, payroll department with the help of time booking records calculate any further incentives such as overtime payment, bonus to be paid to the employees.
2. List of employees and other details: A list of employees on roll and the rate at which they will be paid is sent by the personnel/ HR department. Payroll department should ensure that no unauthorized person can pay.
3. Computation of wages and other incentives: Payroll department based on the details provided by the time keeping department and personnel department calculate wages/ salary to be paid to the employees. Payroll department prepares pay slip for all employees authorized by the personnel department and forward the same to the cost/ accounting department for further deductions and payment.

4. Payment to the employees: Cost/ accounting department deduct all statutory deduction such as employee's contribution to provident fund and employee state insurance (ESI) scheme, TDS on salary etc. After all deductions wages/ salary is paid to the employees.

5. Deposit of all statutory liabilities: All statutory deduction made from the employees along with employer's contributions such as provident fund and employee state insurance scheme are paid to the respective statutory bodies.

Statutory Compliance-

Statutory compliance, in HR, refers to the legal framework within which organizations must operate, in the treatment of their employees. Every country has several hundreds of federal and state labour laws that companies need to align with. This list is forever being added to.

Need For Statutory Compliance- Adhering to statutory compliances is necessary for all big and small companies in the world to keep their businesses safe from the legal trouble. A deep knowledge of statutory compliances is required to minimize the risk associated with the noncompliance of statutory requirements.

There are a number of statutory requirements for Indian companies and companies have to spend a significant amount of time in their payroll management to ensure that they are compliant with the legal regulations. If companies fail to adhere to statutory compliances, they may have to face heavy penalties which are several times more than complying with legal guidelines.

The Statutory Compliances Required for Indian Payroll are:

Statutory Requirements for Minimum Wages: This act provides for fixing minimum rates of wages for skilled and unskilled laborers. It not only guarantees money for bare minimum survival requirements of workers but also takes care of education, medical requirements, and some level of comfort of workers.

The Minimum Wages Act being a state subject, the statutory compliance of a centralized Payroll management is to cater for the payment of minimum wages to an organization's workers spread out across different states.

Payment of 'Overtime': Payment of overtime wages to workers is also a statutory requirement as per the Factory Act & Payment of Wages Act. It affects sectors like manufacturing & construction.

TDS Deduction

Every employer who is paying salary to employees has to deduct TDS under section 192 of the Income tax Act, 1961, if the salary is more than maximum amount exempt from tax. Some of the salary components that impact TDS deduction are: HRA, Special allowance, Leave travel allowance, Children education allowance, Medical allowance, Investments.

Statutory Compliances for ESI Fund and PF Deduction

Employee State Insurance Employee's contribution to the ESI is deducted from the salary/ wages. Currently, the employee's contribution rate Scheme (ESI).

PF is a compulsory contributory fund for the future of employees after their retirement or for their dependents in case of their early death.

Professional Taxes

Professional tax or employment tax is a state-based tax. It is one of the statutory deductions from the gross income before computing the tax.

Gratuity: Gratuity is the amount given to employees by employer when they leave the job after completing five years in service. Gratuity is calculated as $\text{Basic} + \text{DA} \div 26 * \text{No of years of service} * 15$.

Idle time

It is a time during which no production is carried out because the worker remains idle even though they are paid. Idle time can be normal idle or abnormal idle time.

Normal idle time: It is the time which cannot be avoided or reduced in the normal course of business.

(1) Travelling time from one job or department to another,

- (2) The distance covered between the factory gate and actual place of work,
- (3) Elapse of time between finishing one job and starting another job,
- (4) Time spent to overcome fatigue,
- (5) Tea and lunch breaks, and
- (6) Machine or job setting-up time etc.

Abnormal idle time: Apart from normal idle time, there may be factors which give rise to abnormal idle time.

The important causes for the abnormal time are given below:

- (a) Temporary lack of work,
- (b) Machine breakdown,
- (c) Power failures,
- (d) Shortage of raw materials,
- (e) Waiting for tools,
- (f) Waiting for jobs due to unplanned production,
- (g) Stoppage of work due to managerial policy decisions,
- (h) Strikes and lockouts, floods, earthquakes.

Accounting Treatment of Idle Time:

Normal Idle Time: The wages paid for the normal idle time period is treated as production overhead and absorbed into cost of product by adopting an absorption rate. The normal idle time in tool setting etc. can be charged at inflated rate. Jobs are charged at inflated rate.

Abnormal Idle Time: The wages paid for the abnormal idle time can be avoided by taking proper care and caution. It is not treated as part of cost and excluded from cost accounts and it is straight away debited to Costing Profit and Loss Account.

Abnormal Idle Time can be further divided into:

- i) **Controllable abnormal idle time:** refers to that time which could have been put to productive use had the management been more alert and efficient. All such time which could have been avoided is controllable idle time.
- ii) **Uncontrollable abnormal idle time:** refers to time lost due to abnormal causes, over which management does not have any control e.g., breakdown of machines, flood etc. may be characterized as uncontrollable idle time.

Overtime

Overtime premium: Work done beyond normal working hours is known as 'overtime work'. Overtime payment is the amount of wages paid for working beyond normal working hours. The rate for overtime work is higher than the normal time rate; usually it is at double the normal rates. The extra amount so paid over the normal rate is called overtime premium.

The Factories Act provides for payment of overtime wages at double usual rates of wages. Even where the Act is not applicable,- the practice is to pay for overtime work at higher rates usually in accordance with a standing agreement between the employer and the workers-. Hence, payment of overtime consists of two elements, viz., the normal (i.e., usual) amount and the extra payment, i.e., the premium.

Overtime Premium shall be assigned directly to the cost object or treated as overheads depending on the economic feasibility and specific circumstances requiring such overtime.

When overtime is worked due to exigencies or urgencies of the work, the basic / normal payment is treated as Direct Labour Cost and charged to Production or cost unit on which the worker is employed. Whereas the amount of premium (extra amount) is treated as overhead.

If overtime is spent at the request of the customer, then the entire amount (including overtime premium) is treated as direct wages and should be charged to the job.

When the overtime is worked due to lack of capacity as general policy of the company, then the total amount paid is treated as direct wages which is computed at the estimated rate based on the figures of the previous years.

Overtime worked on account of the abnormal conditions such as flood, earthquake,- etc., should not be charged to cost, but to costing Profit and Loss Account if integrated accounts are maintained.

It will thus be seen that overtime involves payment of increased wages and should be resorted to only when extremely essential. The disadvantages- attached to overtime working are as follows: It involves excess labour cost. There is decrease in productivity. Output is usually proportionate to the excess time worked as efficiency during late hours is diminished. Continuous work for long periods leads to fatigue and defective work. Overtime work if not properly distributed among the workers may lead to discontentment.

There is a tendency to keep the work pending to be done during overtime period or to intentionally slow- down in order to compel the management to sanction overtime.

It may, however, be said in favour of overtime work that it increases the productive capacity of the concern as more work is done with the existing resources. Overtime work is particularly useful in pulling up backlog in production arising due to shutdown, breakdown, power failure and such other contingencies.

Though overtime work cannot be completely eliminated, it is essential that proper control should be exercised to keep it to the minimum. The following steps should be taken to control the Overtime:

- (a) All overtime work should be duly authorized after investigating the necessity thereof.
- (b) Overtime cost should be recorded separately and shown against the department- incurring it. This will enable proper investigation and planning of production in future.
- (c) If overtime tends to be a permanent feature, the necessity of recruiting more men and shifting working should be considered.

(d) If overtime is due to lack of plant or machinery or other resources, steps may be taken to install more machines, or to give subcontracts alternatively, to restrict production so as to complete it within the normal time.

Remuneration and Incentives

The term 'remuneration' has been defined as the award for labour and service. It is the result of the agreement between the employer and the employee, whereby for a specified work or service rendered by the employee the employer agrees to pay a specified sum of money. Apart from this an employee by virtue of the fact that he is an employee becomes entitled to certain non-monetary benefits. The method of remuneration adopted varies from industry to industry and, in certain cases, even among different units in the same industry. Whatever be the variation, the method of fixing remuneration payable to the various categories of employees has to be based on certain accepted principles.

An incentive can be defined as the stimulation for effort and effectiveness by offering monetary inducement or enhanced facilities. It may be provided individually or collectively. It may be monetary in the form of a bonus where the employee gets a reward for his efforts directly or non-monetary tending to improve living and working conditions where a group of employees or individuals share the reward arising out of their combined effort in equitable production.

The main factors that should be taken into account before introducing a scheme of incentives are stated below:

1. **System of Quality Control:** The need for producing goods of high quality or those having very good workmanship or finish and the manner this can be ensured. Only if a system of quality control can be relied upon to maintain the quality of goods of the standard required, an incentive scheme should be introduced; otherwise, workers should be paid on time basis.
2. **Maximize production:** The need to maximize production—thus required incentives to be given to workers. But sometimes workmanship is more important than quantity of output; in such cases, incentive schemes of wage payment are not suitable.
3. **Precision in measuring quantity of Work:** Where the quantity of work done cannot be measured precisely, incentive schemes cannot be offered.
4. **Role of Management in Incentive Schemes:** The role of management and workers in achieving greater efficiency, if it is unnecessary for the management to constantly plan work, for example, when the work is repetitive, workers should be offered good incentives to achieve

high efficiency; but in case management is constantly required to plan the work, as in the case of job work, the management should share the fruits of extra efficiency achieved. This factor determines the choice of a particular incentive scheme

The following points highlight the top four incentive schemes for efficient workers. The schemes are:

1. Differential Piece Rate
2. Premium Bonus Scheme
3. Group Incentive Plans
4. Bonus Schemes for Indirect Workers.

Incentive Schemes for Efficient Workers:

- Differential Piece Rate
- Premium Bonus Scheme
- Group Incentive Plans
- Bonus Schemes for Indirect Workers

1. Differential Piece Rate:

Under this system efficient workers are rewarded with higher wages for their increased output. This system aims at the maximization of output which has a direct bearing on reduction of cost per unit. This system can be suitably applied in the following circumstances:

- (i) Where the nature of the work is repetitive and the methods of working, as also equipment can be standardized.
- (ii) Where the output of each worker can be measured.
- (iii) Where the standard time for each job can be set separately.
- (iv) Where fixed overhead is high in comparison with direct wages.

Differential piece work systems are complicated and very expensive to operate. They are very difficult for the workers to understand. The labour cost per unit of production increases with the increase in production efficiency since it involves high rate of wages. A stage of production is reached where the advantages of increased production and reduced overhead cost may not neutralize the rising labour cost.

Some of the well-known systems of payment of wages by results are discussed below:

a. Taylor's differential Piece Work System:

Under this system two wage rates prevail—higher wage rate for above-standard performance and lower wage rate for output below standard. This system encourages the workers to increase their production to earn higher rate of wages. This system discourages the below average workers by providing no guaranteed hourly wage.

b. Merrick's differential Piece Rate:

This system is also known as Multiple Piece Rate System. This is an improvement over the Taylor system. Like Taylor's system this system does not guarantee time rate.

2. Premium Bonus Scheme:

Premium Bonus Plan: Under time rate system of wage payment all the gains contributed by the efficient workers benefit the employer while, under piece rate system, it is the workers who gain or lose. Under premium bonus system, the gains are shared by the employer and employees in agreed ratio. Apart from the minimum guaranteed wages, the efficient workers get bonus depending on the time saved.

Under this system a standard time is fixed for performing a job. If a worker can perform the job within the time less than standard time, he is eligible to get bonus at his specific rate of wages for a percentage of time saved. Standard time is determined on the basis of time and motion study.

The object of a premium plan is to increase production by giving inducement in the form of bonus as a reward of a worker's efficiency. The incentive wage payment plans are useful both for employees and employers. Employees are benefited by increased earnings while the employer gets the benefit of cost reduction.

The difference between premium bonus and efficiency bonus is that the former is a system of initial remuneration of a direct labourer that completes the job in less than the allotted time while efficiency bonus is the additional remuneration which may be paid to both direct and indirect workers.

Fundamentals of Good Premium Bonus plan:

1. Standard time should be fixed on the basis of careful time and motion study.
2. Standard time should be guaranteed.
3. The plan should be simple and easily understandable to the workers.
4. It should appear reasonable both to the employer and employees.
5. The workers should be rewarded generously for increased output.

6. The incentive should be sufficiently high for the more efficient worker.
7. The standard one fixed should not be unnecessarily altered.
8. The employees' earnings should not be affected by the matters beyond his control. He should be compensated for break-downs and other hold-ups for which he is not responsible.
9. The scheme should be coupled with a sound routine of inspections to ensure that workers are paid only for good production.
10. The scheme should facilitate supervision and assist in production control. If possible, it should provide a basis for budgetary control and standard costing.
11. The main aim of the scheme should Influence the worker's morale. Every effort should be made to promote workers' understanding of the scheme and their support for it.
12. The scheme must take account of any relevant national or local trade agreement.
13. The scheme should provide for worthwhile and attainable objectives, with standards of performance not beyond the capabilities of the average worker.

Limitations of Premium Bonus Plan:

1. It is the common belief among .the workers that the scheme in operation is complicated
2. Generally the workers are of opinion that the standard time set for performing a job is unfair and standards are set by using fast workers underrating efforts.
3. A belief among workers exists that workers are treated as commodities. They feel that their opinions and feelings are not considered at the time of making time study.
4. The incentive wage system becomes successful only when the workers have confidence in Company's management.
5. Workers believe that incentive schemes are so formulated so as to confuse them and exploit their ignorance.

The following are some of the important Premium Bonus Schemes:

- (i) Halsey Plan;
- (ii) Halsey-Weir Plan;
- (iii) Rowan Plan;
- (iv) Bedaux Point Scheme; and
- (v) Emerson's Efficiency Scheme.

