Unit - 1 : Introduction to Cost Accounting

Structure of Unit:

1.0 Objectives

After completing this unit, you will be able to:

- To assertion and control cost.
- Determining selling price.
- Facilitating preparation of financial and other statements.
- To reduce cost.
- To provide base for operating policy.

1.1 Introduction

In the initial stages cost accounting was merely considered to be a technique for ascertainment of cost of products or services on the basis of historical data. In course of time due to competitive nature of the market, it was realized that ascertainment of cost is not as important as controlling costs. Hence, cost accounting started to be considered more as a technique for cost control a s compared to cost ascertainment. Due to technological development in all fields, now cost reduction has also come within the ambit of cost accounting. Cost accounting is thus concerned with recording, classifying and summarizing costs for determination of costs of products or services, planning, controlling and reducing such costs and furnishing of information to management for decision making.

Meaning and Definitions of Cost Accounting

"Cost accounting is a quantitative method that accumulates, classifies, summarizes and interprets information for three major purposes: (in) Operational planning and control ;(ii) Special decision; and (iii) Product decision." **-Charles T. Horngren**

"Cost accounting is the process of accounting for costs from the point at which the expenditure is incurred of committed to the establishment of its ultimate relationship with cost units. In its widest sense, it embraces the preparation of statistical data, the application of cost control methods and the ascertainment of the profitability of the activities carried out or planned is defined as the application of accounting and costing principles, methods and techniques in the ascertainment of costs and the analysis of saving and/or excess as compared with previous experience or with standards." **– Institute of Cost and Management Accountants of London**

"Cost accounting 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 therefore for the purposes of managerial decision making. **–Wheldon**

Cost accounting thus provides information to the management for decision of all sorts. It serves multiple purposes on account of which it is generally indistinguishable from management accounting or so-called internal accounting. Wilmot has summarized the nature of cost accounting as "the analysing, recording, standardizing, forecasting, comparing, reporting and recommending" and the role of a cost account as that of "a historian, news agent and rophet".

1.2 Branches of Accounting

There are seven branches of accounting:-

a) **Financial Accounting:** This is called original accounting, which is mainly confined to the preparation of financial statement for the various concern parties and financial institutions.

b) **Cost Accounting:** The process of accounting for cost which begins with the recording of income and expenditure or the bases on which they are calculated and ends with the preparation of periodicals statements and reports for ascertaining and controlling cost.

c) **Management Accounting:** Management accounting is a distinctive form of resource management which facilitates management's 'decision making' by producing information for managers within organization.

d) **Inflation Accounting:** This accounting system do not consider the cost constant at every time because the price of a commodity change with time to inflation and decline purchasing power of money.

e) **Social Accounting:** This deals with the application of double entry system of book keeping to socio-economic analysis at the preparation, estimation and interpretation of nation and international income and balance sheet.

f) **Value –Added Accounting:** In this system income is measured by the value added by a firm in a particular period. It is the difference between the value of the product and the cost of raw material, stores and any brought out component used for production.

g) **Human Resource Accounting:** Human Resource accounting is the measurement of the cost and value of people for the organization or it is the process of identifying and measuring data about human resources and communicating this information to interested parties.

1.3 Emergence of Cost Accounting

The Institute of Cost and Works Accountants of India (ICWAI) was established as a company limited by guarantee for the development of cost accounting in India. The main purpose of this to develop the cost

accounting as a profession. The maintenance of cost accounting records became mandatory since 1965, after the addition of Sec.209 (1) (d) in the companies act 1956.

The Institute of Cost and Works Accountants of India has recently issued cost accounting standard (CAS) 1 to 4 also to understand the subject in a better manner as follows :-

CAS 1 - Classification of cost
CAS 2 - Capacity determination
CAS 3 - Allocation and apportionment of overhead
CAS 4 - Cost of production for captive consumption

1.4 Nature

Cost accounting is a practice of cost control which is as follows:-

(a) Cost accounting is a branch of systematic knowledge that is a discipline by itself. It consist its own principles, concepts and conventions which may vary from industry to industry.

(b) Cost accounting is a science and arts both. It is science because it is a body of systematic knowledge relating to a wide variety of subject and an art because without the efficiency and experience of cost auditor it is not possible to use costing techniques efficiently.

1.5 Advantages

A good system of costing is the technique of controlling the expenditure and helps bringing economy in production, so it serves the needs of a large section of people in the following ways.

(a) **Benefits to the Management:** The information revealed by cost accounting aims at mainly assisting the management in decision making and optimizing profits. Besides this there are certain advantages of cost accounting to the management i.e. it helps in price fixation, in revealing profitable and unprofitable activities, idle capacity, in controlling cost and also helps in inventory control.

(b) **Benefits to the Employees:** Cost accounting introduces wage scheme, bonus to the efficient & sincere employees which in turn increasing productivity, profitability and lowering cost.

(c) **Benefits to Creditors:** The better management of finance through cost accounting leads to timely debt servicing by company in the form of repayment of loan and payment of interest. To stay and grow in competition and for judging soundness of present and perspective borrower and cost reports give better picture of efficiency profit prospectus and capacity.

(d) **Benefits to the Government:** Cost accounting enables the Govt. to prepare plans for economic development of the country, to make policies regarding taxation, excise duty, export, price, ceiling, granting subsidy etc.

(e) **Benefits to Consumers/Public:** Cost accounting helps consumers in getting goods of better quality at reasonable price.

1.6 Importance

Cost accounting gives information and reports to the management in the following ways:-

(a) **Control of Material Cost –**Cost of material is a major portion of the total cost of a product. It can be controlled by regular supply of material and spares for production, maintaining optimum level of funds in stocks of materials and stores.

(b) **Control of Labour Cost:** If workers complete their work within the specified time cost of labour can be controlled.

(c) **Control of Overheads:** By keeping a strict check over various overheads such as factory, administrative and selling & distribution, this can be controlled.

(d) **Measuring Efficiency:** Cost accounting provides information regarding standards and actual performance of the concern activity for measuring efficiency.

(e) **Budgeting:** The preparation of the budget is the function of costing department and budgeting is done to ensure that the practicable course of action can be chalked out and the actual perform corresponds with the estimated or budgeted performance.

(f) **Price Determination:** On behalf of cost accounting information, management is enable to fix remunerative selling price for various items of products and services in different circumstances.

(g) **Expansion:** The management may be able to formulate its approach to expansion on the basis of estimates of production of various levels.

1.7 Installation of Cost Accounting System

It is essential to undertake a preliminary investigation installing a suitable system of cost accounting to know the feasibility of installing cost accounting system to such business.

(a) **Essential Conditions:** The following conditions are essential for successful functioning of the costing system:-

(i.) Material control system should be very efficient.
(ii.) The role of cost accounting must be clear.
(iii.) The methods of wage payment must be sound and well designed.
(iv.) The cost report should be printed forms to facilitate quick compilation.
(v.) The cost and financial accounts must be integrated so as to facilitate reconciliation of profit.

(b) **Essential Factors for Installing a Cost Accounting System:** The following essential factors are to be considered before installing a cost accounting system :-

(i) Nature of Industry –There is no technique or method of costing that can be applied universally. The nature of business should be considered while applying the costing techniques.

(ii) Background of Business Unit –The back ground of business unit includes its existence, position, rate of growth, policy and philosophy of management. It serves as a basis for designing the cost accounts in respect of necessity, simplicity and investment involved in installing cost account.

(iii) Selling & Distribution Method –The warehousing facility, external transport, market research and other promotion measures, terms of sale and promotion of orders from customers are to be considered with regard to distribution process.

(iv) Flexibility and Uniformity – The cost accounting system to be install must be flexible and uniform in operation and must be capable of adoption to changing conditions and facilitates inter firm comparison among various firms belonging to the same industry.

(v) Product Range – Range of product must be analyzed in terms of size, models, fashions, area of market and competitors to determine the method of costing to be selected.

(vi) Organizational Factors – Size and type of organization, levels of management, extent of delegation and responsibility, extent of departmentalization, availability of modem office equipments

and number of managerial and supervisory staff are to be considered while installing cost accounting.

(vii) Area of Control-It must be given top most priority for exercising control over materials when material control occupies significant are of control.

(viii) Reporting and Use of Electronic Data Processing- The reports of cost data must be frequent and promptitude, while installing cost accounting system. In modern ere use of electronic data processing equipments and computers has become a common practice.

(c) Procedure for Installation

(i.) Nature of Business: Nature of the business of organization like capacity of plant, nature of material and labour, and various processes etc. should be considered before installation of costing system.

(ii.) Determination of Cost Centers: Nature and no. of cost centers required should be decided to control cost.

(iii.) Determination of Process: Suitable system or process should be adopted according to the size of business and nature of product.

(iv.) Nature and Quality of Product: Quality of product, time consumed, and process used etc. should be considered while installing a costing system.

(v.) Determination of Extent and Way to Control: Extent and way to over material, labour and over head should be determination.

(vi.) Arrangement for Flow of Cost Data: Proper arrangement should be made for the information related to cost.

(vii.) Forms: Standardized forms should be used by all foreman and workers.

(viii.) Records to be Maintained: Complete and accurate records should be maintained to carefully work out.

1.8 Essential of a Good Cost Accounting System

A good cost accounting should possess the following essential features:

i) It should be simple, practical and capable of meeting the business concern requirements.

ii) Accurate data should be used by cost accounting system; otherwise it may distort the output of the system.

iii) To develop a good system of cost accounting necessary co-operation and participation of executives from various departments of the business is needed.

iv) The cost of installing and operating the system should be result oriented.

v) It should not sacrifice the utility by introducing unnecessary details.

vi) For the introduction of the system a carefully phased programmed should be prepared by using network analysis.

vii) Management should have faith on costing system and works as a helping hand for its development and success.

1.9 Methods

Depending upon the nature of the business and the types of its products, numbers of methods of cost ascertainment are used in practice. The methods of costing are as follows:

a) **Job Costing:** In this system the cost of each job is ascertained separately which is suitable in all cases where work is undertaken on receiving a customer's order. Like a printing press, motor work shop etc.

b) **Batch Costing:** It is considered as the extension of job costing. It represents a number of small orders passed through the factory in batch. Each batch here is treated as a separate unit of cost.

c) **Contract Costing:** It is suitable for the firms which are engaged in the work of construction of bridges, roads, buildings etc.

d) **Single or Output Costing:** It is used in the business where a standard production is turned out and it is desired to find the cost of a basic unit of production.

e) **Process Costing:** It is a method of costing used to ascertain the cost of a product which may passes through various processes before completion.

f) **Operating Costing:** The cost of providing a service is known as operating cost and the methods to ascertain the cost of such services is known as operating costing.

g) **Multiple Costing:** In multiple costing, a combination of two or more methods of costing is used in conjunction to determine the cost of final product. This method is used by the industries where different components are separately manufactured and subsequently assembled into the finished product. For e.g.: Motor car, Television, Ships etc.

1.10 Techniques

For ascertaining cost, following techniques of costing are usually used:-

a) **Uniform Costing:** The practice in which common methods of costing for different undertakings in the same industry are used is known as uniform costing.

b) **Historical Costing:** In this technique, ascertainment of cost is done after they have been incurred but the utility of this technique is limited.

c) **Direct Costing:** The practice of charging all direct costs to operations, processes or products leaving all indirect costs to be written off against profit's in which they arise are called as direct costing.

d) **Absorption Costing:** In this all costs, both variable and fixed are charged to production, operations or processes.

e) **Marginal Costing:** The method of ascertaining marginal cost by differentiating between fixed and variable costs. This technique is used to ascertain effect of changes in volume or type of output over the profits.

f) **Standard Costing:** The preparation of standard costs and applying them to measure the variations from actual cost and analyzing the causes of variations with a view to maintain maximum efficiency in production is known as standard costing.

g) **Activity Based Costing:** ABC is a system that focuses on activities as fundamental cost objects and utilizes the cost of these activities as building blocks or compiling the costs of other cost objects.

1.11 Cost Accounting vs. Financial Accounting

Basis	Cost Accounting	Financial Accounting
1) Purpose	Its main purpose to guide the management for proper planning, controlling and decision-making etc.	It reveals the final results during the particular period for every concern.
2) Coverage	It deals with expenses related to or identified with products.	This deals with whole organization connected with manufacturing and also other activities or areas.
3) Basis	This deals with estimated and actual data both.	This deals only with the actual financial transactions and figures and not on estimation.
4) Scope	It is related to a particular product or service.	It includes all commercial translation of organisation for a particular period of time.
5) Parties Involved	This deals with internal translations between departments within the organisation.	This concern with external parties as well as external transactions.
6) Final Statement	Only one statement is prepared i.e. statement of cost.	Profit & Loss A/c and balance sheet both are prepared.
7) Valuation of Stock	Stock is valued at cost	Market value or cost whichever is lower is considered as the value of stock.
8) Nature	It does not consider only historical records but also predetermined cost.	It is related to the historical records.
9) Classification	It is clearly classifies the cost into fixed and variable cost.	In this cost is not classified into fixed and variable cost.
10) Legal Requirements	Generally these accounts are kept to meet management requirements. Now it has become obligatory.	It is required by companies act, Income Tax Act, etc. to keep these accounts.

1.12 Limitations of Cost Accounting

These are the following reasons for which cost accounting is criticized by the different sections of society:

a) **Not Reliable:** Cost Accounting is based on estimates and so it is not reliable.

b) **Failure of the System:** Cost Accounting system has failed to produce desired results in many concerns. Thus it could be said that this system is at fault.

c) **Unnecessary:** it is not necessary in Business concern as it involves duplication of work.

d) **Inapplicability**: Modern methods of cost accounting are not applicable to every type of industries.

e) **Expenses:** It is expensive because double set of account books has to be maintained and its introduction involves considerable amount of expenditure.

1.13 Summary

The techniques and process of accounting for cost begins with recording of Revenue and expenditure and the basis on which they are calculated and it also includes the presentation of information in the form of periodical statements and reports for the purpose of managerial decision – making. Cost Accounts are key to economy in manufacturing and are indispensable to the intelligent and economical management of the factory. Thus it has come on essential tool of management.

1.14 Self Assessment Questions

1. "Cost Accounting System is neither unnecessary nor expensive, rather it is profitable investment", Comment.
2. Discuss the characteristics of an ideal system of Cost Accounting and differentiate between cost accounting and financial accounting.
3. Explain different 'Methods' and 'Techniques' of costing.

1.15 Reference Books

- Agrawal, Shah, Mendiratta, Agarwal, Sharma, Tailor — Cost and Management Accounting (Malik and Co.)
- Jain, Khandelwal, Pareek — Cost Accounting (Ajmera Book depot, Jaipur)
- Oswal, Maheshwari, Modi — Cost accounting. Cost Accounting (RBD, Jaipur)
- Agrawal, Jain, Sharma, Shah, Mangal — Cost Accounting (RBD, Jaipur)

Unit - 2 : Basic Cost Concepts

Structure of Unit:

2.0 Objectives

After completing this unit, you will be able to:

- Define the classification of cost and cost concepts.
- Differentiate between components of total cost and to make cost sheet.

2.1 Introduction

Element is an important area of a product. To estimate correct cost accounting, cost classification and analysis is being done. This is also necessary to control the cost. In other words elements of cost means expenditure or cost incurred on resources which are helpful in produce an item, for example material, labour and expenses. To understand the cost one should know what is expenses and loss.

Cost:

Generally cost may be explained as the amount of expenditure, actual or notional, relating to a specific thing or activity such as product, job, service, process etc. It may also be expressed as a sacrifice which may be defined in the terms of money means it is the amount of resources given up in exchange for some goods and services. Cost and expenses are different but relative terms.

Where 'costs' includes the cost of material and labour in addition to expenses, the term expenses is widely applied in financial accounts for various types of historical cost. In cost accounting, it is used for costs other than cost of raw material and wages. To understand the meaning of cost, it is necessary to define the meaning of expenses.

Expenses:

Generally expenses are called expired costs means those costs which have been used up totally in generating revenue. They are not capitalised but only shown as expenses in income statement. There are so many examples of expenses such as costs of goods sold expenses, selling expenses and administrative expenses. For expenses, there is no need to be paid in cash immediately, even a promise to pay could be made for the profits received. The manufacturing costs are capitalised in the form of finished goods inventory and when a sale is incurred, they expire becoming expenses. The cost of unsold stock which was an asset prior, now converts expenses of cost of goods sold as it has contributed to the generation of revenue.

Manufacturing expenses may be expressed as cost because this is included in the cost of fished goods stock which is an asset unless sale is made.

For example, depreciation of a factory machine increases the utility of goods manufactured which are therefore included in work-in-progress and finished goods inventory.

Selling and administrative expenses, when not included in the cost of finished goods stock, are deemed only as expenses, not cost (asset) and are deducted from revenues whenever obtained. Similarly, depreciation of a factory building is a cost but depreciation of an office building is an expense.

The term cost itself is without any significant meaning and therefore, it is always advisable to use it with an adjective or phrase that will convey the meaning intended such as prime, direct, indirect, fixed, variable, controllable, opportunity, imputed, sunk, differential, marginal, replacement and the like. Future costs are also considered in cost accounting but not in financial accounting.

Loss:

To understand the concept of cost, the term 'loss' should be defined.

Loss is lost cost. It is applied to define two accounting events. In financial accounting, it is used to describe a circumstance where expenses exceed revenues for an accounting period, that is, the reverse of net income (earnings) for the accounting period. On the other hand, a loss arises due to the cost of an asset being more than the sale proceeds when the asset is sold. This unfavourable event does not arise from a normal business activity but from non-operating transactions or events. This meaning of loss is used to recognize the reverse of gain. That is, if no gain is achieved from the cost incurred or it becomes definite that no benefits accrue, the cost becomes a lost cost, i.e., loss on sale of fixed asset, loss of stock due to fire etc.

2.2 Classification of Costs

There are so many objectives of cost accounting such as planning, decision- making, stock valuation, profit measurement, control etc. For achieving these objectives, cost should be computed, classified and grouped. Cost classification may be known as the process of grouping costs according to their general characteristics.

The various cost classifications are as follows:

1 Natural Classification of Cost

(A)	Direct Material Cost	(B)	Indirect Material Cost
(C)	Direct Labour Cost	(D)	Indirect Labour Cost
(E)	Direct Expenses Cost	(F)	Indirect Expenses Cost

2. According to Variation in Production Activity and Quantity

(A)	Fixed Cost	(B)	Variable Cost

(C) Semi-variable/Fixed Cost (Mixed Cost)

3. Degree of changeability to the product

(A)	Direct Cost	(B)	Indirect Cost

4. Degree of Relation with the Product

(A)	Product Cost	(B)	Period Cost

5. Functional Classification of Cost

   (A) Manufacturing Cost (B) Selling and Distribution Cost
   (c) Administrative Cost

6. Association with the Accounting Period

   (A) Capital Cost (B) Revenue Cost

7. Costs for Decision-Making and Planning

   (A) Opportunity Cost (B) Sunk Cost
   (C) Relevant Cost (D) Differential Cost
   (E) Imputed Cost/Notional Cost (F) Out-of-pocket Cost
   (G) Fixed, Variable and Mixed Cost (H) Shut Down Cost

8. Costs for Control

   (A) Controllable and Uncontrollable Cost (B) Standard Cost
   (C) Fixed, Variable and Mixed Cost

9. Other Costs

   (A) Joint Cost (B) Common Cost

1. Normal Classification of Cost

A) Direct Material cost: Material means those items which are applied for manufacturing of a product and direct material is directly related to production. For example, raw cotton in textiles, crude oil to make diesel etc. There are so many names of direct materials such as process material, prime cost material, stores material and construction materials.

Main points for direct material can be summarized as follows:

(1) Direct material specially acquired for a particular Job, order, process or product.
(2) It is integrated part of manufacturing unit.
(3) Value of direct material is comparatively higher than that of other materials.
(4) Material passing from one process to another process.
(5) Primary packing materials e.g. wrapping, cardboard boxes, the glass bottle in production of syrup etc
(6) It Increases in the same ratio as the increase in production

B) Indirect Material Cost: In the words of **C.I.MA., London**, "indirect material cost is the material cost which cannot be allocated but which can be apportioned to or absorbed by cost centres or cost units".

Thus it may be said that indirect cost is the cost which cannot be directly identified to the unit of output or to the segment of a business activity e.g. oil, grease, consumable stores etc.

C) Direct Labour Cost: Direct labour is known as the wage of those workers who are involved in the production process whose time can be efficiently and economically traceable to units of products e.g. wages paid to compositors in a printing press, labour of machine operators and assemblers. It

may also be defined as prime labour cost, process labour cost, operating labour cost, manufacturing wages, Direct wages and productive labour cost. In the words of **C.I.MA., London**, "direct wages is that wages which can be allocated to cost centres or cost units."

D) Indirect Labour Cost: Some workers does not engage directly in conversion of output but contribute indirectly. Labour is paid for the objective of carrying tasks incidental to goods or service provided. It cannot be practically traced to particular units of output e.g. wages of store-keepers, foremen, time-keepers, supervisors, Inspectors etc. In the words of **C.I.M.A., London**, "Wages which cannot be allocated but which can be apportioned or absorbed by cost centres or cost units is indirect wages."

E) Direct Expenses Cost: It is also defined as chargeable expenses. These direct expenses are incurred directly on a particular product, Job or cost units and recognizable with the cost units. According to C.I.M.A., London, "Direct expenses means, expenses which can be allocated to cost centres or cost units."

For example, -

(1) Hiring of a particular tool plant or equipment for job.
(2) Cost of special moulds, designs and patterns.
(3) Fees paid to architects, surveyors and consultants.
(4) Insurance charges on special materials chargeable to a job.