1. Halsey Plan:

This scheme was originated by F. A. Halsey in 1891. In this plan time rate is guaranteed. A standard time is fixed for the performance of a particular job. If a worker can complete the job before standard time, he is paid bonus for the time saved at a fixed percentage. The percentage varies from 30% to 70%. Generally, the worker is paid bonus @ 50% of standard time saved.

Total wages = Time taken x Rate + 50/100 of Time saved x Rate per hour.

Under the Halsey Premium Plan, with time wages guaranteed up to standard, the employee receives time wages until he produces in less than standard time. For production above standard, the employee's remuneration is increased by the addition of a bonus, but as the savings are shared with the employer the rate of increase is lower than under straight piece-work.

Labour cost falls sharply as output increases up to standard, in the same way as it does with straight time rates. The cost per unit continues to fall when output exceeds standard, but it does not do so as rapidly as before.

Advantages of Halsey Plan:

1. Simplicity:

This scheme is simple to operate. It is also easily understandable to all workers. The worker knows the method of calculating the premium.

2. Efficiency is rewarded:

Individual efficiency of workers is taken care of and rewarded.

3. Benefit of time saved:

Benefit of time saved is equally shared by the employer and employee.

4. Increased labour productivity:

Since worker is motivated in a better way, his earnings increase which leads to increased productivity.

5. Feeling of security:

As the plan assures a minimum hourly rate or guaranteed wage, it helps to create a feeling of security among workers. Moreover, if a worker fails to perform his job well, he is not penalized.

6. Reduction in fixed overhead:

Fixed overhead cost per unit comes down because of increased production.

Disadvantages:

1. Not scientific:

The plan is not scientific since it is difficult to fix standard time for a particular job.

2. Quality deteriorates:

As the workers are attracted by higher income they complete the job in hurry as a result of which quality may suffer.

3. More labour cost:

If the standard time cannot be properly fixed, the amount of bonus payable to workers may involve a large amount of money.

4. More wastage, spoilage, defectives etc:

2. Halsey -Weir Plan:

The Halsey plan was modified by Weir. This is based on 33 1/3 %: 66 1/3-% sharing plan.

Worker's earning = Time taken x Rate per hour + (33 1/3% of time saved x Rate per hour.)

Rowan Plan:

Games Rowan was the first to introduce the scheme in 1898. This scheme is similar to Halsey Plan. Under this scheme bonus is calculated as the proportion of time taken which the time saved bears to the time allowed.

The bonus is paid at time rates. The Rowan Scheme protects the employer from loose rate-fixing by reducing the bonus at high production levels. For this reason this scheme of bonus is unpopular with the workers. The important features of this plan are (i) there is guaranteed day wage and (ii) the incentive is based on time worked compared with the standard time for completing the job.

Advantages of Rowan Plan:

1. Increased production is one of the important advantages of Rowan Plan.

2. The benefit arising out of increased production is shared also by the employer.

3. Up to 50% of the time saved the rate of bonus is higher than that under Halsey Plan. So, relatively slow workers enjoy good incentive.

4. It protects the employer against loose rate-setting.

5. As the premium increases at a decreasing rate above 50% of time saved, the employees do not complete the job quickly, so wastage and defective goods are less.
6. This scheme encourages the employer to better the working conditions.
7. The system is encouraging to beginners and learners.

Disadvantages:

1. It is a complicated system which the workers do not understand easily.
2. At higher level of production, the incentive becomes lower. So, above a point of higher production, the efficient workers feel discouraged to produce more since there is a ceiling of bonus above a certain level Of production,
3. If the standard of Plant and Machinery, Tools, Materials and Working condition cannot be maintained, the scheme will fail to serve any useful purpose.

Bedaux Point Plan:

Under this Plan an hourly guaranteed rate is paid until standard production is attained. Additional wage is paid for units in excess of standard. The workers are paid the basic time wages and wages @ 75% of time saved; the remaining 25% of time saved is paid to personnel who help to attain the standard.

The formula for calculation of earnings is:

$W = T \times R + 75/100 \times B's \times R/60$, where

W = Total wages; T = time worked; R = time rate, $B's$ = Number of points ($B's$) saved. (Note: Number of points means time units. The time unit is one minute, which is known as B . Thus, where the standard time is one hour for a job, it consists of $60B's$.)

Emerson Efficiency Plan:

Under the Emerson Efficiency Plan minimum daily wage is guaranteed. A standard time for each job is determined. This plan is a combination of time and piece rates. The features of this plan are :

1. A standard output or time is fixed which serves as a yardstick of measuring efficiency of each worker
2. Actual performance is compared with the standard to ascertain the amount of bonus.
3. Minimum basic time wage is guaranteed to all types of workers.

Calculation of bonus:

Efficiency of each worker is determined by dividing actual hours into the standard time for the units produced. Emerson suggested that bonus should be paid if a worker attains $66 \frac{2}{3} \%$ efficiency of the standard set and, thereafter, a graded scale of bonus has been suggested. He used 2 differentials so that each worker can enjoy the maximum benefit.

3. Group Incentive Plans:

Group Bonus system is employed in cases where the ultimate production is dependent on the efficiency of a group of workers. In some cases a job is divided into different operations, each of which is performed by a different worker but the operations are very much interlinked in such a manner that the whole work is completed by the collective efforts of a group of persons.

The important feature of this system is that a man's work depends on the work done by one or more of his colleagues. The workers forming a group are treated as a unit and the combined output of the unit is measured for the purpose of wage payment.

Advantages:

Group system of payment enjoys the following advantages:

- (i) It encourages the sense of cooperation and team-work among the workers. This leads to increased productivity and has positive impact on labour relations which is very much needed for increased production.
- (ii) This system discourages absenteeism.
- (iii) A less efficient worker can be identified by the efficient co-workers of the team. This reduces supervision cost.
- (iv) It involves less clerical work and the use of stationery is reduced because the production of the individual worker is not recorded, the production of the group only is recorded. As a result, costing record becomes simple and less complicated.
- (v) It helps to achieve maximum production at minimum cost by reducing spoilage, idle time etc.

Disadvantages:

- (i) Careful selection of workers who are to constitute the group is necessary. If the composition of the group is heterogeneous, with variations of skill, efficiency and seniority of individual workers, there may arise some discontent.
- (ii) An efficient worker is economically penalized for his efficiency for he has to share the reward with other inefficient, if any, co-workers.
- (iii) Rivalry among the members of the group may defeat the very object of the system.

(iv) Calculation of wages becomes complicated.

Area of Application:

Group bonus scheme can generally be employed:

- (i) Where individual output cannot be measured;
- (ii) When the output of a product depends on the combined efforts of a group;
- (iii) Where management wishes to encourage team spirit. The following problem will clarify the method.

The important group bonus schemes are:

(a) Priestman's Production Bonus Scheme: A standard performance in terms of output or point is fixed by this scheme. The workers as a whole, becomes entitled to bonus, if by producing output above the standard output, or by securing points more than the standard points, they can account for better performance. On the basis of the ratio of excess performance to standard performance, bonus is paid according to this scheme. Obviously, time wage is guaranteed under this scheme. Thus, where there is mass production of standard articles with continuous flow of work, this scheme can be extended to the entire factory.

(b) Rucker Plan: Under this plan, added value is defined as the change in market value due to the alteration in the form, location & availability of product or service, excluding the cost of bought in materials or services. The ascertainment of the ratio of earnings & added value is done. Wage is proportionately increased due to any reduction in this ratio. For successful implementation, constant negotiation between employers & employees is required by the scheme. Rucker plan is known as share of production plan.

(c) Scanlon Plan: This is similar to Rucker plan, instead of the ratio between earnings & added value as considered in case of Rucker plan, the ratio between earnings & selling price of production is taken as the basis in case of Scanlon plan.

(d) Towne Gain Sharing Plan: Standard cost of labour is set under this plan. In addition to the wages earned, the workers become qualified to receive bonus for any reduction in the labour cost as compared to the standard labour cost. Bonus is equal to 50% of the savings in labour cost. On pro rata basis, the workers are paid bonus. Under this scheme, the supervisory staff may also be entitled to bonus.

4. Bonus Schemes for Indirect Workers:

Introduction of Incentive schemes for indirect workers is essential for increasing efficiency of service they provide to direct labour or to induce the supervisory staff in the factory to increase the efficiency of the department concerned and thereby to reduce overhead costs.

Since it is very difficult to measure the output of indirect workers it becomes necessary to group indirect workers with the group of direct workers with whom they are directly associated. This will facilitate the computation of bonus on the basis of the output of the direct workers.

In order to determine the suitable scheme for giving bonus to indirect workers, they may be grouped as follows:

- (i) Those who are directly associated with the direct workers and,
- (ii) Those who render some general services e.g., maintenance workers, ambulance men, canteen workers, sweepers etc.

Bonus to Foremen and Supervisors:

Supervisors and foremen are paid bonus which is based upon:

- (i) Output of the department;
- (ii) Quality of the product;
- (iii) Saving in time;
- (iv) Reduction of waste, spoilage, defective goods;
- (v) Reduction in labour turnover.

Bonus to the Executives and the Clerical Staff:

Bonus for executives and clerical staff is paid out of profit of the concern. Bonus is fixed on the basis of efficiency in performance of each department.

Bonus to Repairs and Maintenance Staff:

Group bonus system can be introduced on the basis of performance of the department i.e. reduction in the number of complaints or reduction in breakdown of machinery, vehicle etc.

Utilization of labour

Labour Utilization: For identifying utilization of labour a statement is prepared (generally weekly) for each department / cost centre. This statement should show the actual time paid for, the standard time (including normal idle time) allowed for production and the abnormal idle time analysed for causes thereof.

1. Identification of utilisation of labour with cost centres :

For the identification of utilisation of labour with the cost centre a wage analysis sheet is prepared. Wage analysis sheet is a columnar statement in which total wages paid are analyzed

according to cost centre, jobs, work orders etc. The data for analysis is provided by wage sheet, time card, piece work cards and job cards.

The preparation of such sheet serves the following purposes:

- It analyse the labour time into direct and indirect labour by cost centres, jobs, workOrders
- It provides details of direct labour cost comprises of wages, overtime to be charged as production cost of cost centre, jobs or work orders.
- It provides information for treatment of indirect labour cost as overhead expenses.

2. **Identification of labour hours with work order or batches or capital job:**

For identification of labour hours with work order or batches or capital jobs or overhead work orders the following points are to be noted :

- The direct labour hours can be identified with the particular work order or batches or capital job or overhead work orders on the basis of details recorded on source documents such as time sheet or job cards.
- The indirect labour hours cannot be directly identified with the particular work order or batches or capital jobs or overhead work orders. Therefore, they are traced to cost centre and then assigned to work order or batches or capital jobs or overhead work orders by using overhead absorption rate.

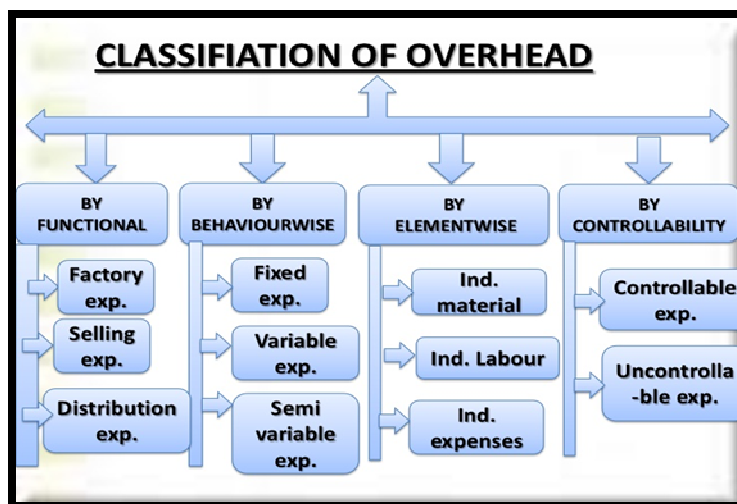
Overheads-Functional Analysis

According to CIMA, overhead costs are defined as, 'the total cost of indirect materials, indirect labour and indirect expenses'. Thus all indirect costs like indirect materials, indirect labour, and indirect expenses are called as 'overheads'. Examples of overhead expenses are rent, taxes, depreciation, maintenance, repairs, supervision, selling and distribution expenses, marketing expenses, factory lighting, printing stationery etc. As per CAS-3, overheads are defined as follows 'Overheads comprise costs of indirect materials, indirect employees and indirect expenses which are not directly identifiable or allocable to a cost object in an economically feasible manner'

Overhead Accounting

The ultimate aim of Overhead Accounting is to absorb them in the product units produced by the firm. Absorption of overhead means charging each unit of a product with an equitable share of overhead expenses. In other words, as overheads are all indirect costs, it becomes difficult to charge them to the product units. In view of this, it becomes necessary to charge them to the product units on some equitable basis which is called as 'Absorption' of overheads. The important steps involved in Overhead Accounting are as follows:-

- Collection, Classification and Codification of Overheads.
- Allocation, Apportionment and Reapportionment of overheads.
- Absorption of Overheads.



Classification of Overheads:

Classification is defined by CIMA as, 'the arrangement of items in logical groups having regard to their nature (subjective classification) or the purpose to be fulfilled (Objective classification). In other words, classification is the process of arranging items into groups according to their degree of similarity. Accurate classification of all items is actually a prerequisite to any form of cost analysis and control system. Classification is made according to the following basis:

Based on Elements: Indirect Materials, Indirect labour and indirect expenses.

Based on Functions of the organization: Manufacturing overheads, Administrative overheads, Selling and Distribution overheads, Research & Development overheads.

Based on the Behaviour: Fixed Overheads, Variable Overheads & Semi variable overheads.

Classification according to Elements

According to this classification overheads are divided according to their elements. The classification is done as per the following details:-

Indirect Materials:

Materials which cannot be identified with the given product unit of cost centre is called as indirect materials. As per CAS-3 indirect material cost is defined as 'Materials, the cost of which cannot be directly attributed to a particular cost object'. For example, lubricants used in a machine is an indirect material, similarly thread used to stitch clothes is also indirect material. Small nuts and bolts are also examples of indirect materials.

Indirect Labour

As per CAS-3, indirect employee cost is the employee cost, which cannot be directly attributed to a particular cost object. Wages and salaries paid to indirect workers, i.e. workers who are not directly engaged on the production are examples of indirect wages.

Indirect Expenses

As per CAS-3, Indirect Expenses are expenses, which cannot be directly attributed to a particular cost object. Expenses such as rent and taxes, printing and stationery, power, insurance, electricity, marketing and selling expenses etc. are the examples of indirect expenses.

Functional Classification:

Overheads can also be classified according to their functions. This classification is done as given below:-

Manufacturing Overheads:

As per CAS-3, Indirect Cost involved in the production process or in rendering service. Manufacturing overheads has different names such as Production Overheads, Works Overheads, Factory Overheads. Indirect expenses incurred for manufacturing are called as Manufacturing Overheads. For example, factory power, works manager's salary, factory insurance, depreciation of factory machinery and other fixed assets, indirect materials used in production etc. It should be noted that such expenditure is incurred for manufacturing but cannot be identified with the product units.

Manufacturing is a separate function like administration, selling and distribution. The term manufacturing stands for activities, which begin with receipt of order and end with completion of finished product. Manufacturing Overhead represents all manufacturing costs other than direct materials and direct labour. These costs cannot be identified specifically with or traced to cost object in an economically feasible way. In other words, manufacturing overhead are indirect manufacturing costs. The term overhead is peculiar and therefore, there is a growing tendency to prefer the term indirect manufacturing cost to overhead.

Given below are a few examples of different items included in different groups of manufacturing overhead:

Indirect Material Cost: Glue, thread, nails, rivets, lubricants, cotton waste, etc.

Indirect Labour Cost: Salaries and wages of foremen and supervisors, inspectors, maintenance, labour, general labour; idle time etc.

Indirect Services Costs: Factory Rent, factory insurance, depreciation, repair and maintenance of plant and machinery, first aid, rewards for suggestions for welfare, repair and maintenance of transport system and apportioned administrative expenses etc.

Administrative Overheads

Indirect expenses incurred for running the administration are known as Administrative Overheads. As per CAS-3, Administrative Overheads are defined as Cost of all activities relating to general management and administration of an organization.

As per the functional classification, Administration Overheads comprise of those indirect costs which are related to the general administrative function in the company. Such functions are related to policy formulation, directing the organization and controlling the operations of the company. Administration overheads are incurred for the benefit of organization as a whole. Controlling them is difficult for they do not vary with most of the variables viz. production or sales. Examples of such overheads are, office salaries, printing and stationery, office telephone, office rent, electricity used in the office, salaries of administrative staff etc. The size as well as control over these overheads depends largely on decisions of management. Organizations growing very fast face the problem of controlling Administrative Overheads. Multi-location set up leads to duplication of many administrative costs.

Treatment of Administration Overheads

There are three different ways of treating the administration overheads as follows:-

Apportionment between Production and Selling & Distribution functions:

This treatment is based on the logic that the administrative functions are for the entire company and these functions facilitate both production as well as selling. In other words, the absorption of Administration Overheads would happen through Production and Selling Overheads. This means these overheads lose their identity. The problem is of course, selection of basis to divide these overheads over the two principal functions of production and selling.

Transfer to P & L Account

This method agrees that administrative costs are all time based costs and as such bear no relation what is produced or what is sold. These are mainly of fixed nature. Hence there is no point in dividing them further to be included in the cost of production or cost of selling. They should be simply charged to the P & L Account. However, this may lead to undervaluation of stocks.

Treating as a separate addition to cost of production & sales

In this method, administration is treated as a separate function and is added as a separate line in the cost computation sheet for a job or an order. Here again, the basis for inclusion as a part of cost of a job is a difficult choice. Generally, a percentage of factory cost is taken as a basis. A care needs to be taken to ensure that the Administration Overheads are charged equitably to Cost of Sales, FG stock and WIP as well.

Controlling Administration Overheads

Given the nature of these expenses, they cannot be controlled at the lower level of management. They can be better controlled by top management as they pertain to formulating policy and directing the organization. The first step in the control mechanism is proper classification of expenses & departmentalization. The actual expenses are collected for each department and then compared with a bench mark. Deviations are analyzed and causes for increase are mitigated by fixing responsibility on the departmental head.

The control benchmarking can be done with respect to:

Figures of the previous year: Expenses could be compared with the figures of previous year and increase or decrease is analyzed. However, comparison with previous year may not help as the condition may have totally changed from one year to the other.

Use of budgets: Budgets are estimates for the current year, and they take into account the changed conditions. They also built in the year's complete plan which would factor all changes in the cost structure. It is advisable to compare budgeted overheads with actual for control purpose.

Use of standards: Although very scientific, this method is difficult to operate. Administrative activities (being very subjective) cannot be standardized. On a certain level it can be applied e.g. the time taken to process a voucher by accountant can be standardized, or time taken for processing a payment could be standardized.

Selling and Distribution Overheads: As per CAS-3, Selling Overheads, also known as Selling Costs, are the expenses related to sale of products and include all Indirect Expenses in sales management for the organization. Overheads incurred for getting orders from consumers are called as Selling Overheads. On the other hand, overheads incurred for execution of order are called as Distribution Overheads. As per CAS-3, Distribution Overheads, also known as Distribution Cost, are the cost incurred in handling a product from the time it is ready for dispatch until it reaches the ultimate consumer. Examples of Selling Overheads are sales promotion expenses, marketing expenses, salesmen's salaries and commission, advertising expenses etc. Examples of Distribution Overheads are warehouse charges, transportation of outgoing goods, packing, commission of middlemen etc.

The magnitude of S & D Overheads in the total cost would depend on many factors such as nature of the product, type of customers, spread of market, statutory restrictions etc. A consumer

product needs heavy expense on advertising. A sale to institutions rather than individual customers' needs a different selling effort. Distribution Costs will increase if the spread of the market is large. Some activities cannot be advertised at all such as a Doctor, a Cost Accountant. The total magnitude of S & D Costs and the proportion of selling and distribution efforts will decide the treatment thereof and control mechanisms to be used. For some of selling expenses there may not be a direct relationship with the product. If a company incurs expense on advertising, it may be difficult to relate to a specific product unless it's a product advertisement. But further, there may be a substantial time lag between the expense and the benefit arising out of that. In case of Distribution Costs many of them may be possibly linked to the product.

Collection and Absorption of S&D Overheads

While classifying the S & D Costs are properly bifurcated and coded accordingly. This could be done by having separate account codes for Selling Overheads such as: advertising, sale commission, travelling expense, communication, exhibition, market survey, free samples, credit & collection costs, bad debts, and Distribution expenses such as: transportation vehicle related expenses, warehousing and storage at different places, depreciation. Depending upon the size of the organization, there may be proper departmentalization of S&D activities. The departments could be:

- Sales head office
- Sales regional offices
- Depots
- Direct selling department
- Dealers management
- Credit and collection (commercial)

The costs are collected through various source documents under the above heads and for the above departments. For absorption, the basis to be used will have practical difficulties, as one will have to look for a relationship between the expenses and the cost unit. Some expenses like sales commission, shipping costs, and direct selling expenses can be absorbed directly. The other expenses can be absorbed on the basis of either sales value, cost of goods sold, gross profit or number of units sold. Out of these the sales value method is the most commonly used.

Control over S & D Expense

The S & D Expenses are related to sales and distribution activity which is externally focused. The extent of these expenses depend mainly on external factors like consumer profile, changing habits, technology improvements etc. Controlling these expenses does not mean capping them. It aims at increasing the effectiveness of these expenses e.g. getting maximum sales per rupee of S & D Expenses. For control purpose, a great care should be taken to ensure correct classification and collection of S & D Overheads. The collected expenses must be analyzed to assess the effect of them on sales. Such analysis could be done as follows:

Analysis of sales and S & D Expenses by geographical locations – This could be regions, zones, domestic and international etc.

Analysis by type of customers - This could be done as institutional, government, retail etc.

Analysis by products or services – This may be done as range of products, the application of products, brands etc.

Analysis by salesmen.

Analysis by channel of distribution – This analysis pertains to wholesalers, retailers, commission agents etc.

The analysis of sales, profits and S & D expenses on the basis of above factors will give a good insight into the performance as well as control over expenses. All these three parameters may be compared with

Previous year;

Budget for the current year or

Standards for the current year

Research and Development Overheads

Research Cost is defined as the cost of searching for new or improved products, new applications of material, or new or improved methods, process, systems or services. In the modern days, firms spend heavily on Research and Development. Expenses incurred on research and development is known as Research and Development Overheads.

Development cost is the cost of the process which begins with the implementation of the decision to use scientific or technical knowledge to produce a new or improved product or to employ a new or improved method, process, system, etc. and ends with the commencement of formal production of that product by that method. Development starts where the research ends.

Development cost is the expenditure incurred for putting the results of research on a practical commercial basis.

Special features of Research & Development Costs

The features are as follows:-

- Expenditure is incurred ahead of the actual production and may not be charged to current production.
- The amount of expenditure may often be substantial.
- The expenditure may at times be entirely fruitless, yielding no tangible results.
- Benefit of the expenditure may be realized over a number of years.
- Difficulty in fixation of standards for control.
- Collection of R&D Overheads

Accumulation of Research and Development Overheads is essential for the following reasons:-

- For review cost to date.
- For planning the activities subsequent to research.
- For evaluation of performance with relation to past performance or for inter-firm comparison.
- The collection of R&D Overheads is made through the following documents. Material requisitions, labour time cards, invoices, vouchers (royalty, patent, license. etc). Research & Development expenditure may be identified by its nature i.e basic or applied research or development by the elements of cost, by business sector, by project. Each Research & Development project is allotted a project work order number. Separate series of work orders or codes should be used to distinguish from regular work orders.

R & D overheads can be accumulated as follows:-

- All expenditure under the direct elements (direct material, labour and expenses) must be charged to the work orders.
- Expenses like supervisor salary, material handling charges, maintenance of equipment can be directly allocated to particular research work order.
- Items of general overheads like depreciation of building, depreciation of maintenance equipment, share of purchase department expenses may be suitably apportioned to the research work order.

Accounting of R&D Overheads

Accounting of Research & Development Cost arise due to the following causes:-

- The expenditure is in the nature of pre-production costs and there is a considerable time lag between the incidence and expenditure and realization of benefit.
- There is no immediate production, or the production is so small that it becomes difficult to charge such costs to products.
- It is because of these difficulties that the accounting of Research and Development Costs has been a subject of some controversy. Three methods are available for charging Research and Development
- Costs as:
 - Charging off to the current year Profit & Loss Account.
 - Capitalization so that cost may be amortized on a long term basis.
 - Deferment and charge-off to costs of the next two or three years-a short/medium term amortization.
 - Research and Development may be regarded as a function of production and the Research & Development Costs may be charged to costs to be recovered through the general overhead rates.

Classification based on behavior

Fixed Overheads:

The amount of overhead tends to remain fixed for all volumes of production within a certain range. Examples of Fixed Overheads are Audit fee, Interest on capital, Depreciation of plant & machinery, Insurance, Rent of buildings, etc. A fixed overhead represents constant expenditure incurred during a period without regarding to the volume of production during that period. Even when production completely ceases in a particular period, this constant amount of expenditure will continue to be incurred partially, if not wholly. Therefore the Fixed Overheads are also known as Period Costs. Sometimes these costs are also termed as Shutdown or Stand-by Costs.

Features of Fixed Costs

Fixed Costs are stated to be by and large uncontrollable, in the sense they are not influenced by the action of a specified member of an undertaking. For example, the supervisor has practically no control over the fixed costs like depreciation of plant & machinery. The production supervisor can only see that the maximum possible utilization of the assets is made.

The fixed overhead amount is constant per period; the cost per unit of production varies with the volume. This variation is inverse since with increase in production, cost per unit decreases as the same amount of fixed overheads is spread over larger units of production.

Factors affecting the Fixed Overheads: When a plant or a department is completely idle and there is no production, several items of Fixed Overheads disappear. Fixed Overheads are thus, of two types, viz. a lower standing fixed cost when production is nil and a higher running fixed cost when the plant is running. For instance, maintenance expenditure incurred at plant shutdown has to be increased to a higher level when production starts.

Any long term change in the productive capacity of an undertaking also affects the basic characteristic of fixed overhead. Fixed costs are constant for short term periods only, within a limited range of capacity.

Another factor that affects the fixed nature of fixed overhead is the change in basic price level. Graphical representation of Fixed Costs is depicted as below:

Fixed Costs may be broadly classified into three basic types:-

1. Fixed costs that have no casual relationship with the volume of output and are incurred mainly as results of policy decisions of the management. Research, development, design, employee training, advertisement and marketing expenses are examples of this expenditure. Accountants term such costs as discretionary fixed costs (also known as programmed costs or managed costs).
2. Fixed costs that do not change significantly in the short term such as depreciation, rent, etc.
3. Fixed costs that are fixed for short period for a particular capacity, but change considerably when there is a long-term change in the volume or capacity.

Variable Overheads: Variable Costs are those which vary in total direct proportion to the volume of output. These costs per unit remain relatively constant with changes in production. Thus Variable Costs fluctuate in total amount but tend to remain constant per unit as production activity changes. Examples are indirect material, indirect labour, lubricants, cost of utilities, etc.