F) Indirect Expenses Cost: Those expenses which cannot be directly, conveniently and fully charged to cost units are known as indirect expenses In the words of **C.I.M.A.**, London, "Indirect expenses are expenses which cannot be allocated but which can be apportioned to or absorbed by cost centres or cost unit" For example, insurance, power, lighting and heating, rent, rates and taxes, depreciation etc.

2. According to Variation in Production Activity and Quantity:

Costs can be divided into (i) fixed, (ii) variable, and (iii) mixed costs, in terms of their changes in cost behaviour in relation to variation in output, or activity or volume. Activity can be expressed in any form such as units of output, hours worked, sales, etc.

A) Fixed Cost: Fixed cost is a cost which does not vary in total for a given time period in spite of wide fluctuation in production or volume of activity. These costs are also termed as standby costs, capacity costs or period costs. Few examples explaining the nature of fixed costs are rent, property taxes, supervising salaries, depreciation on office facilities, advertising, Insurance, etc. Fixed costs are incurred with the passage of time and not with the production of the product or the job.

Hence, fixed costs are defined 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 remuneration of supervisor in the form of salary and perquisites are so much per unit but, it can be said that supervisor's salary and perquisites are so much per month.

Fixed costs can be further classified in the following categories

a. Committed costs: Those costs are unavoidable in short-term if the concern has to function. Such costs are basically incurred to maintain the company's benefits and physical existence, and over which

management has little or no discretion. Few examples of committed costs are plant and equipment depreciation, taxes, insurance premium, rate and rent charges.

b. Managed costs: Managed costs are related to current activities which must continue to be incurred to ensure the operating existence of the company e.g., management and staff salaries.

c. Discretionary costs: They are also identified as programmed costs. Discretionary costs result from special policy decisions, management programmes, new researches etc. Few examples of such costs are research and development costs, marketing programmes, new system development costs.

The difference between committed and discretionary costs is that it is hard to eliminate or neglect committed costs in times of low production or decline in business activity, whereas discretionary costs such as research and development could be reduced to a desirable level.

d. Step costs: A step cost is fixed for a given amount of production and then rises in a constant amount at a higher production level. For example, in a manufacturing concern, one supervisor is needed at a salary of Rs 20,000 p.m. for every 50 workers. So long as 50 workers or less than that are working, the supervision costs will be Rs. 20,000 p.m. But, as soon as the 51st worker is employed, the cost of supervision rises by Rs. 20,000 p.m. and will be Rs. 40,000.Up to 100 workers the cost of supervision remains fixed at Rs. 40,000. But, if more than 100 workers are employed the cost of supervision will go up further. The following figure can be used to explain this concept :

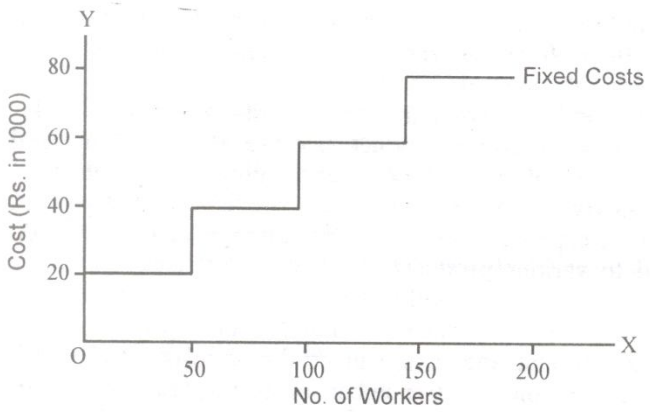


Figure : Step Cost

B) **Variable Cost:** Variable Cost is those costs that change directly and accordingly with the production. There is a fixed ratio between the variation in the cost and variation in the level of output. Direct materials cost and direct labour cost are the costs which are generally variable costs. For example, if direct material cost is Rs. 50 per unit, then for producing each extra unit, a direct material cost of Rs. 50 per unit will be incurred. That is, the total direct material cost increases in direct proportion to increase in units manufactured. However, it should be highlighted that it is only the total variable costs that vary as more units are produced; the per unit variable cost remains fixed.

Variable overheads like factory supplies, indirect materials, sales commission, office supplies are some other examples of variable costs. If the factory is shut down, variable costs are eliminated. Variable cost is always revealed in terms of units or percentage of volume; it cannot be stated in terms of time. For every increase in the units produced there is a proportionate increase in the cost. When production increases to 3,000 units from a level of 2,000 units, the cost of direct materials increases in direct proportion at the fixed rate of Rs. 50 per unit. The line of variable cost is shown as linear rather than curvilinear.

C) **Semi-variable/Fixed Cost (Mixed Cost):** Mixed costs are costs made up of fixed and variable items. They are a combination of semi-variable costs and semi-fixed costs. Because of the variable element, they vary with volume; because of the fixed element, they do not fluctuate in direct proportion to output. Semi-fixed costs are those costs which remain fixed up to a certain level of production after which they become variable.

3. Degree of Changeability to the Product

According to this basis, cost may be divided into direct and indirect cost.

A) **Direct Cost:** it may be defined as the term of direct materials, direct labour and direct overheads. That means it is a cost which can be directly identified to a unit of output or the segment of a business operation. It output units are the objects of costing, then direct cost represent cost and resources that can be traced to or identified with the finished product .

B) **Indirect Cost:** Indirect costs are those costs which cannot be associated with or chargeable to a single product because they are incurred for more products. The examples of indirect costs are: indirect materials (lubricants and scrap materials), salary of factory supervisors (indirect labour), rent, rates and depreciation (indirect expenses). Indirect costs, often related to as overheads, have to be apportioned to various products.

Costs also may be direct or indirect with respect to particular firm segments or divisions. That is some cost which are indirect for a product, may be charged to a segment or department and thus, will be direct costs for that department. A segment may mean any one of a number of things, viz. department, division, specific activity, sales territory etc.

Before classifying the cost into direct and indirect, it is necessary to know whether it is being related with a product, sales area, department or some other activity. For example, if a salesman simultaneously handles several products, his salary is an indirect cost for each product, but a direct cost to his sales area or department.

4. Degree of Relation with the Product

Cost may be divided into product costs and period costs in terms of relation with the product.

A) **Product Cost:** Generally product costs are identified with the product and merged in inventory values. In other words, product costs are those costs that are included in the cost of manufacturing a product. In a manufacturing firm, it is the combination of four elements: (i) direct materials, (ii) direct labour, (iii) direct expenses, and (iv) manufacturing overhead. Thus, product cost is a complete factory cost. Prior to sale, product costs are deferred as inventories and until the goods are sold, are shown on the balance sheet as assets. As finished inventory goods is sold, product costs are transferred from the inventory accounts to the cost of goods sold account thus becoming expenses and part of the period costs at the time revenue is realised.

B) **Period Cost:** Period costs are those costs which are not identified with product or activity during the period in which they are evolved. They are not carried forward as a part of value of stock to the next accounting period.

These costs are required to generate revenues but they cannot be directly related with units of product. Difference of opinion exists regarding whether certain costs should be considered as product or period costs.

5. Functional Classification of Costs

Functional classification of costs defines how the cost was applied (manufacturing, administration or selling). A functional classification expresses that the business performs various functions for which costs are incurred. In measuring net income, expenses are usually classified by function and grouped under the headings of manufacture, selling and administrative costs. Manufacturing costs are all production cost incurred to manufacture the products and to bring them to a saleable condition, including direct materials, direct labour and indirect manufacturing (or factory overhead) costs. Selling and administrative charges may be assumed as expenses when incurred or charged to prepaid expense accounts such as prepaid insurance. Functional classification is also important because it gives an opportunity to the management to calculate the efficiency of departments performing various functions in the firm.

6. Association with Accounting Period

Costs can also be classified into two major classes on the basis of the accounting period to which they relate: (i) capital expenditures, and (ii) revenue expenditures.

A capital expenditure provides benefit to future periods and is classified as an asset; a revenue expenditure is treated to benefit the current period and is classified as an expense; a capital expenditure will flow into the cost stream as an expense when the asset is applied up or written off. The difference between capital and revenue expenditures is vital to the accurate matching of costs and revenue and to the right measurement of periodic net income.

7. Costs for Decision-Making and Planning

A) **Opportunity Cost:** opportunity cost is the cost of opportunity lost. Opportunity cost is the cost of choosing one item of action in terms of the opportunities which are given up to carry out that course of action. Opportunity cost is the profit lost by avoiding the best competing alternative to the one chosen. The benefit lost is normally the net earnings or profits that might have been earned from the rejected alternative.

   For example, assume that a manufacturer can sell a semi-finished product to a customer for Rs. 5,00,000. He decides, however, to keep it and eliminate it. The opportunity cost of the semi-finished product is Rs. 5,00,000 because this is the amount of economic resources rejected by the manufacturer to complete the product. Simultaneously, capital which is invested in plant and inventories cannot now be invested in shares and debentures that will earn interest and dividends.

   The loss of interest and dividend that would be earned is the opportunity cost. Other examples of opportunity cost are when the owner of a business foregoes the opportunity to employ himself elsewhere; or a machine used to make Product X is said to have an opportunity cost if the machine can be sold or if it can also make Product Y.

   Opportunity costs help in decision-making and selecting alternatives. Decision-making is selecting the best alternative which is adopted with the help of opportunity costs. But opportunity costs are not recorded in an accounting system as they relate to opportunities lost.

B) **Sunk Cost:** Sunk cost is past or historical cost which has already been incurred. It may be known as unavoidable cost, it refers to all past costs since these amounts cannot be changed once the cost is incurred. They are the costs which have been created by a decision in the past and cannot be altered or neglected by any decision that is made in the future. Examples of sunk costs are the book values of existing assets, such as plant and equipment, inventory, investment in securities, etc. Except the possible benefits or losses on sales of any of such assets, the book value is not relevant for decisions regarding whether to use them or dispose them off.

Some accountants make discussion and argument that the total cost of a fixed asset is not the sunk cost, but sunk cost is the difference between the purchase price of a fixed asset and the net amount that could be realised from its sale. For example, if a plant has a book value of Rs 10,00,000 and a scrap value of Rs. 60,000 then the sunk cost is Rs. 9,40,000 (Rs 10,00,000 - 60,000) and not Rs. 10,00,000 That is, the sunk cost is the difference between book value and scrap value.

C) **Relevant Cost:** Relevant costs are related to future, which differ between alternatives. Relevant costs may also be termed as the costs which are influenced and changed by a decision. On the other hand, irrelevant costs are not influenced by the decision, whatever alternative is selected. The features of relevant cost are as follows

(i) Relevant costs are basically future costs, i.e. those costs which are, expected to be charged in future. Relevant costs therefore, are not past (sunk) costs which have already been incurred and cannot be altered by a decision.

(ii) Relevant costs are only incremental (additional) or avoidable costs. Incremental costs refer to an increase in cost between two options. Avoidable costs are those which are not incurred from one alternative to another.

To take an example, assume a business firm purchased a plant for Rs. 20, 00,000 and has now a book value of Rs. 2,00,000. The plant had become obsolete and cannot be sold in its present situation. However, the plant can be sold for Rs. 1,60,000 if some modification is done on it which did cost Rs. 60,000.