The variable overhead costs seldom reveal the characteristics of perfect variability. i.e an expenditure which varies directly with variation in the volume of output. They simply tend to vary rather than vary directly in direct proportion of output. We come across three types of variable overhead expenses in actual practice as explained below:-

- 100% variable expenses. For all production the variable expenditure remains constant.
- The expense per unit of production is low at lower ranges of output but gradually increases as production goes up.
- The expenses per unit of production are more at lower ranges of output but gradually decrease with the decrease with the increase in production.

Semi-Variable Overheads:

These are a sort of mixed or hybrid costs, partly fixed and partly variable costs. For example Telephone expenses, include a fixed portion of annual charge plus variable charge according to the calls. Thus total telephone expenses are semi-variable.

Semi-variable overheads are of two types:-

The expenses which change with the change in volume of output, but the variation cost is less than proportionate to change in output. Examples are power & fuel, lighting, repairs and maintenance of buildings, etc.

The costs tend to remain constant within certain range of output, then jump up and remain constant for another range and so on.

Step cost

A step cost is a cost that does not change steadily with changes in activity volume, but rather at discrete points. The concept is used when making investment decisions and deciding whether to accept additional customer orders.

A step cost is a fixed cost within certain boundaries, outside of which it will change. When stated on a graph, step costs appear to be incurred in a stair step pattern, with no change over a certain volume range, then a sudden increase, then no change over the next (and higher) volume range, then another sudden increase, and so on. The same pattern applies in reverse when the volume of activity declines.

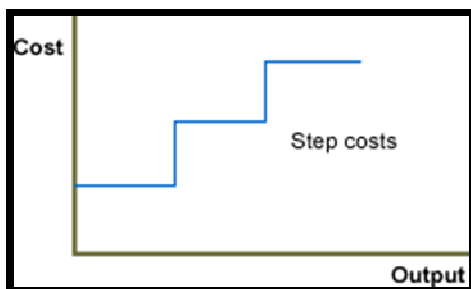
For example, a facility cost will remain steady until additional floor space is constructed, at which point the cost will increase to a new and higher level as the entity incurs new costs to maintain the additional floor space, to heat and air condition it, insure it, and so forth.

As another example, a company can produce 10,000 widgets during one eight-hour shift. If the company receives additional customer orders for more widgets, then it must add another shift, which requires the services of an additional shift supervisor. Thus, the cost of the shift supervisor is a step cost that occurs when the company reaches a production requirement of 10,001 widgets. This new level of step cost will continue until yet another shift must be added, at which point the company will incur another step cost for the shift supervisor for the night shift.

Step costing is extremely important to be aware of when a company is about to reach a new and higher activity level where it must incur a large incremental step cost. In some cases, incurring the extra amount of a step cost may eliminate profits that management had been expecting with an increase in volume. If the increase in volume is relatively minor, but still calls for incurring a step cost, it is possible that profits will actually decline; a close examination of this issue may result in a business turning away sales in order to maintain its profitability.

Conversely, a company should be aware of step costs when its activity level declines, so that it can reduce costs in an appropriate manner to maintain profitability. This may require an examination of the costs of terminating staff, selling off equipment, or tearing down structures.

The point at which a step cost will be incurred can be delayed by implementing production efficiencies, which increase the number of units that can be produced with the existing production configuration. Another option is to offer overtime to employees, so that the company can produce more units without hiring additional full-time staff.



Departmentalization 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 of overhead. Departmentalization of production overheads is the process of identifying production overhead expenses with different production/service departments or cost centres. It is done by means of allocation and apportionment of overheads among various departments.

Thus, it involves:

- (i) Allocation and apportionment of overheads among production and service departments and
- (ii) Reapportionment of service department overheads among production departments.

A factory is administratively divided into sub-divisions known as departments for running it smoothly and efficiently. This sub-division is done in such a manner that each department represents a division of activity of the concern such as repairs department, power department, tools department, stores department, cash department, cost department etc.

Following factors must be taken into consideration while organizing a concern into a number of departments:

- 1) Every manufacturing process is divided into its natural divisions in order to maintain natural flow of raw materials from the time of the purchase till its conversion into finished goods and sale.
- 2) For ensuring smooth flow of production, the sequence of operations is taken into consideration while determining the location of the various departments.
- 3) For physical control on production and maintaining efficiency of the concern, division of responsibility must be taken into consideration while organizing departments. Division of responsibility as far as possible should be clear, without ambiguity and dual control.

Types of Departments: In a manufacturing concern, there are three types of departments:

- (a) Manufacturing or producing departments
 - (b) Service departments
 - (c) Partly producing departments.
- (a) Producing Departments: A department where actual process of manufacturing is carried on is called manufacturing or producing department. It covers direct manufacture and is engaged in converting raw materials into finished goods by performing some manual and/or machine operations on any part of the product.

The number of such departments and their number will depend upon the nature of industry, type of work performed and the size of the factory. For example, in Steel Rolling Mill, Hot Mill, Cold Mill, Pickling Shop, Annealing Shop, Hardening, Polishing and Grinding are the producing departments.

(b) Service Departments: Service department is an auxiliary and is not directly engaged in production though its existence is very essential for smooth and efficient running of production departments. Such departments are not directly engaged in the conversion of raw materials into finished goods. Such departments (as electricity or repairs and maintenance) render a particular type of service for the benefit of other departments.

The number of departments in a factory and the names to be assigned to them depends upon size of the factory, nature of industry and the nature of service rendered. The service departments, common to most concerns are stores, cost office, personnel department, planning and progress department, tool room, hospital and dispensary, machine maintenance and electrical maintenance section etc.

(c) Partly Producing Departments: A department may normally be a service department but sometimes does some productive work, so it becomes partly producing department. For example, a carpentry shop which is mainly responsible for the repairs and upkeep of sundry fixtures and fittings may occasionally be required to manufacture packing boxes for direct charge to outturn, will be a partly producing department.

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. So it is the allotment of whole item of cost to a cost centre or cost unit or refers to the charging of expenses which can be identified wholly with a particular department. For example, the whole of overtime wages paid to the workers relating to a particular department should be charged to that department.

Similarly, the cost of repairs and maintenance of a particular machine should be charged to that particular department wherein the machine is located. Power, if separate meters are provided at each cost centre and fuel oil for boilers are other examples of allocation. So, the term allocation means the allotment of the whole item without division to a particular department or cost centre.

Apportionment of Overhead Expenses:

Cost apportionment is the allotment of proportions of items to cost centres or cost units on an equitable basis. The term refers to the allotment of expenses which cannot identify wholly with a particular department. Such expenses require division and apportionment over two or more cost centres or units.

So cost apportionment will arise in case of expenses common to more than one cost centre or unit. It is defined as the allotment to two or more cost centres of proportions of the common

items of cost on the estimated basis of benefit received. 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 adopted should be such by which the expenses being apportioned must be measurable by the basis adopted and there must be proper correlation between the expenses and the basis.

Therefore, the common expenses have to be apportioned or distributed over the departments on some equitable basis. The process of distribution is usually known as 'Primary Distribution'.

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

- (i) **Direct Allocation:** Overheads are directly allocated to various departments on the basis of expenses for each department respectively. Examples are: overtime premium of workers engaged in a particular department, power (when separate meters are available), jobbing repairs etc.
- (ii) **Direct Labour/Machine Hours:** Under this basis, the overhead expenses are distributed to various departments in the ratio of total number of labour or machine hours worked in each department. Majority of general overhead items are apportioned on this basis.
- (iii) **Value of Materials Passing through Cost Centres:** This basis is adopted for expenses associated with material such as material handling expenses.
- (iv) **Direct Wages:** According to this basis, expenses are distributed amongst the departments in the ratio of direct wages bills of the various departments. This method is used only for those items of expenses which are booked with the amounts of wages, e.g., workers' insurance, their contribution to provident fund, workers' compensation etc.
- (v) **Number of Workers:** The total number of workers working in each department is taken as a basis for apportioning overhead expenses amongst departments. Where the expenditure depends more on the number of employees than on wages bill or number of labour hours, this method is used. This method is used for the apportionment of certain expenses as welfare and recreation expenses, medical expenses, time keeping, supervision etc.
- (vi) **Floor Area of Departments:** This basis is adopted for the apportionment of certain expenses like lighting and heating, rent, rates, taxes, maintenance on building, air conditioning, fire precaution services etc.

(vii) Capital Values: In this method, the capital values of certain assets like machinery and building are used as basis for the apportionment of certain expenses.

Examples are: Rates, taxes, depreciation, maintenance, insurance charges of the building etc.

(viii) Light Points: This is used for apportioning lighting expenses.

(ix) Kilowatt Hours: This basis is used for the apportionment of power expenses.

(x) Technical Estimates: This basis of apportionment is used for the apportionment of those expenses for which it is difficult, to find out any other basis of apportionment. An assessment of the equitable proportion is carried out by technical experts. This is used for distributing lighting, electric power, works manager's salary, internal transport, steam, water charges etc. when these are used for processes.

Principles of Apportionment of Overhead Costs:

The determination of a suitable basis is of primary importance and the following principles are useful guides to a cost accountant:

(i) Service or Use or Benefit Derived: If the service rendered by a particular item of expense to different departments can be measured, overhead can be conveniently apportioned on this basis. Thus, the cost of maintenance may be apportioned to different departments on the basis of machine hours or capital value of the machines, rent charges to be distributed according to the floor space occupied by each department.

(ii) Ability to Pay Method: Under this method, overhead should be distributed in proportion to the sales ability, income or profitability of the departments, territories, basis of products etc. Thus, jobs or products making higher profits take a higher share of the overhead expenses. This method is inequitable and is not generally advisable to relieve inefficient units at the cost of efficient units.

(iii) Efficiency Method: Under this method, the apportionment of expenses is made on the basis of production targets. If the target is exceeded, the unit cost reduces indicating a more than average efficiency. If the target is not achieved, the unit cost goes up, disclosing thereby the inefficiency of the department.

(iv) Survey Method: In certain cases it may not be possible to measure exactly the extent of benefit which the various departments receive as this may vary from period to period, a survey is made of the various factors involved and the share of overhead costs to be borne by each cost centre is determined.

Unit 3-

Cost Ledgers: Integrated and Non-Integrated Accounting System.

To measure the efficiency of any business, the prerequisite is that, the accounts must be properly maintained. To maintain uniformity in accounts, accounting standards are issued. But there can be other main classification in accounts i.e. Integrated and Non – Integrated Accounts. Maintenance of accounts may differ from business to business as per the nature of business. Some business may be carrying out trading activities or in some business manufacturing may also be involved.

The case where Accounts as per Cost and Accounts as per finance are not maintained separately, such a system is known as Integrated Accounting system. All the transactions relating to manufacturing such as stores inward, stores transfer, stock loss etc which are known as cost transactions and all the transactions such as sales, interest received, salary paid, etc which are known as financial transactions are all recorded in one accounting system and no bifurcation of transaction is made.

While in the case of non – integrated accounts, all the transactions relevant to cost accounts are recorded in the cost accounting system and the transaction as per Financial Accounts are recorded in the Financial accounting system. At the end of the period, reconciliation has been made between profits derived as per both accounting systems and reasons for such difference are found out for the purpose of decision making and accuracy.

Integrated accounting system has its own advantages such as it requires less times and less efforts in preparing the same along with saving the time and resources. While the non – integrated accounting system has its own advantage that it can easily deal with notional expenses like interest, rent, etc. Accounts like cost ledger control accounts, stores ledger control accounts, etc are prepared in Non – integrated accounting system.

In a non-integrated accounting system two different sets of accounting records are maintained for Financial Accounting and Cost Accounting purposes. This system is also called as 'cost ledger accounting system'. The Cost Accounts are also maintained in double entry bookkeeping as in the case of Financial Accounts.

The non-integrated system of accounting is followed in the following situations when:

- (a) Principal ledgers are to be maintained in Costing Department,
- (b) Principal accounts are to be maintained, and
- (c) Journal entries are to be passed in Cost Accounts.

The main object of Cost Accounting is to analyze costs by functions i.e., jobs, processes, services and specific overhead categories such as administration, selling or distribution. The special ledger accounts necessary for this purpose depend upon the extent to which analysis is to be made. The maintenance of Cost Accounts under non-integrated system show the importance of Cost Accounting in the concern.

When a separate set of Cost Accounts are maintained, it must be ensured that it is properly linked to the Financial Accounts so as to facilitate easy reconciliation.

It is the responsibility of Cost Accountant in maintenance of Cost Accounting records in non-integrated accounting system, and the Financial Accountant will maintain the Financial Accounting records. In Cost Accounts no personal accounts are kept but the transactions affecting the nominal accounts are recorded in both accounts.

Inter-Locking of Accounts:

CIMA defines Interlocking of Accounts “as a system in which the cost accounts are distinct from financial accounts, the two sets of accounts being kept continuously in agreement by the use of control accounts or made readily reconcilable by other means.”

This system of accounting necessitates the maintenance of separate accounts under costing and finance functions and its periodical reconciliation. The Cost Accounts use the same basic data as the Financial Accounts, but frequently adopt different bases for matters such as depreciation and stock valuation.

Where separate Cost Accounting and Financial Accounting systems are operated, a Cost Ledger Control Account has to be maintained as a link between two sets of accounts. At the end of each accounting period, it is necessary to reconcile the Cost and Financial Accounts.

The units many a times prepares integrated accounts and many a times non – integrated accounts are also prepared. Integrated accounts means accounts as per costing and as per finance are all in one while in non – integrated accounting separate accounts are maintained as per cost and as per finance. There will always be difference between accounts maintained as per cost and accounts maintained as per finance. To make the cost accounts reliable, reconciliation is made to know the reasons of difference between both accounts. Reconciliation is numerical in financial in nature.