In this example, Rs. 60,000 (modification cost) and Rs. 1,60,000 (sales value) both are relevant as they reflect future, incremental costs and future revenues a respectively. The firm will have incremental benefit of Rs. 1,00,000 (Rs. 1,60,000 - Rs. 60,000) on sale of the plant.

Rs 20,00,000 has already been incurred and being a sunk cost is not relevant to the decision, i.e. whether modification should be done. Similarly, the book value of Rs. 2,00,000 which has to be written off, whatever alternative future action is chosen is also not relevant because is cannot be altered by any future decision.

D) **Differential Cost:** Differential cost is the increase or decrease in total costs between any two alternatives due to change in activity or a particular management decision.

Differential costs are similar to the additional variable expense charged in respect of the additional output, plus the increase in fixed costs, if any. This cost day be evaluated by taking the total cost of production without the additional contemplated outlay and comparing it with the total costs incurred if the additional output is under consideration.

Differential costs are also named as incremental costs, although technically an incremental cost should refer only to an increase in cost from one alternative to another; decrease in cost should be referred to as decremental cost. Differential cost is a broader concept encompassing both cost increases (incremental costs) and cost decreases (decremental costs) between options.

For example, assume that a company has normal capacity to manufacture 50,000 units of a product; production beyond that point would require the installation of additional plant and equipment that would increase the amount of fixed costs. General utilisation of available capacity ranges between 40,000 and 50,000 units. Fixed costs for the range of output and expanded capacity have been estimated as follows:

	Normal capacity	Expanded capacity
Number of units	40,000 to 50,000	50,000 to 60,000
Fixed costs	Rs. 2,00,000	Rs. 2,50,000

Now assume that the variable cost is Rs. 4 per unit. A statement comparing manufacturing costs at three different production levels would be as follows:

Number of units

Particulars	40,000	50,000	60,000
Variable costs	Rs. 1,60,000	Rs. 2,00,000	Rs. 2,40,000
Fixed costs	Rs. 2,00,000	Rs. 2,00,000	Rs. 2,50,000
Total manufacturing cost	Rs. 3,60,000	Rs. 4,00,000	Rs. 4,90,000
Average per unit	Rs. 9.00	Rs. 8.00	Rs. 8.17
incremental costs	-	Rs. 40,000	Rs. 90,000
Additional output (units)	-	10,000	10,000
Incremental cost per unit	-	Rs. 4.00	Rs. 9.00

The additional capacity which would be needed to expand actions to 60,000 units would enhance the fixed costs by Rs. 50,000. The incremental cost of an additional 10,000 units would total Rs. 90,000 or Rs. 9.00 per unit. The average cost of the 60,000 units would be Rs. 8.17 per unit.

The concept of differential costing is vital in planning and decision-making.

It is an important tool in calculating the profitability of alternative choice decisions and helping management in choosing the optimum alternative. The differential cost analysis can assist management in knowing the additional profit that would be earned if idle or unused capacity is used for additional production or if some extra investments are made by the organization.

E) Imputed Cost / Notional Costs: Imputed costs are those costs which do not involve actual cash outlay. These costs are not actually incurred in some transaction but which are relevant to the decision as they pertain to a particular situation. These costs do not enter into traditional accounting system or in financial records. Interests on internally generated funds, rental value of company-owned property and salaries of owners of a single proprietorship or partnership are some examples of imputed costs.

Costs paid or charged are not imputed costs. For example, if Rs. 60,000 is paid for purchase of raw materials, it is an outlay cost but not an imputed cost, because it would enter into ordinary accounting systems. When a company uses internally generated funds, no actual interest payment is needed. But if the internally generated funds are invested in some projects, interest would have been earned.

The revenue forgone (loss of interest) reveals an opportunity cost, and thus, imputed costs are opportunity costs.

F) Out of Pocket Cost: Out of pocket cost involves the cash outflows due to a particular management decision activity. Non-cash costs such as depreciation are not involved in out-of-pocket costs. This cost concept is important for management in deciding whether or not a particular project will at

least return the cash expenditures related with the project choosen by management. Similarly acceptance of a special order for production may necessitate the considerations of out-of-pocket costs that need not to be charged if the special order proposal is not accepted. Depreciation on plant and equipment is not relevant in decision-making because no cash goes outside the concern.

G) **Fixed, Variable and Mixed Costs:** These costs have been defined in the previous classifications.

H) **Shut Down Cost:** Shut down costs are those costs which have to be arise under all conditions in the case of stopping manufacture of a product or closing down a department or a division. Shut down costs are always fixed costs. If the manufacture of a product is stopped, variable costs like direct materials, direct labour, direct expenses, variable factory overhead will not be incurred. However, a part of fixed costs (if not total fixed costs) related with the product will be incurred such as rent, watchman's salary, property taxes etc. Such fixed costs are unavoidable. Some fixed costs associated with the product become negligible and need not be incurred in case production is stopped such as supervisor's salary, factory manager's salary, lighting, etc. Shut down costs, thus refer to minimum fixed costs which are incurred in the event of closing down of a department or division.

8. Costs for Control

A) **Controllable and Uncontrollable Cost:** Controllable cost is that cost which is subject to direct control at some level of managerial supervision.

The concept of controllable cost is very significant in cost accounting and contributes to the achievement of the goals of cost control and responsibility accounting The CIMA, London, explains controllable cost as 'a cost which can be influenced by the action of a specified member of an undertaking' and a non- controllable cost as 'a cost which can be influenced by the action of a specified member of an undertakings'. Basically, a controllable cost is the cost over which a manager has direct and full decision authority. That is, controllable costs can be controlled (reduced) by a manager at a given organizational level. Some examples of controllable costs are indirect labour, lubricants, cutting tools, and power costs incurred in the machine department. Controllable costs do not reveal that they are 100% controllable. Some costs are partly controllable by a responsibility centre manager. For example, the cost of raw materials is controlled by the production managers as well as purchase managers. The production manager controls at quantity level, and the purchase manager at the price level. Such costs are reported to both of them, but one responsible manager should be held accountable for those costs which he can control.

The term "controllable cost" is different with the terms "variable cost, direct cost". Variable costs change with the output but are not necessarily. For example, factory supplies used for servicing plant and equipment may vary with the output in the production department, but the production manager cannot control them.

It is influenced from the two factors: (i) the time period factor, and (ii) the decision-making authority, can make a cost controllable or uncontrollable. If the time period is long enough all costs can be controllable and curtailed. Similarly, the decision-making authority affects the cost. If a responsibility center manager has been delegated the authority to spend the cost, he can control it but all costs can be said to be controllable by somebody in the concern. The managing director of a company is responsible for all costs. But practically, the responsibility and authority of controlling costs is delegated to various levels in the concern.

B) Standard Cost: Standard costs are those costs which are planned or pre-determined cost estimates for a unit of output in order to get a basis for comparison with actual costs. It is evaluated at assuming a particular level of efficiency in utilization of material, labour and indirect services. Standard costs are used to prepare budgets. Standard cost is a unit concept and indicates standard cost per unit of output, per labour hour etc. On the other hand, the term budgeted Cost' is a total concept and implies total budgeted cost of an item at some activity level or output level such as budgeted cost of material is Rs 8,00,000 if 8000 units are produced.

C) Fixed, Variable and Mixed Costs: These costs have been explained earlier.

9. Other Costs

A) Joint Cost: Joint costs incur where the processing of a single raw material or production resources results in two or more various joint products or by-products up to the point of separation simultaneously. Joint costs relate to two or more products manufactured from a common production process or element-material, labour, or overhead or any combination thereof, or so locked together that one cannot be produced without producing the other(s).

Thus, joint cost is the cost of two or more products that are not identifiable as individual types of products until a particular stage of production known as the split-off point (point of separation) is reached. For example, kerosene, fuel oil, gasoline and other oil products are derived from crude oil. Joint costs are total costs incurred upto the point of separation. Joint costs can be apportioned to different products only by means of some suitable bases of apportionment.

B) Common Cost: Common costs are those which are incurred or charged for more than one product, job or any other certain costing object. These costs are not easily recognizable with individual product and therefore are normally apportioned.

Common costs are common to products, processes, functions, responsibilities, customers, sales territories, costing units and period of time.

2.3 Cost Concepts

There are six basic cost concepts on which cost classification and various cost terms are based, which are as follows :

1. **Concept of Objectivity:** This concept helps to give direction to the operations referred to cost finding, cost analysing, cost recording and cost reporting. This concept requires goal congruence i.e. cost exercises have to be in harmony with the objectives. Objectives influence cost treatments and cost strategies which may include internal reporting for operational, external and specific non-repetitive decisions.

2. **Concept of Materiality:** This concept that forces exactness must be tempered by good judgement, if no misrepresentation of product cost is likely to result. For example, overhead may include few items of direct cost, which may not be as material as to justify tracing them to particular unit of production. A specific decision may be helpful, but benefits may not be materially sufficient to implement it. Materiality is determined with reference to nature of firm's affairs, managerial policies and competitors' practices.

3. **Concept of Time Span:** All assumptions relating to various cost exercises remain valid only during related specific time span. The fixed cost statement is relied upon a time span under consideration. No costs will remain fixed for the whole time. Time span choosed by a firm should be more enough

to permit the procedures to record the related cost, output, labour hours and other factors required in the interpretation or analysts. If time span is too less, leads and lags in recording the cost data may be quite hassle. If cost associating to a specific time span activity is recorded to another time span activity, cost result may turn out to be quite wrong.

4. **Concept of Relevant Range of Activity:** Relevant range of activity reveals the span of volume over which the cost behaviour is expected to remain valid. Various cost activities are relied upon on specific assumptions relating to cost behaviour patterns, which are valid only within the related range of cost exercise. A fixed cost is fixed only in relation to the relevant range of activity during the time span.

5. **Concept of Relevant Cost and Benefit:** This concept is for decision-making objectives. In appraising alternative courses of action, management should consider only relevant cost and relevant profits relating to alternatives under consideration. Irrelevant cost and benefits are ignored. The affects of this concept on operating or cong range capacity decisions are as follows :

   (a) Relevant Cost and Profit for Operating Decisions: In operating decisions concentration is on optimum application of existing capacity. Increment analysis based on differential cost and differential revenue is based directly on the concept of relevant cost and profit.

   (b) Relevant Cost and Profit for Capacity Decisions: Relevant cost and profits to a capacity decision are varied from the cost and profits relevant to an operating decision. In the long-term, the concepts of fixed and variable cost are meaningless. In long-term decisions, cost and profits are evaluated in relation of their influence on cost. A long-term decision must consider time value of money, the timing of the investment and recovery of cost. The terms out-of-pocket cost and sunk cost are also considered from this perspective.

6. **Concept of Normal and Abnormal Cost:** The term normal refers for cost or circumstances which is in agreement with what is representative, usual or regular. The term abnormal refers for cost or circumstances which are varied from what is normal, expected or ordinary. Various cost accounting treatments and strategies are laid down for normal and abnormal cost and circumstances.