Reconciliation of Cost & Financial Accounts

Reconciliation is required because many items of financial accounts such as income tax, dividends, goodwill, interest, losses on sale of investment etc are not included in cost accounts while items like opportunity cost of capital, notional loss etc which form part of cost account but

are not a part of financial accounts. There may be difference in financial and cost accounts due to under or over – absorption of overheads, different base of stock valuation and many other matters. Reconciliation is useful to ascertain correct product cost and ensure correct decision making.

Reconciliation is prepared in three main steps commencing from ascertaining profit as per financial accounts, then ascertaining profit as per cost accounts and at last reconciliation of both profits is made. The only reason behind preparation of reconciliation of cost and financial accounts is the maintenance of non – integrated accounts. It is not required to be prepared when the integrated accounts are prepared as both accounts as per finance and cost is one and the same.

Need for Reconciliation:

In those concerns where there are no separate cost and financial accounts, the problem of reconciliation does not arise. But where cost and financial accounts are maintained independent of each other, it is imperative that periodically two accounts are reconciled. Though both sets of books are concerned with the same basic transactions but the figure of profit disclosed by the former does not agree with that disclosed by the latter.

Thus, reconciliation between the results of the two sets of books is necessary due to the following reasons:

1. To find out the reasons for the difference in the profit or loss in cost and financial accounts and to indicate the position clearly and to be sure that no mistakes pertaining to accounts have been committed.
2. To ensure the mathematical accuracy and reliability of cost accounts in order to have cost ascertainment, cost control and to have a check on the financial accounts.
3. To contribute to the standardization of policies regarding stock valuation, depreciation and overheads.
4. To facilitate coordination and promote better cooperation between the activities of financial and cost sections of the accounting department.
5. To place management in better position to acquaint itself with the reasons for the variation in profits paving the way to more effective internal control.

Methods of Reconciliation:

Reconciliation of costing and financial profits can be attempted either:

- (a) By preparing a Reconciliation Statement or
- (b) By preparation Memorandum Reconciliation Account.

Reconciliation Statement: When reconciliation is attempted by preparing a reconciliation statement, profit shown by one set of accounts is taken as base profit and items of difference are either added to it or deducted from it to arrive at the figure of profit shown by other set of accounts.

Procedure of Reconciliation:

When there is a difference between the profits disclosed by cost accounts and financial accounts, the following steps shall be taken to prepare a Reconciliation Statement:

(I) ascertain the various reasons of disagreement (as discussed above) between the profits disclosed by two sets of books of accounts.

(II) If profit as per cost account (or loss as per financial accounts) is taken as the base:

Add:

- (i) Items of income included in financial accounts but not in cost accounts.
- (ii) Items of expenditure (as interest on capital, rent on owned premises etc.) included in cost accounts but not in financial accounts.
- (iii) Amounts by which items of expenditure have been shown in excess in cost accounts as compared to the corresponding entries in financial accounts.
- (iv) Amounts by which items of income have been shown in excess in financial accounts as compared to the corresponding entries in cost accounts.
- (v) Over-absorption of overheads in cost accounts.
- (vi) The amount by which closing stock of inventory is undervalued in cost accounts.
- (vii) The amount by which the opening stock of inventory is overvalued in cost accounts.
- (viii) Over charge of depreciation in cost accounts.

Deduct:

- (i) Items of income included in cost accounts but not in financial accounts.
- (ii) Items of expenditure included in financial accounts but not in cost accounts.
- (iii) Amounts by which items of income have been shown in excess in cost accounts over the corresponding entries in financial accounts.
- (iv) Amounts by which items of expenditure have been shown in excess in financial accounts over the corresponding entries in cost accounts.
- (v) Under-absorption of overheads in cost accounts.

- (vi) The amount by which closing stock of inventory is overvalued in cost accounts.
- (vii) The amount by which the opening stock of inventory is undervalued in cost accounts.
- (viii) Under charge of depreciation in cost accounts.
- (III) After making all the above additions and deductions, the resulting figure will be profit as per financial accounts (or loss as per cash accounts).

Note: If profit as per financial accounts (or loss as per cost accounts) is taken as the base, then items added shall be deducted and items to be deducted shall be added i.e. the procedure shall be reversed.

Memorandum Reconciliation Account:

Reconciliation can also be done by preparing a Memorandum Reconciliation Account. This account is a memorandum account only and does not form part of the double entry. When reconciliation is attempted through Memorandum Reconciliation Account, profit to be taken as “base profit” is shown like opening balance of this Account. All items of differences required to be deducted are debited and those to be added are credited to this Account, the balancing figure of this Account is the profit shown by other set of Accounts.

The specimen form of Memorandum Reconciliation Account is given as follows:

MEMORANDUM RECONCILIATION ACCOUNT	
To Financial expenses : Discount Fines and penalties Bank interest Underwriter's commission Donations Goodwill written off Under-absorption of overheads Under-valuation of opening stock in cost accounts Over-valuation of closing stock in cost accounts Under charge of depreciation in cost accounts Profit as per Financial Accounts	By Profit as per Cost Accounts Financial income : Rent Interest Dividend Profit on sales of assets Items charged in cost accounts : Interest on own capital Rent on own building Over-absorption of overheads Over-valuation of opening stock in cost accounts Under-valuation of closing stock in cost accounts Over charge of depreciation in cost accounts.

Costing Systems: Single Output Costing, Job Costing, Batch Costing

1. SINGLE/OUTPUT/UNIT COSTING

One operation costing method of costing by units of production and is adopted where production is uniform and a continuous affair, units of output are identical and the cost units are physical and natural. The cost per unit is determined by dividing the total cost during a given period by the number of units produced during that period.

This method of costing is generally adopted where an undertaking is engaged in producing only one type of product or two or more products of the same kind but of varying grades or quality. The industries where this method of costing is used are dairy industry, beverages, collieries, sugar mills, cement works, brick works, paper mills etc. In all these cases, work is a natural unit of cost e.g., a tonne of coal, a quintal of sugar, a tonne of cement, 1,000 bricks, 1 kg of paper and soon.

Collection of Costs: The cost in such industries is collected under the following headings:

(i) Material:

As there will be only one product and the process of manufacture is also simple, the raw material, if any, is directly charged to the production of the period in total. The items of stores issued for maintenance and other purposes are analysed by cost centres through the requisition slips. Normal loss of material is adjusted by inflating the issue price of materials.

(ii) Labour:

The labour costs are collected periodically through payrolls which are prepared separately for each section of the work. The purpose of such analysis is only to localise the cost to specific cost centres or to departmental managers, so that the cost can be effectively controlled. Labour—direct and indirect—should be identified separately. The direct labour cost is collected separately and forms a part of prime cost whereas indirect labour is charged to the factory overheads.

(iii) Overheads: These are classified into three broad categories: factory overheads, administration overheads and selling and distribution overheads. These are usually charged at a predetermined rate.

Job Costing

Job costing is a method of costing applied in industries where production is measured in terms of completed jobs. Industries where job costing is generally applied are Printing Press, Automobile Garage, Repair workshops, Ship Building, Foundry and other similar manufacturing units which manufacture to customers' specific requirements.

Job costing is a method of costing whereby cost is compiled for a job or work order. The production is against customer's orders and not for stock. The cost is not related to the unit of production but is a cost for the job, e.g. printing of 5000 ledger sheets, repairs of 50 equipment's, instead of printing one sheet or repair of one equipment.

The elements of cost comprising Prime Cost viz. direct materials, direct labour and direct expenses are charged directly to the jobs concerned, the overhead charged to a job is an apportioned portion of the departmental overhead.

Documents Used in a Job Order Cost System:

The following are the important documents used in a Job Order Cost System:

(i) Production Order or Manufacturing Order:

This is a works order authorizing the production department to produce a specified quantity of a product which constitutes the job.

(ii) Cost Sheet: For recording costs, very often a separate record called a cost sheet is used. The cost sheet and the works order may also be combined, when costs are recorded on the production order itself.

(iii) Other Documents: The other documents which are used as control mechanism by the dispatching function are: Material Requisitions, Tool Orders, Time Tickets, Inspection Order, etc.

Job Cost Accounting Procedure:

Cost of direct materials in respect of a job is obtained from copies of Material Requisitions costed by the Stores Accounting Section. Cost of direct wages is obtained from various Time Tickets costed by the Payroll Department. Direct Expenses, if any, are also taken up.

Manufacturing overheads are then applied at predetermined departmental absorption rates and recorded in the cost-sheet. Various overheads may be recorded in the separate columns meant for these in the cost sheet which are totaled to obtain the total cost of direct material, direct labour, direct expenses and apportioned manufacturing overheads. These are the four elements of cost which together give the production cost or manufacturing cost of the job.

Advantages of Job Order Costing:

- (i) Profitability of each job can be individually determined.
- (ii) It provides a basis for estimating the cost of similar jobs which are to be taken in future.
- (iii) It provides the detailed analysis of the cost of material, labour and overheads for each job as and when required.
- (iv) Plant efficiency can be controlled by confining attention to costs relating to individual jobs.

- (v) Spoilage and defective work can be identified with a specific job and responsibility for the same may be fixed on individuals.
- (vi) By adopting pre-determined overhead rates in job costing, we can get all advantages of budgetary control.
- (vii) Job costing is essential for cost-plus contract where contract price is determined directly on the basis of cost.

Limitations of Job Order Costing:

- (1) It is expensive to operate as it requires considerable detailed clerical work.
- (2) With the increase in the clerical work the chances of errors are increased.
- (3) Job order costing cannot be efficiently operated without highly developed production control system. The job costing requires intricate factory organization system.
- (4) The costs as ascertained are historical as they compiled after incidence and therefore does not provide control of cost unless it is used with standard costing system.

BATCH COSTING

Batch costing is a form of specific order costing. Job costing refers to costing of jobs that are executed against specific orders whereas in batch costing items are manufactured for stock. A finished product may require different components for assembly and may be manufactured in economical batch lots.

When orders are received from different customers, there are common products among orders; then production orders may be issued for batches, consisting of a predetermined quantity of each type of product. Batch costing method is adopted in such cases to calculate the cost of each such batch.

Cost per unit is ascertained by dividing the total cost of a batch by number of items produced in that batch. In order to do that a Batch Cost Sheet is prepared. The preparation of Batch Cost Sheet is similar to that of Job Cost Sheet. This method is mainly applied in biscuits manufacture, garments manufacture, spare parts and component manufacture, pharmaceutical enterprises etc.

Need for Determining Economic Lot Size:

The need for determining economic lot size arises as:

- (i) Every time a component/product is to be made, setting up of the tool is involved. Because of this some loss in production time will be there. Therefore, maximum numbers of units are produced once the machine is set in order to reduce the cost per unit,

- (ii) Such large production at one run will lead to accumulation of inventory and the costs related thereto,
- (iii) Thus there is a quantity for which reduced cost of production is just offset by costs of carrying the quantity inventory. The determination of most economical batch quantity requires consideration of many related factors of costs and economies.

The factors that influence the decision in this respect are:

- (a) Set up cost,
- (b) Manufacturing cost,
- (c) Interest on capital,
- (iv) Storage cost, and
- (v) Rate of consumption.

Types of Costs in Batch Costing:

There are two types of costs involved in Batch Costing:

- (i) Set up costs
- (ii) Carrying costs.

If the batch size is increased, set up cost per unit will come down and the carrying cost will increase. If the batch size is reduced, set up cost per unit will increase and the carrying cost will come down. Economic Batch quantity will balance both these opponent costs.

The formula to be used for calculation of economic lot size is $Q = \sqrt{\frac{2US}{C}}$

Where

- Q = Qty. or units of products in the economic batch.
- S = Set-up cost per batch
- C = Carrying cost per unit of production p.a.
- U = Annual units of production.

Difference Between Job Costing and Batch Costing:

In case of job costing, work is undertaken as an identifiable unit and cost of each job is ascertained separately. Such a method of costing is suitable in case of motor workshop, printing press and where manufacture of products is according to customers' specific requirements.

Batch costing is extension of job costing. Job costing refers to costing of jobs that are executed against specific orders whereas in batch costing items are manufactured for stock. In batch costing a batch may represent a number of small orders passed through the factory in batches.

Each batch is treated as a unit of cost and is separately costed. Cost per unit is ascertained by dividing the total cost of the batch by number of items produced in that batch.

Contract Costing: Contract costing is that form of specific order costing which applies where the work is undertaken according of customer's requirements and each order is of long duration as compared to job costing. The work is generally of constructional and repairs nature.

A construction contract is a contract for the construction of an asset or of a combination of assets which together constitute a single substantial project. This covers various activities such as construction of plants (including site preparation), bridges, roads, dams, ships, buildings, complex pieces of equipment, production of motion pictures etc.

That is why this method is used by builders, civil engineering contractors, constructional and mechanical engineering firms etc. These contracts are negotiated in a number of ways.

Distinguishing Features of Contract Accounts:

The work to be executed depends upon customer's specification and is generally done at site. Each contract is treated as cost unit and is generally of long duration for completion. Most of the expenses are direct in nature and payment is received depending on the stage of completion of work.

Following are the main distinguishing features of contract accounts:

(i) Higher proportion of direct costs:

As most of the items of expenses can be directly identified with a contract, though indirect, are treated as direct expenses. Expenses on telephone installed at site, site power usage, site vehicles, transportation are treated as direct expenses.

(ii) Low indirect cost:

The only item of indirect cost may be head office expenses. Such cost represents only a small proportion of the contract cost and is absorbed usually on some overall basis such as percentage of total contract cost.

(iii) Difficulties of cost control:

The large scale of contracts and the size of the site may create some major problems of cost control relating to material usage and losses, pilferage, labour supervision and utilisation, damage to and loss of plant and tools etc.

(iv) Surplus materials: Surplus material, if any, will be either credited to the contract account with the cost of material at the end of the contract or will be debited to the new contract account,

if directly transferred to another contract. If the material is not required immediately, it will be stored and the cost debited to a stock account.

Comparison between Job Costing and Contract Costing:

There are certain similarities in job and contract costing. Both the methods belong to the category of specific order costing in which work is executed according to the specification of customers. Under both the methods customers come on their own and there is no need of creating demand.

Generally quotation price is asked before giving order and production starts only on receipt of order from the customer. As every job and contract is dissimilar in nature and is identified by a separate number and is known by that number until it is completed. Profit is also determined in respect of each job and contract separately.

In spite of the above similarities there are certain differences between job and contract costing.

These are given as under:

1. Size:

A job is small in size but the contract is big in size.

2. Place of Work:

Work under job costing is performed in the workshop of the proprietor but the contract is executed mostly at site.

3. Time for Completion:

A job usually takes less time for completion of work whereas a contract takes more time to complete the work.

4. Payment of Price:

The selling price of a job is paid in full after completing the job but in case of a contract, the price is paid in various installments depending upon the progress of the work

5. Investment:

There is heavy investment on assets initially in case of job costing as compared to contract costing.

6. Nature of Expenses:

In job costing, expenses may be direct and indirect but in case of contract costing, most of the expenses are direct in nature.

7. Transfer of Profit:

Profit earned on a job is entirely taken to profit and loss account but in case of incomplete contract, only proportionate profit is transferred to profit and loss account depending on the completion stage of the contract.

8. Nature of industry applicable:

Job costing is applied in printing, foundry, engineering and ship building industries but the contract costing is applied to civil engineering-roads, bridges, buildings etc.

9. Cost units:

Job is the cost unit in job costing hut contract is the cost unit in contract costing.

10. Contractual obligation:

In job costing a job is undertaken as per specification of the customer and there is a contractual obligation to complete the job in time. There may be a provision of rejection of defective job and rectification thereof. In contract costing, in addition to the contractual obligation as given in case of job costing, there is a provision of retention money and payment to be made according to the work certified.

11. Cost accumulation and variance analysis:

It is more complicated in job costing whereas it is simple in contract costing.

Types of Contracts:

Generally there are three types of contracts:

- (i) Fixed price contracts. Under these contracts both parties agree to a fixed contract price.
- (ii) Fixed price contracts but in some cases subject to escalation clause (discussed afterwards).
- (iii) Cost plus contracts. Under these contracts no fixed price could be settled. The contractor is reimbursed for allowable or otherwise defined costs plus a percentage of these costs or a fixed tee towards profit.

Each contract is considered as a separate unit of cost and is allotted a distinguishing number. A separate account is kept for each individual contract; usually a greater part of the work is carried out at the contract site itself, so the whole of the expenditure can be charged direct to the contract.

However, the overhead relating to the office, central stores etc. require apportionment among the various contracts on some arbitrary basis such as percentage of wages, materials or prime cost.

Profit on Uncompleted Contracts (Modern Approach):

According to this approach, two methods of calculating the profits on uncompleted contracts are used by the contractors:

These are:

- (i) Percentage of Completion Method. Under this method the profit is determined at the end of each accounting period before the completion of the entire contract.
- (ii) Completion Contract Method. Under this method, the profit is recognized only when the contract is completed or substantially completed.

Method: (i) may be adopted only if the following conditions are satisfied:

- (a) The cost attributable to the different stages of completion of the contract activity can be clearly identified. For this purpose each stage of the contract should be distinguished as a separate cost centre or profit centre. This is necessary to match the cost with the revenue till the stage of completion and to find out the resultant profit attributable to the proportion of work completed.
- (b) There must exist adequate estimating process so that both costs to complete the com. act and the percentage of contract performance completed at the end of the accounting period can be reliably estimated. The stage of completion can be determined by calculating the proportion that costs incurred to date bear to the estimated total costs of the contract activity.
- (c) The costs attributable to the contract generally start with the signing of the contract and end when the contract is nearing completion. Costs incurred before signing a contract is applicable if such costs can be directly associated with a specific contract and there is every probability that the contract will be obtained.

The costs may be divided into following classes:

- (i) Costs directly related to a specific contract as cost of moving equipment to site, site labour costs and supervision, material used for construction, expenses incurred at the site; depreciation of plant and equipment used etc.
- (ii) Costs allocable to contracts as design, technical assistance, insurance, fabrication of materials elsewhere including overheads etc.
- (iii) Costs apportioned to contracts as general administration, finance costs, research and development cost, depreciation of idle plant and equipment etc.

(iv) Credit is to be given for the materials and other revenue sources, surplus to requirements transfer red to other contracts etc.

(d) Progress payments and advance received from customers cannot generally be treated as equivalent to revenue earned. The revenue is to be based on the percentage of completion of work.

(e) The amount of loss, if any, estimated on the revised estimate of the uncompleted work, is to be deducted from the present revenue.

Work-in-Progress:

The total expenditure cumulative to the year end is treated as work-in-progress, if no profit is taken in the accounts. The amount of profit is to be added to the progress cost, if profit is included for the adoption of the percentage of completion method.

For balance sheet purposes, payments received from the contracted from time to time are normally taken separately as advance and shown on the liabilities side of the Balance Sheet. Alternatively, the advance may be deducted from the Cost (and profit) and only one figure kept on the assets side.

Some special items under contract accounting are explained below:

Sub-Contract: Sub-contracting, usually of a part of the work, is another essential feature which we frequently come across in contract work. Sub-contracting may be necessary under the following circumstances:

- Work of a specialized nature for which facilities are not internally available within the concern is offered to a sub-contractor.
- It may be advantageous to get a part or component from outside, if it is costlier to manufacture it.
- Consideration of opportunity cost; the management may not like to invest capital which may be utilized for other more profitable lines.
- The capacity of the firm may be limited and in order to keep time schedule, work may be speeded by offering it to sub-contractors.

Defective Work: Defective work will not evidently be paid for by the contractee but the cost of such defective work should be charged to the Contract Account. Sometimes,

rectification of the defective work is required to be made at the contractor's cost; the cost of such rectification should also be charged to the Contract Account but shown separately.

Escalation Clause: Escalation clauses are often provided in contracts as safeguards against any likely changes in price or utilisation of material and labour. Such a clause in a contract would provide that in the event of a specified contingency happening, the contract price would be suitably enhanced. This clause is particularly necessary where the price of certain raw materials are likely to rise, where labour rates are anticipated to increase, or where the quantity of material or labour time cannot be properly assessed or estimated unless the work has sufficiently advanced. There may also be **'De-escalation or Reserve Clause'** to provide for any future decrease in price etc. so that the benefit may be passed on to the contractee.

Work-in-progress: In Contract Accounts, the value of the work-in-progress consists of:-

the cost of work completed, both certified and uncertified,

the cost of work not yet complete, and

the amount of profit taken as credit.

In the Balance Sheet, the work-in-progress is usually shown under two heads, viz. certified and uncertified. The cost of work completed and certified and the profit credited will appear under the head 'certified' work-in-progress, while the completed work not yet certified and the cost of labour, material and expenses of work which has not reached the stage of completion are shown under the head 'uncertified' work-in-progress.

Profit on incomplete contracts: For the purpose of finding out the portion of the profit out of notional profit to be transferred to Profit and Loss Account, the contracts are divided in the following manner:-

Contracts which have just commenced: In this case no portion of the notional profit shall be transferred to Profit and Loss Account and the entire amount is kept as reserve. There are no hard and fast rules to determine that a particular contract is just commenced or

reasonably advanced or almost complete. However, as per general norms, the contracts in which less than 1/4th work is done are regarded as the contracts which have just commenced.

Contracts which have reasonably advanced: In this case the profit to be transferred to Profit and Loss Account out of notional profit is based on the degree of completion of the contract. The degree of completion of the contract can be found out by comparing work certified and the contract price.

If the degree of the completion of the contract is less than or equal to 1/4th no portion of the notional profit shall be transferred to Profit and Loss Account and the entire amount would be kept as reserve.

If the degree of completion of work is ($> 1/4$ and $< 1/2$), 1/3 of the notional profit shall be transferred to Profit and Loss Account and the remaining amount would be kept as reserve.

If the degree of completion of work is more than or equal to 1/2, 2/3rd of the notional profit shall be transferred to Profit and Loss Account and the remaining amount would be kept as reserve.

The profit so arrived in the above manner shall further be reduced in the ratio of cash received to work certified. Thus, the formula is as follows:

Contracts which are almost complete:

In this case the portion of the profit to be transferred to Profit and Loss Account is calculated by using the estimated total profit which is ascertained by subtracting the total cost to date and the additional cost to complete the contract from the contract price. The different formulas for such computations of profit are as follows:-

Progress Payment

Progress Payment is the part Payment made to the contractor at different stages as the work progresses, instead of making one full payment on the completion.

Progress Payments – are the periodic payments by contractee to the contractor on the basis of certificate issued by contractee's architect.

Progress payments are typically included when the contract requirement includes significant time between award and delivery.

Work Certified:

A contractor undertakes to execute the contract on the basis of the price agreed upon, and this price is known as the contract price. The contract price is payable by the contractee either in a lump sum on the completion of the contract or in installments on the basis of the work done.

In the case of small contracts, the payment is made after the completion of the work. The contract account is credited and the balancing figure is transferred to profit and loss account. In the case of large contracts, a good amount of working capital is needed and the contractor may not wait till the completion of the contract.

In such cases, there may be a provision for payment of contract price in installments on the basis of work progress certificate issued by the architect or surveyor or engineer as the work done so far. The amount of the work certified is credited to the contract account and debited to the contractee's account.

Generally, it is seen that the full amount for the work certified is not paid by the contractee but a certain percentage is retained. This retained sum is known as retention money. This is done in order to protect the contractee, in case faulty work appears or faulty work is not rectified or a penalty is to be imposed on the contractor for undue delay. The retention money may be from 10% to 20%.

On receipt of the certificate, any one of the following methods is followed:

(A) Contractee's A/c	Dr.	For value of work certified
To Contract Account		
Bank Account	Dr.	
To Contractee's Account		When cash is received
NB: The balance in Contractee's Account (Retention Money) is shown in Balance Sheet (Asset side)		
(B) Work-in-progress Account	Dr.	
To Contract Account		For value of work certified
Bank Account	Dr.	
To Contractee's Account		When cash is received

NB: The work-in-progress Account will be shown in Balance Sheet after deducting the amount received from Contractees.

Retention money

In the case of contracts running for long periods of time, it is customary for the contractor's firm to get on account payments against the portion of contract completed. The amount received depends upon the extent of work certified by the technical assessor i.e. on the surveyor's certificates, as these are called. Normally such payments are not received to the full extent of the work completed but a small percentage is held back as retention money, payable on completion of the contract. The retention money is a sort of safeguard available to the contractee in case the contractor is not able to fulfill one or more of the conditions laid down in the contract.

Retention money is that portion of value of work certified which is retained by the contractee as security for any defective work which may be discovered later within the guarantee period. Retention money is paid when it is ensured that there is no fault in the work carried out by the contractor.

Computation of retention money:

$$\text{Retention Money} = \text{Value of Work Certified} - \text{Cash Received}$$

Generally, the terms of the contract provide that the whole of the amount shown by the archive's certificate shall not be paid to the contractor but a specified percentage or portion money (say 10% or 20%) thereof shall be retained by the contractee till the contract. The money so retained is known as 'Retention money'. The cash received from the contractee is credited to his personal account. The value of work (certified and uncertified) is debited to work-in progress account. The work-in-progress account is shown as an asset in the balance sheet after deducting the amount received from the contractee. In the beginning of the next year the work-in-progress account is transferred to the debit side of the contract account. On completion of the contract, the contractee's account is debited and contract account is credited by total contract price.

Escalation clause

An **escalation clause** is a clause in a lease or contract that guarantees a change in the agreement price once a particular factor beyond control of either party affecting the value has been determined. An important example of this is a contract that adjusts for inflation.^[1]

Escalation clauses are quite common in construction contracts to cover unexpected costs due to fluctuations in the prices for raw materials, fuel, and labor during the course of the construction project

Escalation clause in a contract provides that if during the period of execution of a contract, the prices of materials, rates of labour etc. rise beyond a specific limit, the contract price will be increased by specified rate or amount. Escalation clause does not cover that part of increase in costs which is caused due to inefficiency or wrong estimation.

Circumstances prompting insertion of escalation clause in the contract are:

(i) Contract is for a long period where input cost can change significantly.

- (ii) Raw material cost are expected to increase.
- (iii) Labour rates are subject to frequent upward revisions by the regulatory authorities.
- (iv) Certain other important inputs, such as power, fuel, etc. are subject to frequent price hikes.
- (v) Total quantity of materials and labour to be used for the contract cannot be anticipated with reasonable accuracy and are likely to surpass the projections.

Meaning of De-escalation Clause: Conversely, de-escalation clause may also be provided for the downward adjustment of the contract price in case the prices of materials, rates of labour etc. fall beyond a specified limit.

Escalation clause aims at safe guarding the interest of the contractor against unforeseen rise in cost. On the other hand, de-escalation clause provides for a decrease in the contract price due to decrease in the price of inputs so that the benefits of price decreases are passed on the contractee.

Contract accounts

According to the Accounting Standard – 7 (AS – 7) issued by the Institute of Chartered Accountants of India, a construction contract” is a contract for the construction of an asset or of a combination of assets which together constitute a single project. Examples of activity covered by such contracts include the construction of bridges, dams, ships, buildings and complex pieces of equipment.”

A Contractor has to maintain a separate account known as Contract Account for each job and this facilitates to know the profit earned or loss incurred. It is akin to factory job costing, but varies only in size; and the contract continues for a longer time.

A contractor undertakes a small number of big contracts at a time. For example, builders, civil engineering firms, constructional and mechanical engineering firms etc., adopt this method of costing.