   Generally these terms are used in reference to normal or abnormal working situations in cost accounting discussions.

2.4 Components of Total Cost

1. **Prime Cost:** It consists costs of direct material, direct labour and direct expenses. It is also known as basic, first or flat cost.

2. **Factory Cost:** It comprises of prime cost and in addition, works or factory overheads which include costs of indirect labour and indirect expenses. This cost is also known as works cost, production or manufacturing cost.

3. **Office Cost:** If office and administration overheads are added to factory cost office cost is arrived at. This is also termed as administration cost or total cost of production.

4. **Total Cost:** Selling and distribution overheads are added to the total cost of production to get the cost of sales.

The various components of total cost can be depicted through the help following chart:

Components of Total Cost

Direct Material Direct Labour Direct Expenses	Prime Cost or Direct Cost or First Cost
Works Cost Plus Office and Admn. Overheads	Office Cost or Total Cost of Production
Office Cost Plus Selling and Distribution Overheads	Cost of sales or Total Cost

2.5 Cost Sheet

Cost sheet is an analytical statement of expenses relating to production of an article which informs regarding total cost, per unit cost and quantity of production.

According to **Wheldon**, "Cost sheets are prepared for the use of management and consequently, they must include all the essential details which will assist the manager in checking the efficiency of production."

In the words of **C.I.M.A., London**, "Cost sheet is a cost schedule or document which provides for the assembly of the estimated detailed cost in respect of a cost centre or cost unit"

When cost per unit of production is not necessary to calculate then a statement of cost is prepared to ascertain total cost and profit or loss on production.

Cost Sheet or Statement of Cost

For the year ending……

Output……units

Particulars	Total Cost	Cost Per Unit
	Rs.	Rs.
Direct Materials Consumed	-----	------
Direct Wages	-----	------
Direct Charges or Chargeable Expenses	-----	------
Prime Cost	**-----**	**------**
Works Overhead	-----	------
Works Cost	**-----**	**------**
Administrative or Office Overhead	-----	------
Cost of Production or Cost of Goods Sold	-----	------
Selling and Distribution Overhead	-----	-----
Selling Cost or Total Cost	**----**	**----**
Profit ….% on Cost or Selling Cost	----	----
Sales	----	----

Production Statement Output……units

Particulars	Total Cost	Cost Per Unit
	Rs.	Rs.
Raw Materials Consumed (op. stock of R.M.+Purchases + closing stock of R.M.)	----	----
Direct Labour or Wages	----	----
Direct Expenses	----	----
Prime Cost	**----**	----
Works Overhead	----	----
Add : Opening Work in Progress	----	----
Less : Closing Work in Progress	----	----
Works Cost	**----**	**----**
Office Overhead	----	----
Total Cost of Production	----	----
Add : Opening Stock of finished goods	----	----
Less : Closing Stock of finished goods	----	----
Cost of Production or Cost of Goods Sold	**----**	**----**
Selling and Distribution Overhead	----	----
Cost of Sales	**----**	**----**
Profit	----	----
Selling Price	**----**	**----**

Illustration : The following figures have been extracted from the records of a manufacturing company for the year ending 31st December, 2008. You are required to prepare a statement of cost showing : (a) Cost of raw materials consumed (b) Prime Cost (c) Factory Cost (d) Cost of production (e) Cost of goods sold (f) Total cost of goods sold and profit on sales.

	Rs.
Stock of Raw Materials (1-1-08)	3,000
Stock of Raw Materials (31-12-08)	2,400
Purchases of Raw materials	14,000
Stock of work-in-progress (1-1-08)	1,000
Stock of work-in-progress (31-12-08)	800
Carriage inward	500
Manufacturing wages	4,000
Other direct expenses	200
Indirect wages	1,000
Experiment expenses	400
Wastage of materials	50
Factory overhead	7,000
Establishment on costs	2,000
Selling overhead	4,000
Distribution overhead	1,000
Stock of finished goods (1-1-08)	1,200
Stock of finished goods (31-12-08)	3,000
Sales	40,00

Solution:

Statement of Cost

Particulars	Rs.	Rs.
Purchase of Raw Materials	14,000	
Add: Opening Stock of Raw Materials	3,000	
Carriage inward	500	
	17,500	
Less: Closing Stock of Raw Materials	2,400	
(a) Cost of Raw Materials Consumed		15,100
Add: Direct Wages		4,000
Other Direct Expenses		200
(b) Prime Cost		19,300
Add: Factory Overheads:		
Indirect wages	1,000	
Experiment Expenses	400	
Wastage of Materials	50	
Factory Overheads	7,000	8,450
		27,750
Add: Opening Stock of WIP		1,000
		28,750
Less: Closing Stock of WIP		800
Factory Cost		27,950
Add: Office Overheads:		
Establishment on Costs		2,000
Cost of Production		29,950
Add: Opening Stock of Finished goods		1,200
		31,150
Less: Clothing Stock of Finished Goods		3,000
Cost of Goods Sold		28,150
Add: Selling Overheads		4,000
Add: Distribution Overheads		1,000
Total Cost of Goods Sold		33,150
Sales		40,000
Net Profit		6,850

2.6 Summary

Cost is a measurement in monetary terms of the amount of resources used for the purpose. Thus the cost

can be regarded as the price paid for attaining the objects. The objects may be a product, a service or any activity. For proper planning, decision making, stock valuation, profit measurement and control in business cost should be computed, classified and grouped according to their general characteristics.

2.7 Self Assessment Questions

1. Explain the various concepts of 'Cost'.

2. Define Cost Sheet with Performa.

3. From the following particulars of a manufacturing firm, prepare a statement showing:

   (a) Cost of materials consumed
   (b) Works cost
   (c) Cost of production
   (d) Percentage of works overhead to productive wages
   (e) Percentage of general overhead to works cost

	Rs.
Stock of materials on January 1, 2008	40,000
Purchase of raw materials in January, 2008	11,00,000
Stock of finished goods on 1-1-2008	50,000
Productive wages	5,00,000
Finished goods sold	24,00,000
Works overhead charges	1,50,000
Office and general expenses	1,00,000
Stock of materials on 31-1-2008	1,40,000
Stock of finished goods on 31-1-2008	60,000

Ans.: (a) Rs. 10,00,000 (b) Rs. 16,50,000 (c) Rs. 17,50,000 (d) 30% (e) 6.6%

2.8 Reference Books

- Agrawal, Shah, Mendiratta, Agarwal, Sharma, Tailor — Cost and Management Accounting (Malik and Co.)
- Agrawal & Agrawal — Management Accounting (RBD. Jaipur)
- Khan, Jain — Management Accounting (S. Chand & Sons.)
- I. M. Pandey — Management Accounting (S. Chand & Sons.)
- M.R. Agarwal — Managerial Accounting (Garima Publications)
- Jain, Khandelwal, Pareek — Cost Accounting (Ajmera Book depot, Jaipur)
- Oswal, Maheshwari, Modi — Cost accounting. Cost Accounting (RBD, Jaipur)
- Agrawal, Jain, Sharma, Shah, Mangal — Cost Accounting (RBD, Jaipur)

Unit - 3 : Material : Purchasing Organization and Control

Structure of Unit:

3.0 Objectives

After going through this unit, you will be able to understand:

- How material constitutes an integral part of the cost of production
- Who purchase the material
- Centralized /decentralized purchasing
- Purchase cycle or purchase procedure
- Different purchase system
- What is purchase order, GRN , Schedule of Quotations, Debit note

3.1 Introduction

Successful operations of any of the business depend to a large extent on the availability of goods and services of the right quality in the right quantity at the right time, from the right source at theright prices. Out of three elements of cost (material, labor, overheads), material cost account for nearly 50% of the cost of production, it is therefore essential to establish suitable procedure for proper control of materials from the time of placing order with suppliers and vendors until they have been consumed. Material control is a system which ensures the provision of Five Rights as discussed above in the first two lines of this paragraph.

Now what is material. Material constitutes an important part of the cost of product. It means all those supplies and components which are supplied to the organization for the purpose of consumption like Raw material, components, spare parts, consumables etc depending upon the nature of industry. For McDonalds potatoes, flour, cheese, butter, vegetables can be stock of raw material.

Who purchases the materials

There are different groups of purchasers who buy materials for different purpose from different sources.

Ist category

Purchasers ⟶ Who buys ⟶ Ultimate consumption

IInd category

Middlemen ⟶ Whole sellers, retailers, agents

IIIrd category

Manufacturers ⟶ Rawmaterial, components, consumables, machine tools, fuels packing material

IV category

Governmental agencies and institutions ⟶ Public utility

Activity A:

1. Name any three industries where the material function is a board room activity?

Material department can contribute effectively to profits, as purchasing is a spending function and every rupee saved in buying goes to the profit column. The basic objective of material management is to provide raw materials timely.

3.2 Centralized Purchasing

Purchase of Material

Purchasing is a specialized activity in a manufacturing concern because it has its bearing on every vital factor concerning the manufacture like quantity, quality, cost, efficiency, prompt delivery, and volume of production. Quality of finished product ultimately depends upon quality of raw materials used in it. High skill work can of course help in improving the quality of product but it cannot change the character of raw material, which is base for the end product. A traditional housewife is a pace setter when demand, price, consumption, source, money, management comes into pictures. The purchases can be

- Centralized
- Decentralized.

It means all the purchases are made at one central point or by one central department. In such a system all the departments, which requires materials, machines, supplies, components, tools etc. send their purchase request to the centralized purchasing department and this department takes care of timely supply of required purchases. This system is useful in multiproduct, multi unit organization where centralized purchase of key raw materials, which may be common to all products or units, be a very economic proposition.

Benefits of centralized purchasing are as under:

- **It can reduce the price:** As materials are purchased in bulk, which means economical price due to lower rate of materials, trade discount, economical transport etc.
- **Effective control:** Central purchase avoids duplication, overlapping so it helps in exercising effective control on material function.
- **Favourable terms:** When material is acquired in bulk there may be more favourable terms with vendors due to reduced cost and trade discount.
- **Specialized staff:** The staff at central purchasing department becomes expert and specialized in purchase function ,their expert knowledge and negotiation skills can help in reducing the cost of purchase to great extent.
- **Clear policy:** Centralized purchasing helps in adopting uniform policies, practices which ultimately helps in reduction of prices at various levels.

Where centralized purchasing practices can be adopted:

Largest central purchasing organisation is the directorate general of supply and disposal, which caters to the needs of defence, railway and communication. BHEL, also makes centralized purchase of major items like copper and electrical steel for its various units. 100% centralization can exist only in wishful thinking. It has following disadvantages: -

- **It increases the lead time:** If there are too many people from the point supply to point of consumption, it can increase the lead-time.

- **Initial cost is too high:** Centralized purchase needs a full-fledged department in place, which can cater to the needs of all the departments.
- **Supply of inferior quality:** Sometimes inferior quality material is issued for consumption when there is non-availability of material demanded in the stores.