Accounting Procedure:

A contract ledger is kept in which a separate account is opened for each contract undertaken. It is usual to give each contract a distinguishing number. A contract account is debited with all direct and indirect expenditure incurred in relation to the contract. It is credited with the amount of contract price on completion of the contract. The balance represents profit or loss made on the contract and is transferred to Profit and Loss Account.

The treatment of important expenses dealt with is as follows:

(a) Material:

Materials needed for a contract may be obtained either from direct purchase or from the store. When the materials are purchased from outside for the use of a contract, the total cost is directly debited to the related contract.

If the materials are received through Material Requisitions from store, the cost of the material will be debited to the related contract. Each Material Requisition contains the contract number. Alternatively, material cost of a job can be known from the Material Abstract, prepared on the basis of Material Requisition and debited to the contract directly, in summary, either weekly or monthly.

There may be two types of wastages – normal and abnormal. In the case of normal wastages, the issue rate of materials is inflated in order to recover the normal wastages and the total cost of materials at the inflated rate is debited to the contract.

The abnormal wastage is to be transferred to profit and loss account. Any type of theft or destruction of materials is lost which is transferred to profit and loss account.

Surplus materials lying at the site are credited to the contract account with the cost, whether the surplus is returned to the store or transferred to another job. Sometimes, the customer himself supplies certain materials for the contract; and the same should be entered into a separate book of accounts and not debited to the contract.

At the time of closing accounts, materials, if any, in hand are credited to the contract account.

Accounting for Material Costs: Material Costs are accounted for as follows :

- (i) Material purchased directly for the contract or supplied from stores is debited to the contract.
- (ii) Materials returned to stores are credited to contract account.
- (iii) In case materials already issued to contract get abnormally lost due to fire, theft, accident etc. the cost of such materials is credited to contract account and is debited to profit and loss account.
- (iv) Materials lying at site at the end of the accounting period are credited to contract account.
- (v) In case there is normal wastage of materials at site due to evaporation, spoilage and pilferage, such normal wastage may be ignored.
- (vi) In case of transfer of materials from one contract to another, the transferor contract is credited and the transferee contract is debited.
- (vii) For materials supplied by the contractee without affecting the contract price, such material should not be charged to contract account.

(b) Labour:

The contracts are carried out at the site of the construction i.e., away from the contractor's premises. Therefore, there arises a problem of control. The labour employed on contracts is treated as direct labour, and the labour cost is debited to the contract. When there are a number of contracts, a pay-roll is prepared for each contract.

The total amount of each contract is to be debited to the respective contracts. The salaries of supervisory staff, supervising two or more contracts, are apportioned on equitable basis. Wages accrued will also be debited to the contract account.

Accounting for Labour Cost : Labour Costs are accounted for as follows :

- (i) All labour employed at the contract site should be debited to the concerned contract as direct labour.
- (ii) Wages outstanding on account of a contract at the end of the accounting period should be debited to that contract.
- (iii) Wages paid to workers who move from one contract to another, are distributed over the contracts on the basis of time spent by workers on each contract.

(c) Overhead:

Generally apportioning overhead expenses do not arise, because most of the expenses such as lighting, power, maintenance of plant, architect fees, hire charges of special plant etc., are entirely charged to the contracts. However, costs common to more than one contract such as Head Office expenses should be apportioned and charged to each contract with respective share on some suitable basis; for example, labour-hour rate.

(d) Plant:

The cost of the plant used for the contract is charged. Special types of plants are brought to the site for use, such as cement concrete mixer, crane, tractor, floor polishing machine etc. A clear record may be kept and properly accounted. There are two methods of charging the contract for using the machines.

(1) Contract is debited with the full value of the plant. When a new plant or old plant is issued to a contract, the cost of the plant or book value of the old plant is debited to the contract. The plant is revalued at the end of the year and credited to the contract with revalued (depreciated) value.

This method is good when the plant is put under regular use for the contract for a longer period, in certain cases; the plant gets completely worn out before completion of the work. The depreciated value of the plant is carried forward as the opening balance at the commencement of the next accounting year.

(2) Alternatively, the depreciation calculated on the basis of hourly or daily rate, is debited to the contract. In such case, the value of the plant is not debited to contract. For this, an 'Upkeep Account' is to maintained. The cost of running expenses of the plant, repairs, maintenance, oil etc., is debited, a hire rate is fixed with the help of this account and the contract is charged accordingly.

When a portion of the plant is returned to the store, the contract is credited with the depreciated value of that part. If the plant is sold, the full value is debited to the contract and credit must also be given to the contract. When the plant is lost or destroyed, it will be transferred to profit and loss account.

Items	Treatment
Plant at beginning	The value of plant at the beginning of the contract period is debited whereas the plant at end is credited.
Purchase of machinery	The value of the plant purchase for a contract is debited.
Transfer of machinery	The value of machine transferred to the contract from other contracts is debited and the plant transferred to other contracts is credited.
Sales of machinery	The value of machinery sold is shown in credit side in selling prices or market value.
Profit or loss on sale	The profit earned through the sale of machinery is debited and the loss suffered is credited.
Loss of machinery	The losses of machinery due to theft, fire, damage etc. are shown in credit side of a contract account. However, the claim accepted by the insurance company is credited like sales.

(e) Sub – contracts:

Sometimes, the contractor gives a portion of work to sub-contractor. For instance, the work of painting, special flooring etc., may be given to another contractor. The cost of the sub-contract is directly charged to the main contract.

(f) Extra Work:

It is possible that the contractor may be given additional work or the original contract may be altered by the contractee. In such cases, the work is additional and will be subjected to a separate charge. If the amount is small, the contract is debited or if the amount is large, a separate account is to be opened. In both the cases, the cost of extra work is added to the cost of the original contract.

Work Certified:

A contractor undertakes to execute the contract on the basis of the price agreed upon, and this price is known as the contract price. The contract price is payable by the contractee either in a lump sum on the completion of the contract or in installments on the basis of the work done.

In the case of small contracts, the payment is made after the completion of the work. The contract account is credited and the balancing figure is transferred to profit and loss account. In the case of large contracts, a good amount of working capital is needed and the contractor may not wait till the completion of the contract.

In such cases, there may be a provision for payment of contract price in installments on the basis of work progress certificate issued by the architect or surveyor or engineer as the work done so far. The amount of the work certified is credited to the contract account and debited to the contractee's account.

Generally, it is seen that the full amount for the work certified is not paid by the contractee but a certain percentage is retained. This retained sum is known as retention money. This is done in order to protect the contractee, in case faulty work appears or faulty work is not rectified or a penalty is to be imposed on the contractor for undue delay. The retention money may be from 10% to 20%.

On receipt of the certificate, any one of the following methods is followed:

(A) Contractee's A/c	Dr.	For value of work certified
To Contract Account		
Bank Account	Dr.	
To Contractee's Account		When cash is received
NB: The balance in Contractee's Account (Retention Money) is shown in Balance Sheet (Asset side)		
(B) Work-in-progress Account	Dr.	
To Contract Account		For value of work certified
Bank Account	Dr.	
To Contractee's Account		When cash is received

Work Uncertified:

If the progress of a work is unsatisfactory, not reaching the stipulated stage, though certain work is completed, such work does not qualify for a certificate by the architect. This work is known as work done but uncertified. It is valued at cost.

Profits on Incomplete Contracts:

Big contracts take several years for completion. The exact amount of profit can be ascertained only after the completion of the contract. Incomplete contracts are known as work-in-progress and are valued at cost. Generally profits should not be anticipated. As such, no profit should be transferred to profit and loss account in respect of incomplete contracts. If it is so, there may be wide fluctuations in the profit and loss account and may invite serious repercussions.

For example, profit and loss account in respect of incomplete contracts will show a loss notwithstanding the fact that the year was a good year of profits. Secondly, trading result will differ from year to year and will be un-comparable. Thirdly, high rate of income tax will have to be paid, if the profit is ascertained after the completion of the contract.

Therefore, on account of these drawbacks, it is desirable that the entire profits are not shown in one year, because the profits are not earned in a year. Hence, the profits on incomplete contracts are anticipated carefully.

Treatment of Profits:

1. If the contract is recently started and the work completed is one-fourth or less than one – fourth of the total work, no profit should be transferred to profit and loss account.
2. If the contract has reasonably advanced and if the architect of the contractee certifies that the work completed is more than one-fourth, but less than half of the work, one-third of the notional profits is normally credited to the profit and loss account. This is further reduced by the ratio cash received to work certified i.e.

$$\text{Notional profit} \times \frac{1}{3} \times \frac{\text{Cash received}}{\text{Work certified}} = \text{Profit to be credited.}$$

If more than half or the contract is nearing completion, then two-thirds of the notional profit may be credited on the basis of cash received to profit and loss account, i.e.,

$$\text{Notional profit} \times \frac{2}{3} \times \frac{\text{Cash received}}{\text{Work certified}} = \text{Profit to be credited.}$$

In the second case 2/3 of the profit and in the third case 1/3 of the profit are left over to meet future contingencies such as penalties, increase in costs or losses if any.

Work-in-Progress:

Incomplete contracts are referred to as work-in-progress includes the value of work certified and the cost of work uncertified. When less than 1/3 of the work is complete, the net expenditure

incurred up to date is taken to be the value of work-in-progress. Net expenditure means gross expenditure MINUS value of material, plant in hand at the end of the year.

When contract is well progressed of nearing completion, the work-in-progress is valued either way for Balance Sheet purpose:

First Method	
Value of work certified	-
Add: Uncertified Work	-
Total	-
Less: Profit carried forward, and Cash Received	-
WIP for B/S Purpose	-
Second Method	
Net Expenditure incurred	-
Add: Profit taken credit for	-
Total	-
Less: Cash Received	-
WIP for B/S purpose	-
Proof (illustration No. 25. 1)	
First Method	
	Rs.
Value of Work Certified	Rs. 6,00,000
Add: Uncertified work	-
Total	6,00,000
Less: Profit Carry	
Forward 12,507 }	
Cash Received 4,80,000 }	4,92,507
WIP for B/s Purpose	1,07,493

Specimen format of Contract Account			
	Rs.		Rs.
To Materials issued from stores		By Work in Progress:	
To Materials purchased		Work completed and certified	

To Direct wages	Work completed but uncertified
To Direct expenses	Materials at site
To Plant and machinery (actual value)	Plant at site (depreciated value)
To Overheads	By Materials returned to stores
To Balance c/d (Notional Profit)	By Plant returned to stores
To Work in Progress (Reserve)	By Profit and loss account (abnormal loss)
To Profit and loss account	By Balance b/d (Notional Profit)

On completion of the contract, the agreed price for the work done is credited to contract account. The balance of the contract account represents profit or loss (actual or notional) and is transferred to Profit and loss account.

Process Costing (including Joint Products and By-products and Inter-process Profits), Operating/Service Costing. (Transport & Power House only).

Process costing is a method of costing used to ascertain the cost of production of each process, operation or stage of manufacture where processes are carried on having one or more of the following features:

- (i) Where the product of one process becomes the material of another process or operation,
- (ii) Where there is simultaneous production at one or more process of different products, with or without by product,
- (iii) Where, during one or more processes or operations of a series, the products or materials are not distinguishable from one another, as for instance, when finished products differ finally only in shape or form.

There are a number of industries where:

- (i) The final product emerges only after two or more process such as paper—the raw material, bamboo or sabai grass or any other, is made into pulp: pulp is made into paper and then it is finished, glazed etc. for sale;
- (ii) The product of one process becomes the 'raw material' of another process or operation (for example, refined groundnut oil is the material for making vegetable 'ghee') and

(iii) Different products may have a common prior process (for example, brass goods will require melting of brass commonly for all goods). Another example is petroleum products produced by the same refinery.

A common feature is that production goes on without interruption and, normally, special production is not arranged for meeting any particular order. In a steel mill, for example, when a customer orders a certain quantity, no special arrangements will be made for him—his order will be executed out of the quantity produced in general. Thus, 100 tonnes of steel sheets of a certain size cannot be distinguished from the remaining quantity of steel sheets of that size.

Further, often important by-products are produced automatically at the end of each process. These by-products may have an importance almost equal to that of the main product. Consider kerosene oil, diesel oil, naphtha and petrol which all are produced from the same crude oil, in addition to a host of smaller products.

In such industries the method of cost accounting used is known as Process Accounts. It may be possible to find out the total cost without distinguishing the cost of each process but it is not desirable to do so. Wastage and by-products of different nature may arise out of each operation or process. Each process is likely to entail different types of expenses. It would thus be advisable to find out the cost of each process or operation separately.

Sometimes it is possible to either process the materials ourselves or buy them ready for use in the next process. For instance, if one wants to market perfumed castor oil, one can buy castor seed and carry out all the processes—crushing, refining and finishing—or one can buy refined castor oil and add the necessary perfume and color and bottle it and market it. The decision will depend upon the cost and the price prevailing in the market. This is another reason why cost of each process should be ascertained.

The method is useful in the case of:

- (i) Metallurgical industries (like steel and aluminum);
- (ii) Chemical industries (like plastics and drugs);
- (iii) Food processing industries (like cheese, chocolates, etc.) and
- (iv) Any other industry where there is continuous output involving two or more processes.

Joint Production

Joint products are two or more products produced simultaneously by the same process. Joint products become separate and identifiable at the **split-off point**.

Meaning of Joint Products:

Joint products may be defined as two or more products produced simultaneously in a process, each having a sufficiently high saleable value to merit recognition as a main product. They cannot be produced separately. The processing of a particular material may result in the production of two or more products. If all the products are of equal economic importance and none of them can be termed as major products, then these will be referred to as joint products.