Centralized purchase, how it can be made more effective: It can be made highly effective if user departments will take care of the following: -

- Incomplete Specification
- Frequent last minutes changes
- Rejecting good quality in case of surplus
- Accepting bad quality when urgently needed.

3.3 Decentralized Purchasing

Under decentralized purchasing various department units are authorized or made responsible to take decision independently and directly. In a way the power to procure material are delegated to the concerned department or lower levels

The advantages of this system are: -

- **Better knowledge -** the department which buys the material better knows the requirements of his department.
- **Shorter time of communication-**The local decision making system on the spot will shorter the time of communication.
- **Better control-**the department may have better liason and the and control on the local purchase officer.
- It helps in **reducing the lead-time** due to speedy communication.

No single system can be helpful in achieving the results, so partial centralization for high consumption value items and leaving the remaining to unit level is desirable to be adopted for better results for the company.

Activity B:

1. Which method of purchase is more suitable for the following industry? Steel industry, confectionery unit, Pizza hut

3.4 Purchase Procedure

The success of purchase executives depends a great deal on how well they are able to understand the purchase function. If they have selected right quality, right quantity, right source which can prove to be their strength or weakness at any critical moment. So there should be production target or budget for the concern as a whole. This will help to simplify the work of purchase department. In general, the major functions of a purchase dept. may include:

1. Initiating the Purchase
2. Purchase Requisition
3. Deciding Important Factors
4. Studying the Market and Sources of Supply
5. Placing the Purchase Order
6. Follow Up
7. Receiving and Inspecting the Goods
8. Passing Invoices for Payment

1. Initiating the Purchase

The people who can initiate the purchase of material can be Store keeper, who has to keep his stores in place. Different department heads, who want to acquire such materials, which do not form part of the store list such materials are not usually kept in the store rooms.

2. Purchase Requisition

A form known as purchase requisition is commonly used as a formal request to the Purchase department for procuring goods and services. It enlists all those articles for which the stock balance has come down to ordering points.

Purchase Requisition Form

<table>
<tr><td colspan="7">Cost Centre-------

Please Purchase for ---------- Department</td><td colspan="3">Date------</td></tr>
<tr><td colspan="2">Item No.</td><td colspan="2">Code No.</td><td colspan="2">Description</td><td colspan="2">Quantity Required</td><td colspan="2">Remarks</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td colspan="2"></td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td colspan="3">Required By</td><td colspan="3">Checked By</td><td colspan="4">Approved By</td></tr>
<tr><td colspan="5">For use of Department Issuing this requisition</td><td colspan="5">For use of Purchase Department</td></tr>
<tr><td>Item No.</td><td>Quantity in Stock</td><td>Consumption per Day</td><td>Item No.</td><td>Purchase Order No.</td><td>Supplier</td><td>Delivery Date</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Store Keeper</td><td colspan="5">Purchase Officer</td></tr>
</table>

The Purchase Manager places orders for goods as per the requisition received from the storekeeper or the Department Head. Generally purchase requisition is prepared in triplicate, the original copy is sent to purchase department, second to the store department and third copy is kept by department who is preparing the purchase requisition.

3. Deciding Important Factors

It includes deciding upon the following issues.

- What to Purchase?
- When to Purchase?
- How much to Purchase**?**

4. Studying the Market and Sources of Supply

After deciding quality, quantity, and the next step is to invite inquiries, tenders or quotations from the prospective suppliers in prescribed form with all-necessary details

Schedule of Quotations

XYZ Co.Ltd.

Schedule of Quotations

Material Code ------ Date----------

Serial No.	Name of Party	Quantity offered	Rate per Unit	Time of Delivery	Quality	Other Terms

Initial of Purchase manager---------	Purchase Order No.---------- Date--------

The tenders received are tabulated in a chart. They are compared on different grounds like quality, quantity. Regarding sources of supply, purchase department must have full information of various sources of supply of material, plant and other needs, keeping needs of material requirement of the concern. Records of prices and quotations should be kept in comparative statement called schedule of quotations. A Purchase Manager is also expected to keep pace with current and expected changes in Government import and industrial licensing policy, emergence of substitutes, He should also be able to predict trend of market and market prices, make a bargain on purchases.

Activity: C

1 Being Purchase Manager of an emerging business school you have to purchase 150 laptops for students. Which steps you need to take to purchase the laptops?

5. Placing the Purchase Order/ Supply Order

Deciding on sources of supply, the purchase manager prepares a purchase order, which is request made by the purchaser to the supplier to deliver certain goods of requisite quality and quantity at the terms and conditions agreed between them. A purchase order gives complete details about quantity, quality, specification of goods, rates approved, place and date of delivery, mode of transport, terms of payment etc. Before placing the purchase executives or purchase manager needs to check the vendor rating which helps to decide on a reliable source who will give uninterrupted supply of material.

What is Vendor Rating

A Reliable vendor is the greatest asset of any organization which is must for correct and cordial Buyer-Seller relations. It is necessary to identify potential and reliable vendors and to maintain up to date records

in order to assess their performance. It is essential to compare one vendor's performance with others in order to improve the overall reliability and profitability. In order to fulfill the objective of getting a quality product at minimum cost, It is essential to assess the vendor performance on the basis of price, delivery, quality and service. The purchase section should maintain a book of vendors and enter all complaints or faults of them in order to blacklist any supplier for repeated failure.

Purchase Order

XYZ Co. Ltd

To,

No.-----

Date -------

Our Ref.-------

Please supply the following items in accordance with the terms and conditions mentioned herein.

Item No.	Description	Quantity	Price	Per Unit	Total Value	Remarks

Delivery at-------

Discount--------

Excise Duty--------

Sale Tax-----------

Freight---------

Terms of payment----------

Other particulars---------

Special Instruction

Receipt of this order may please be acknowledged

For XYZ Co. Ltd.

(Signature)

(For Office use only)

Acknowledgement received on

Date of Delivery

Challan No:

Date:

6. Follow Up

Follow up of purchase order in essential to keep pace with schedule of supply by the specified date so that production work should not be interrupted. The purchase manager needs to ensure that material should be supplied on agreed date.

7 . Receiving and Inspecting the Goods

Generally in large works a separate department known as receiving department receives the supplies and in

small under takings, it is done by storekeeper. The delivery note/ advice note sent by supplier is handed over to receiving officials for checking goods with the advice notes.

If any deficiencies are noted the matter is taken up with the supplier by purchase department. Excess supplies are either retained or returned to the suppliers. Goods received note is prepared by the receiving clerk after receiving, inspecting the goods and verifying them with advice note.

Goods Received Note (GRN)

XYZ Co. Ltd. No GRN ---------- Goods Received Note Date---------- From(Supplier)							
Goods		Quantity received	No. Of Packing	Order No.	Advice Note	Inspection	
Description	Code No.					Quantity rejected	Remarks

A GRN gives the following details

- Serial number and Date
- Supplier name and address
- Description, Code,
- Quantity of goods received
- Order No.,
- Supplier advice note number
- Inspection report of goods received
- Bin number where this material is to be entered.

8. Passing Invoices for Payment

The invoices received from the suppliers are passed on to the stores accountant who checks the invoice with the supplier's quotations, copy of the purchase order and goods received note. The quantity, quality and rates of materials are checked and verified. After approving the invoices, these are sent to pay/accounts department for payment to avail cash discounts for prompt payments, if any.

Accounting of Purchases

When the invoices of goods are received by the purchasing department, the purchase order is marked with the invoice number to process the passing of a invoice. If the invoice is in order the purchasing officer will sign and pass it to the accounts department, where it will be checked by a clerk as to its accuracy. The invoice is then entered in the purchase journal. The journal will be posted daily to the purchase ledger and total purchase for a month will be entered into purchase account. The cashier will draw a cheque to clear the creditor's account.

Debit Note

XYZ Co. Ltd.

Debit note

From ----- No.-------

Date-----

We are debiting your A/C with the value of under mentioned materials for the reasons stated. Meanwhile we await your instructions.

Description	Specification	Price	Amount
Our Order No.	Our GRN No.	Your D/N No.	Date received

Please remember a debit note is issued when goods are not according to the standard or received in excess of the order and to be returned. A Credit note may be issued under reverse circumstances.

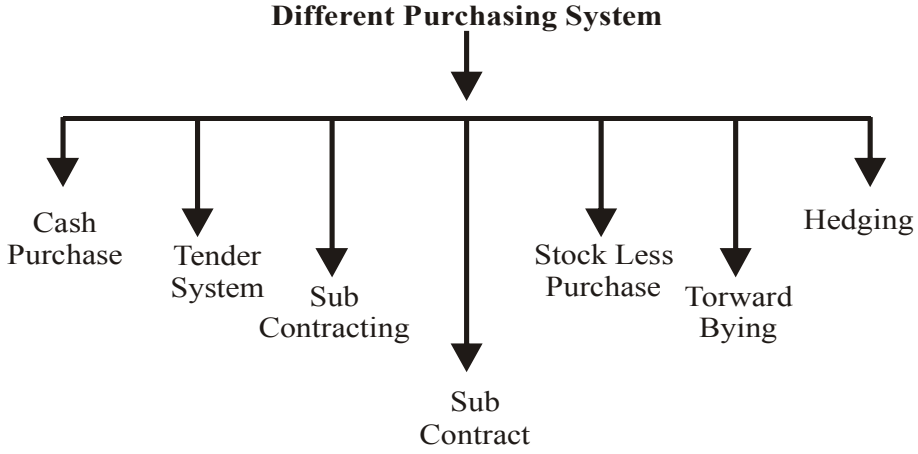
Activity D:

1. Compare Debit note and credit note

3.5 Purchase policy

There are different systems of purchasing available to the industrial buyers. The system depends on factors like demand, supply, price, urgency of requirement, vender, type of material, organization culture, power of delegation, procedures seasonal commodities etc. The basic objective of purchase policy is to buy the required material in the right quantity from right source at the right time and price to obtain the maximum value for each rupee spend on material cost.

Large organizations usually have a written purchase policy, which clearly gives guidelines and direction to all those related.



Cash Purchase

In this system payments are made across the counter. Each department head is given some imprest amount and is authorized to purchase subject to a ceiling value per item. The major reason of purchase of such items is that, such items are required urgently.

Tender System: This system is generally adopted by government sector organizations; the main purpose is to procure materials at the most competitive rates and to eliminate the chances of undue favour to any supplier. Buying should be as impersonal as possible and should foster a spirit of competition. Private sector organizations adopt this method of purchase for items whose values are very high. Major disadvantage of this system is longer time for placing an order compared to other systems. Tender are of three types: -

- Open tender
- Limited tender
- Single tender

When an advertisement is given at least three or four leading national newspapers will be called for **open tender system**: **Limited tender** means when quotations are invited only from registered suppliers and others known sources to the buying organization. The main advantage of this tender is lead time is reduced. When there is only a **single** source of material the value of quotation is not very high. There are mainly for monopoly items.

Sub Contracting

This is most commonly used method of procuring manufactured components for few properly chosen items, if the buying organization feels that manufacturing cost will be higher compared to subcontracting cost. The decision to sub contract is based on factors such as capacity utilization, cost of manufacture, and availability of technology. Generally the sub contractors are smaller establishments with specialists in the line. Most important consideration is to ensure whether the subcontractor would be able to meet delivery schedules and quality requirements. The buying organization must carry out make/buy analysis before deciding upon subcontracting.

System Contract

In this, the seller becomes the material planner for the buyer. It is long-term contract between the buyers and provides for the automatic replenishment. The system is designed to assist both the buyer and the seller. Regularly consumed low value items are system contracted. The buyer has to be careful in the choice of the contractor, because the agreement is of long duration. By adopting this system, the buyer can concentrate on costlier items and items of shortage, leaving other items to system contractor.

Stockless Purchase

Zero stock buying is a system, which largely depends upon sound relations between buyer and seller. If the seller /vendor has clear idea about the requirements of the buyer he can hold the stock at a convenient location, from where the buyer can draw from the warehouse according to his needs. As seller has whole responsibility to hold the stock as per buyer needs, he can charge more for his services. But this increased price is automatically compensated by decreased carrying cost for the buyer.

Blanket Order

Blanket order is generally entered for row value (ABC) C-class items. It is useful for the purchase of those items, whose annual requirements cannot be effectively forecasted. The price can be agreed upon or can be the prevailing market prices at the time of supply. An example of blanket order can be to place an order for

the annual supply of stationery items. The buyer can get quantity discount, as he is placing order for a longer period. The seller will have to concentrate more on services than on trying to convince the buyers.

Forward Buying

In this, the buyers commit to buy at a future date a contracted quality at contracted price, whatever may be the ruling market price then. The buyer does so with a speculative interest that the prices will rise in future. He wants to protect the organization from any future shortage or due increases in price. Forward buying helps buyers and sellers to ensure themselves against uncertainties arising from frequent changes in the supply and demand.

Hedging

Hedging is totally different from forward buying .The buyer tries to protect himself in the future by entering into two transactions, a purchase and a sale in two markets, whose prices move up and down together. But such perfect conditions do not exist in the market. So hedging is basically a tool for protecting against future losses due to difference in different markets.

Activity E:

1 After going through different purchase system which system do you think is most suitable for?
   a) Automobile Industry
   b) Infrastructure Industry
   c) Public sector undertakings

3.6 Principles of Skillful Buying

After going through the purchase cycle, different purchase systems we can say that skillful buying depends upon skillful handling of five rights which are:

Right Quality

The existence of each organization depends upon its valuable customers and they want quality. For a purchase executive quality is the key parameter to decide on purchasing. Right quality of raw material is the base for finished product. Now who decide about the quality of raw material being used, though the responsibility is of design department but the purchase division being eyes and ears of the organization are in better position to suggest about sources and alternatives so that the minimum price is paid for maximum benefit.

Right Quantity

Right quantity means the ideal size of material which should always be available in the stores, so that there should no interruption due to shortage of raw material and supplies. Excess material and shortage of material both the situation are bad for any manufacturing concern .excess stock means blockage of capital, warehousing cost ,insurance cost, maintenance cost and loss due to obsolescence and spoilage. In case of shortage of material means cost of men and machines rendered idle, interruption in production will result in delay of timely supply of goods in the market. So it is very important to decide on right quantity to be ordered, it can be done with the help of deciding inventory levels and with EOQ technique.

Right Prices

This is the most difficult parameter for any purchase executive to decide, because high price does not necessarily means high quality and lowest price need not be the best price .actually right price means which brings the best ultimate value associated with other factors like quality, quantity, delivery and standards. A vendor need to adhere to quality ,quantity and time schedule if he is not keep these requirements, though his prices may be the lower but actual cost to the organization will be more. If the vendor is not able to maintain the quality, it will lead to rejections

Right Source

The success of purchase executive depends on how carefully he has selected his suppliers. If the material does not reach on time or if it is of inferior quality, the organizations production cost will increase due to increased idle time, increased rejections or high input cost. To decide about the right source the purchase executive needs to be fully aware about the track record, rating, financial capability of the supplier, delivery records, capability of handling emergency demands. Sources of material supply should be selected with extra care as these relations go a long way with the organization

Right Time

Right time means to identify when an order is to be placed. There is always a time gap between placing an order, procuring them and supplying them to the point of production. This time gap is called **lead time** .there is a direct relationship between lead time and inventory longer the lead time more the need of working capital. Lead time and consumption rate can change any time without prior information a store has to take of all these uncertain circumstances. The purchase should have right sources or supplier who have proven track record of timely delivery of materials.

Activity F:

1 As purchase manager of a leading concern add few more skills which a person should have for skillful buying?

3.7 Summary

Material planning, buying, receiving, inspecting is scientific process which needs to have skills of different types. An organization needs to decide which method of buying centralized or decentralized is to be followed for what type of material. There are so many factors which decide the quality, quantity, price, source and time of material to be purchased. Material planning is not necessarily a board room activity in different types of organization it varies depending upon the size, needs, demand of the organization.

3.8 Self Assessment Questions

1 "The purchase department is a profit centre" discuss.

2 How efficient buying can contribute to savings for the organization?

3 Write short note on:

- Stock less purchase
- Tender purchase
- Lead time
- System contract
- GRN
- Purchase order

4 What is centralization and decentralization in material management? Compare and contrast between the two.

5 What are the different steps followed by purchase department to fulfill the purchase needs of the organization?

6 What do you understand by 5R's of buying? Discuss.

3.9 Reference Books

- Horngren.T.chareles, Datar.M.Srikant "Cost Accounting a Managerial Emphasis" Pearson
- Gopalakishanan.P., "Purchasing and Material Management", Tata McGraw-Hill education pvt Ltd.
- Bhar B.K., "Cost accounting", Academic publications.
- Jain & Narang, "Cost Accounting", Kalyani Publications, New Delhi

Unit - 4 : Material : Stores Organization and Control

Structure of Unit:

4.0 Objectives

After completing this unit, you will be able to:

- Describe the procedure involved in material storage.
- Understand the concept of inventory control and its need and importance.
- Understand the various inventory records.
- Understand the various inventory control techniques.

4.1 Introduction

Materials constitute a very significant proportion of total cost of finished product. More than fifty percent of the total cost of the product or job is generally the cost of materials alone, in several industries. Therefore, a control of the cost of the materials is quite essential to meet the objectives of cost control and cost reduction.

This control is exercised beginning from the point the orders are prepared for being placed with suppliers, and ending at the point the materials are effectively utilized in production or are disposed off otherwise. We have acquired a basic knowledge about the materials procurement procedure in previous unit and in this unit we will be study about the material storage, inventory record, inventory control and its various techniques.

4.2 Material Issue Procedure

Issue of material must not be made except under properly authorized requisition slip; usually it is the foreman of a department who has the authority to draw materials from the store. Issue of material must be made on the basis of first in fist out, that is, out of the earliest lot on hand. If care is not exercised in this regard, qualify of earliest lot of material may deteriorate for having been kept for a long period.

Material Requisition Note: It is the voucher of the authority as regards issue of materials for use in the factory or in any of its departments. Where a 'Materials List' has been prepared, either the whole of the materials would be withdrawn on its basis or separate materials requisitions would be prepared by the person or department and the material drawn up to the limit specified in the list. The requisition notes are

made out in triplicate. The copies are distributed in the following manner:

- To store-keeper
- To cost department
- To department requiring it

If no material list has been prepared, it is desirable that the task of the preparation of material requisition notes be left to the planning department. If there is no planning department,(or although in existence, is unable to undertake this task), the requisition notes should be prepared by the person or department that requires the materials. Usually, a foreman's authority is enough but, in the case of costly materials, it would be desirable to have such requisition duly approved by some higher authority, like the Superintendent or Works Manager before these are presented to stores.

Performa of Material Requisition Note

Material Requisition Note

Work Order No…… No……

Department…….. Date…….

Item No.	Particulars	Quantity	Rate	Amount

Store keeper Workman receiving the material Foreman S.L. clerk

Bill of Material: It is also known as material specification list or simply material list. It is a schedule of standard quantities of materials required for any job or other unit of production. A comprehensive materials list should rigidly lay down the exact description and specification of all material required for a job or other unit of production and also required quantities so that if there is any deviation from the standard list, it can easily be detected. The materials list is prepared by the engineering or planning department in a standard form. The number of copies prepared varies according to the requirement of each business, but four is the minimum number. A copy of it is usually sent to each of the following department:

- To store department
- To cost account department
- To production control department
- To planning department

The advantages of using **"bill of material"**, by the above departments may be summed up as follows:-

Stores Department:

1. A bill of material serves as an important basis of preparing material purchase requisitions by stores department.
2. It acts as an authorization for issuing total material requirement.
3. The clerical activity is reduced as the stores clerk issues the entire/part or the material requirement to the users if there details of material asked are present in the bill of materials.

Cost Accounts Department:

1. Bill of material is used by Cost account department for preparing an estimate/budget of material cost for the job/process/operation.
2. It may be used as a device for controlling the excess cost material used. This is done after determining material variances and ascertaining the reasons for their occurrence.

Production Control Department:

1. Bill of material may be used by this department for controlling usage of materials.
2. Its usage saves time which otherwise would have been wasted for preparing separate requisitions of materials.

Engineering or Planning Department: As stated earlier this department prepares the materials list in a standard form. A copy of list is sent to stores, cost accounts and production control department.

Proforma of Bill of Materials

Bill of Materials

Job No…….. No……

Department authorized…….. Date……..

SI. No.	Code No.	Description	Qty.	Date of Issue & Qty. Issued Date	Qty.	Rate Rs.	Amount Rs.

Authorized by……..... Received by……

Store keeper's signature……..... Cheeked by……..

Cost clerk……

Difference between Bills of Material and Material Requisition Note

Bills of Material	Material Requisition Note
It is the document prepared by the drawing office.	It is prepared by the foreman of the consuming department.
It is complete schedule of component parts and raw materials required for a particular job of work order.	It is a document authorizing store-keeper to issue materials to the consuming department.
It often serves the purpose of a stores requisition as it shows the complete schedule or materials required for a particular job i.e. it can replace stores requisition.	It cannot replace a bill of materials.
It can be used for the purpose of quotations.	It is useful in arriving historical cost only.
It helps in keeping a quantitative control on materials drawn through stores requisition.	It shows the material actually drawn from stores.

Transfer of Material (Inter – departmental transfer of materials): The surplus material arising on a job or other units of production may sometime be unsuitable for transfer to stores because of its bulk, heavy weight, brittleness or some such reason. It may, however, be possible to find some alternative use for such materials by transferring it to some other job instead of returning it to the store Room.