In petroleum industry	Petrol, diesel, gas, and kerosene
In dairy industry	Skimmed milk, butter and cream
In saw mill	Several grades of lumber and slabs

Methods of Accounting:

Apportionment of joint cost among the joint products is essential for determining the share of individual joint products correctly. Ascertainment of share of cost is required for pricing the products, valuing the closing inventory and ascertaining the profit or loss on sale of different products.

Following methods are commonly used for apportioning the joint costs among the joint products.

(a) Physical Units Method:

Under this method the joint costs are apportioned among the joint products in the ratio of physical units of output produced at the point of separation.

For example, the physical base like raw material weight in physical quantity is used as the base for apportioning the joint costs. This method is very simple and easy to use. It is also technically a sound method.

However this method cannot be used when output consists of different types of units such as liquids, solids, etc. It is also illogical to assume that all joint products are equally desirable and valuable since this method assigns same unit to high quality and low quality joint products.

(b) Average Unit Cost Method:

Under this method, the total units produced at that point divide the total cost incurred up to the split-off point to get average cost per unit of production. All joint products are valued at the

average cost. This method can be used when all products are expressed in terms of same units. It cannot be used when the units are not comparable.

Advantages:

- (a) It is very simple and easy to adopt.
- (b) It is logical to use this method as all joint products are produced from the same raw material and same process.
- (c) When this method is used all joint products will have uniform cost.

Disadvantages:

- (a) The apportioned costs cannot be used for setting prices particularly in a competitive market.
- (b) It is not useful for scientific decision-making.
- (c) This method fails to recognize the fact that all joint products are not equally costly and to give due weightage to this factor.

(c) Survey Method:

This method assumes that the difference in costs of joint products arises due to certain qualitative and quantitative factors like raw materials used, labour operations performed, time consumed for production and technical difficulties in manufacture.

Based on technical evaluation, weights are assigned to each product in the form of points. Apportionment of joint costs is made on the basis of these point values.

Advantages:

- (a) This method enables accurate allocation of joint costs.
- (b) It is considered more equitable than other methods, for it takes into consideration all related factors and assigns due weightage in the form of point values.
- (c) Usage of weight factors results in the fair allocation of joint costs based on the benefits received by each product.

Disadvantages:

- (a) Assignment of weights is based on intuitive judgment and therefore arbitrary in nature.
- (b) The weights used may be inappropriate in the first place and may become useless with the passage of time.

(d) Standard Cost Method:

This method can be used only when there is standard costing system in operation. Standard costs are set for each of the joint products and joint costs are apportioned among the joint products on

the basis of standards set. This method has the advantage of measuring the efficiency and exercising control in producing joint products.

(e) Contribution Margin Method:

This method employs marginal costing technique for apportioning joint costs among the joint products. Under this method the total joint cost is divided into two categories viz., variable and fixed costs.

The variable cost is allocated on the basis of physical quantities produced and fixed cost is allocated on the basis of contribution margin ratio. Contribution means excess of sales over variable costs.

(f) Market Value Method:

Under this method the market values (sales values) of the joint products are used to apportion the joint costs incurred up to the point of separation. This method is considered logical since product with high sales value bears a larger portion of joint costs and one with low sales value bears smaller portion of joint costs.

In other words, the joint costs are apportioned on the basis of their ability to absorb joint costs. This ability is measured by sales value or selling price. The justification for this method is that the joint products should generate enough revenues to cover all costs plus a reasonable return.

However, this method may not be appropriate when the selling prices of joint products are highly fluctuating. Also determination of relative selling prices a difficult and time consuming exercise.

By-Products

Meaning of By-Products:

By-product is a secondary product. By-products are minor products obtained incidentally in the process of manufacturing the main product. They possess some saleable value. A by-product is of minor commercial importance and often requires further processing before sale. The commercial or economic importance of the products classifies as main or joint products and by-products.

The relationship between main product and by-product changes with changes in economic or industrial conditions or with advancement of science. In the manufacture of sugar bagasse, press mud, and molasses are obtained as by-products along with the main product sugar. In dairy industry, buttermilk (a by-product) is produced along with butter and cheese (main products).

Methods of Accounting:

By-products are secondary products and have very low commercial value. They are produced jointly with the main product and mostly in continuous process industries like oil refining, sugar manufacturing, chemical, meatpacking and coal.

However, in order to ascertain the true cost and profit of main product the value of by-products should be dealt with in cost accounting. Various methods are used to deal with the cost and sales value of by-products. They are classified into two categories as Non-cost or Sales Value Method and Cost Method.

Non-cost methods include the following:

- (a) Other income or Miscellaneous Method,
- (b) Total Sales less Total Cost,
- (c) Total cost less sales value of by-product,
- (d) Total cost less net value of by-products,
- (e) Total cost less net yield of by-products,
- (f) Reverse cost method.

Cost Methods include the following:

- (a) Replacement or Opportunity Cost Method,
- (b) Standard Cost Method,
- (c) Joint cost proration.

2. Cost Methods:

Standard Cost Method:

This method can be used only when there is standard costing system in operation. Under this method the standards are set for each product based on technical assessment. The by-product is valued at standard rate and the standard cost of by-product is credited to the process account of the main product. As the standards set remain stable, the cost of main product would reflect changes, if any, due to operational factors. This is a good method to exercise control over the cost of main product effectively.

Replacement Cost Method:

This method can be used when the by-product could be used as a raw material in the same undertaking. Under this method, the by-product is valued at the opportunity cost or replacement cost.

The opportunity cost refers to savings in the cost of raw materials that need not be purchased from outside. For example in coke manufacturing, coal gas is obtained as a by-product.

This coal gas may be used as fuel within the organization for heating purposes instead of buying gas from outside. The cost of gas so saved would be the opportunity cost or replacement cost of the by-product used for internal purposes. This cost is credited to the cost of production of main product (i.e., coke).

Proration of Joint Cost:

This method is used when the by-product gains some economic significance or commercial value. In that case, the joint cost is apportioned between main product and by-products on some suitable basis. This method does not differentiate between joint products and by-products.

For example, in oil refining, cooking gas was considered as a by-product. Now it has assumed greater economic significance like diesel, petrol, etc. and it is being treated as joint product. When a by-product is treated as a joint product, the joint costs are prorated (apportioned) between main product and by-products on a suitable basis.

1. Non-Cost Methods:

(a) Miscellaneous Income Method:

This method is used when the by-product has very low sales value and low commercial importance. Under this method the sales value of by-product is treated as other income or miscellaneous income and credited to profit and loss account. It is also used when the management's interest is in net results rather, than close analysis.

(b) Total sales less Total cost:

Under this method the sales value of by-product is added to sales value of main product. Then the combined total cost of main product is deducted from the total sales value.

(c) Total cost less sales value of by-products:

Under this method the sales value of by-products like waste and scrap is reduced from the combined total cost of production. However the main disadvantage of this method is that the cost of main product fluctuates from time to time with the changing prices of by-product. If there is any inventory of by-product, it is valued at the market price.

(d) Total cost less net sales value of by-products:

Under this method, net sales value (i.e., sales value minus selling and distribution expenses) of the by-product is deducted from the total cost of production. Selling and distribution expenses are charged only against by-products actually sold.

(e) Total cost less net yield of by-products:

Under this method, costs incurred after the split-off point and selling and distribution expenses are deducted from the sales value of by-products. The net realized value is then deducted from the total cost of main product.

(f) Reverse cost method:

This method assumes that the sales volume of by-product includes certain element of profit and therefore, it should not be charged to process account. Hence, the cost of by-product is arrived at working backwards. Estimated profit margin, then selling and distribution expenses first reduce the sales value of by-product and finally the cost incurred after split-off point.

Process Costing-Inter Process Profits:

In process costing, the usual practice is to transfer the output of one process to another and finally to finished stock at cost price. In this method of transfer, process accounts will not reveal any profit or loss. But sometimes, the transfer is made at transfer price or market price.

This method is adopted in order to measure the efficiency or inefficiency of individual's process. When market price cannot be ascertained, certain percentage of profit margin is added to the cost of processing in order to arrive at the transfer price. Consequently, each process account reveals a profit and this profit is known as 'inter process profit'.

Advantages of Accounting for Inter Process Profits:

- (a) Inter process profits enable to measure the efficiency of each process.
- (b) Comparison of costs with market price at each stage assist management to take 'make or buy' decisions.
- (c) The efficiency of or inefficiency of one process. In other words, each process can be assessed separately on that account.

Adjustment for Inter Process Profits:

When the output of one process is transferred to another and finally to finished stock account at transfer price (cost plus estimated profit margin), the closing inventories if any will be valued at transfer price. Such inventories will include unrealized profits. Such profits should be adjusted for purposes of year-end financial reporting.

Otherwise, it will amount to earning profit by trading within the organization. Hence, necessary adjustments are made in the values of closing inventories by means of creating reserves or provision for unrealized profits. Total profit less provision for unrealized profits would amount

to profits earned on sale of finished stock. The closing inventories will be shown in the balance sheet at cost i.e., values of inventory at transfer price less provision for unrealized profits.

Computation of provision for unrealized profits:

Formula Cost of inventory = cost/total X Closing inventory

Provision for unrealized profits = Value of closing inventory – Cost

Operating/Service Costing. (Transport & Power House only)

Definition of Service Costing:

CIMA defines Service Costing as 'cost accounting for services or functions (e.g., canteens, maintenance, personnel). These may be referred to as service centres, departments or functions.' Service Costing is also known as 'operating costing' is used for establishing costs of services rendered or services offered for sale and no items are produced.

Service costing is used in service organizations like transport companies, hotels, hospitals, power generation, colleges, boiler houses etc. The method of costing is similar to output costing.

Service Cost Unit:

All the costs incurred during a period are collected and analyzed and then expressed in terms of a cost per unit of service.

The cost unit to be applied needs to be defined carefully and it is frequently a composite figure such as tonne-kilometer, kilowatt-hour, patient day etc. The costing should be comprehensive enough to show the effects like off-season and peak-season demand, full time, part time, etc.

The service costs are usually collected under the following headings:

- (1) Standing charges (fixed costs), and
- (2) Running expenses (variable costs).

The cost per unit is calculated as follows:

$$\text{Cost per Service unit} = \frac{\text{Total Costs for the period}}{\text{Number of Service Units in the period}}$$

Price for the service is fixed by adding a markup to the cost per unit. The cost per unit of service is used for control of costs by comparing costs month by month or period by period etc. Any discrepancies over the normal are investigated for corrective action.

In practice, the cost units used by some service organizations are given below:

Operating costing is similar to output costing. All costs are suitably classified under fixed and variable. These costs are then collected, analyzed and expressed in terms of appropriate cost unit. The classification of cost into fixed and variable is very important as it draws management's attention to the fixed costs to which they are committed regardless of the units of services ultimately given. It also indicates the change in the cost structure in the operating level.

Application of Service Costing:

Service costing is applied to the operations concerned in an organization which provide services to production departments. For example, Canteen for the staff, Hospital for the staff, Boiler house for supplying steam to production departments, Captive Power generation unit, operation of fleet of vehicles for transport of raw material to factory or distribution of finished goods to the market outlets, computer department services used by other departments etc.

When services are offered to outside customers with a profit motive and it is the business of the organization in offering services, like Transport organization, Hotel business, Power generation company etc., Service Costing is applied. The method of costing is similar to Output Costing. All costs incurred during a period are collected and analyzed and then expressed in terms of a cost unit of service.

Forms of Service Costing:

i. Transport Costing:

In transport undertakings most of the data required for cost finding are obtained from log books and other incidental records. The costs are divided into (i) Fixed costs, and (ii) Running costs (variable). The more the kilometers a vehicle travels, the cheaper the cost per kilometer travelled.

This is due to spreading of fixed cost over the number of kilometers run. More the number of kilometers travelled, lesser will be the fixed cost per kilometer travelled. However, the variable cost per kilometer will not change.

The proforma Operating Cost Sheet of a Transport Company is given below:

Absolute and Commercial Ton-kms:

The distinction between absolute and commercial ton-kms. are as follows:

- (a) Absolute ton-kms. are the sum total of ton-kms. arrived at by multiplying various distances by respective load quantities carried.
- (b) Commercial ton-kms. are arrived at by multiplying total distance kms. by average load quantity.

The following illustration will explain the above:

Illustration:

A truck starts with a load of 10 tons of goods from station P. It unloads 4 tons at station Q and rest of the goods at station R. It reaches back directly to station P after getting reloaded with 8 tons of goods at station R. The distances between P to Q, Q to R and then from R to P are 40 kms, 60 kms. and 80 kms. respectively:

Compute 'absolute ton-km.' and 'commercial ton-km'.

Solution:

Absolute Ton-kms

$$= (10 \text{ tons} \times 40 \text{ kms.}) + (6 \text{ tons} \times 60 \text{ kms.}) + (8 \text{ tons} \times 80 \text{ kms.})$$

$$= 400 + 360 + 640 = 1,400 \text{ ton-kms.}$$

Commercial Ton-kms.

$$\text{Average load} \times \text{Total km. travelled} = \{10+6+8/3\} \text{ tons} \times 180 \text{ kms.} = 1,440 \text{ ton-kms.}$$

Power House Costing:

The proforma Operating Cost Sheet of Power House/Boiler House is given below:

Power House/Boiler House Operating Cost Sheet for the month		Units generated: xxx
Particulars of Expenditure		Amount (Rs.)
Fixed Expenses:		
Staff salaries		xxx
Administration overheads		xxx
	(a)	xxx
Variable Expenses:		
Operating labour wages		xxx
Coal consumed		xxx
Lubricants and oils		xxx
Stores and spares		xxx
Repairs and maintenance		xxx
Depreciation		xxx
	(b)	xxx
(i) Total Operating Cost	(a)+(b)	xxx
(ii) Units generated		xxx
Cost per unit of Electricity generated	(i)/(ii)	xxx



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