It must be stressed that generally transfer of material from one job to another is irregular, if not improper, in so far it is not conducive to correct allocation and control of material cost of jobs or other units of production. It is only in the circumstances envisaged above that such direct transfer should be made, at the time of material transfer a material transfer note should be made in duplicate, the disposition of the copies of this not being are as follows :

- **To cost department**
- **To department making transfer**

No copy is required for the store as no entry in the stores records would be called for. The cost department would use its copy for the purpose of making the necessary entries in the cost ledger accounts for the jobs affected.

Proforma of the Material Transfer Note

Material transfer note

From Job No.. …… No. ……

To job No…….. Date……

Item no.	Particulars	Rate	Amount

Transferred by Received by Job ledger clerk

Return of Material: Sometimes, it is not possible before end to make any precise estimate of the material requirements or units of production. Besides, at times due to some technical or other difficulty, it is not practicable to measure exactly the quantity of material required by a department. In either case, material may have to be issued from stores in bulk, often in excess of the actual quantity required. Where such a conditions exists, it is of the utmost important from the point of view of materials control that any surplus material left over on the completion of a job should be promptly hand over to the storekeeper for safe and proper custody.

Unless this is done, the surplus material may be misappropriated or misapplied to some purpose, other than that for which it was intended. The material cost of the job against which the excess material was originally drawn in that case, would be overstated unless the job is given credit for the surplus arising there on.

The surplus material, when it is returned to the store room, should be accompanied by a document known either as a **shop credit note** of alternatively as a **stores debit note**. This document should be made out by the department returning the surplus material and it should be in triplicate to be used as follows:

- Store room
- Cost department
- Department returning it

Proforma of Shop Credit Note

Shop Credit Note

Job No. …… No. ……..

Department……. Date……..

Item No.	Particulars	Quantity	Rate	Amount

Store –keeper S.L.clerk Foreman of returning department

Activity A:

1. After study of above material issue procedure you think that a systematic issue procedure enhance control over material. Why?

4.3 Material Storage

Proper Storing of materials is of primary importance. It is not enough only to purchase material of the required quality. If the purchased material subsequently deteriorates in quality because of bad storage, the loss is even more than what might arise from purchase of bad quality materials. Apart from preservation of quality, the store-keeper also must ensure safe custody of the material. It should be the function of store-keeper that the right quantity of materials always should be available in stock.

4.3.1 Duties of Store Keeper:

These can be briefly set out as follows:

1. To exercise general control over all activities in stores department
2. To ensure safe keeping both as to quality and quantity of materials.
3. To maintain proper records
4. To initiate purchase requisition for the replacement of stock of all regular stores items wherever to stock level of any item of store reaches the minimum limit fixed in respect thereof.
5. To initiate action for stoppage of further purchasing when the stock level reaches the maximum limit.
6. To check and receive purchased materials forwarded by the receiving department and to arrange for the storage in appropriate places.
7. To reserve a particular martial for a specific job when so required.
8. To issue materials only in required quantities against authorized requisition notes/material lists.
9. To check the book balances, with the actual physical stock at frequent intervals by way of internal control over wrong issues, pilferage, etc.

4.3.2 Minimizing the Cost of Purchasing and Store-Keeping:

There are two types of costs which are involved in making a purchase and keeping the goods in the store:

For placing each order, a certain amount of labor is required and, therefore, it will involve a certain sum of money as cost, it is called **ordering cost**. It should be noted that the cost of making a purchase not only includes the cost incurred by the purchasing department but it also includes the cost of receiving and inspecting the goods. These costs will naturally increase if the number of order is large; there can be saving if the number of orders is reduced.

The other type of cost is concerned with keeping the goods in stock it is called **carrying cost** or **holding cost**. It comprised the money invested, the loss which is likely to take place if the goods are kept, the expenses incurred on looking after the items etc. larger the stock, higher will be this type of cost. In order to reduce this cost, it is necessary to bring down level of the stock.

It may be noted that the number of orders can be cut down only, if the quantity of each order is increased, but if that is done, the average quantity of hand will increase and, therefore, interest and the cost of store keeping will be higher. It is necessary, therefore to have balance between those two costs and to keep total of the two at the minimum level. With this objective in view, the **Economic Order Quantity** is worked out. But different items for stock have to be treated differently. The name given to such classification is the **'ABC' Analysis**, or the **Selective Inventory Control.**

4.3.3 Different Classes of Stores:

Stores are classified in following three types

- **Central or Main Store**
- **Sub-Store**
- **Departmental Store**

Central Store: The central stores are the most common of all and in practice, factories generally have only a central store under the control of one store keeper. Such a store is centrally situated and is easily accessible to all departments. If receipts and issues of different items of stores are not large, and the various departments are close to each other, one ventral store for all purposes is sufficient.

Sub-Store: In big organizations, particularly in the case of collieries, tea gardeners, etc., where the work spots are distributed over a large area, sub-stores are created. A sub-store is in fact a branch of the central store. It is generally created to facilitate easy accessibility to the various work spots or consumption centers. Only the essential items, as well as those required urgently, are kept in them. The issues to sub-stores are not treated as consumption but only as a transfer, from one store (central) to another sub-store. The control in the matter of ordering or receiving rests with the central stores and the sub-stores do not generally receive any item directly.

Departmental Store: Departmental stores are created normally to minimize the time spent on drawing from stores. For example, a week's supply may be drawn at one time and kept in a departmental store at a place marked for the purpose. Such stores, however, are essential where one or more production departments work in multiple shifts and the central store works for only one shift; also for the storage of work in progress and semi-finished components where these are large in number or in bulk. Unlike a sub store in the departmental store, the control rests with the department in charge. The materials are generally issued in bulk to the departmental store and it is the responsibility of the department-in-charge to keep proper accounts as regards issues and stock. If the bulk of material is required for only on department, it is usually stored near the department under the charge of the superintendent concerned.

4.3.4 Stores Location:

The location of store should be carefully planned. It should be near to the material receiving department so that transportation charges are minimum. At the same time, it should be easily accessible to all other departments of the factory, railway siding, roads etc. Planned location of the stores department avoids delay in the movement of materials to the departments in which they are needed.

4.3.5 Stores Layout:

The store should be adequately provided with necessary racks, drawers, and other suitable receptacles for storing materials. Each place where materials are kept is called a bin. For example- drawer or rack or a corner. Each bin should be seriously and systematically numbered and for every item a bin allotted, for convenience of access. The number of the bin should be entered in the store ledger concerned accounts.

Activity B:

1. Discuss briefly duties of store keeper.
2. Write five industries and classify their store type.

4.4 Store Record

The record of stores may be maintained in three forms:

- Bin Cards
- Stock Control Cards
- Stores Ledger

The first two forms of accounts are records of quantities received, issued and those in balance, but the third one is an accounts of their cost also. Usually, the accounts are kept in two forms, the quantitative in the store and quantitative-cum-financial in the cost department.

4.4.1 Bin Cards and Stock Control Cards

Both are essentially and mostly similar and contain quantitative records of stores. Stock cards contain further information's regarding stock on order. Bin cards are kept attached to the bins or receptacles or quite near there to so that these also assist in the identification of stock. The stock control cards, on other hand, are kept in cabinets or trays of loose binders.

Advantages of Bin Cards:

1- There would be fewer chances of mistakes being made as entries will be made at the same time as goods are received or issued by the person actually handling the materials.
2- Control over stock can be more effective, in as much as comparison of the actual quantity in hand at any time with the book balance is possible.
3- Identification of the different items of material is facilitated by reference to the bin card the bin or storage receptacle.

Disadvantages of Bin Cards:

1- Store records are dispersed over a wide area.
2- The cards are liable to be smeared with dirt and grease because of proximity of material and also because of handling materials.
3- People handling materials are not ordinarily suitable for the clerical work involved in writing bin cards.

Advantages of Stock Control Cards:

1- Records are kept in a more compact manner so that reference to them is facilitated.
2- Records can be kept in a neat and clean way by men solely engaged in clerical work so that a division of labour between record keeping and actual material handling is possible.

3- As the records are at one place, it is possible to get an overall idea of the stock position without the necessity of going round the stores.

Disadvantages of Stock Control Cards:

1- On the spot comparison of the physical stock of an item with its book balance is not facilitated.

2- Physical identification of materials in stock may not be as easy as in the case of bin cards, as the stock control cards are housed in cabinets or trays.

4.4.2 Stores Ledger

A modern stores ledger is a collection of cards or loose leaves specially ruled for maintain a record of both quantity and cost of stores received. Issued and those in stock. It is a subsidiary ledger to the main cost ledger and maintained by the cost accounts department. It is posted from goods received notes and materials requisitions. The advantages of writing up stores ledger mechanically are:

1- It enables distribution of work among a number of clerks due to which receipts and issues are posted quickly and regularly.

2- It enables stock records to be centralized in case of an organization having a number of depots.

3- The accuracy of posting can be mechanically tested more conveniently.

4- The records are clean and neater. Also the recurring cost of maintaining them is much less than those kept manually.

5- If up-to-date records are available, the management will be able to exercise greater control over quantities held in stock from time to time which may result in a great deal of saving in both the amount of investment in stock and their cost.

Now-a-days, mostly a duplicate record of issues and receipt of materials is kept one on bin cards in the store and the second in the stores ledger in the costing department.

Difference between bin card & stores ledger

Bin Card	Stores Ledger
It is maintained by the storekeeper in the store	It is maintained in costing department.
It contains only quantitative details of material received, issued and returned to stores.	It contains information both in quantity and cost.
Entries are made when transactions take place.	It is always posted after the transaction.
Each transaction is individually posted.	Transactions may be summarized and then posted.
Inter-department transfers do not appear in Bin card.	Material transfers from one job to another job are recorded for costing purposes.

4.4.3 Treatment of Shortages in Stock Taking

At the time of stock taking generally discrepancies are found between physical stock shown in the bin card and stores ledger. These discrepancies are arising due to shortages and losses. The reasons of these discrepancies may be classified as unavoidable or avoidable.

Losses arising from unavoidable causes should be taken care of by setting up a standard percentage of loss based on the study of the past data. The issue prices may be inflated to cover the standard loss percentage. Alternatively, issues may be made at the purchases price but the cost of the loss or shortage may be treated as overheads.

Actual losses should be compared with the standard and excess losses should be analyses to see whether they are due to normal or abnormal reasons. If they are attributable to normal causes, an additional charge to overheads should be made on the basis of the value of materials consumed. If they arise from abnormal causes, they should be charged to the costing profit and loss account.

Avoidable losses are generally treated as abnormal losses. These losses should be debited to the costing profit and loss account.

Losses or surpluses arising from errors in documentation, posting etc., should be corrected through adjustment entries.

Activity C:

1. Discuss advantages and disadvantages of bin card and stock control cards.
2. Discuss treatment of shortages in stock taking.

4.5 Inventory Control

4.5.1 Meaning of Inventory and Inventory Control

Inventory means **"a schedule of items held at a particular point of time."** Inventory comprises of stocks of materials, components, work-in-progress, and finished products and stores and spares. The main objective of inventory control is to achieve maximum efficiency in production and sales with the minimum investment in inventory. Inventory control refers supervision of supply, storage and accessibility of items of inventory in order to ensure adequate supply without excessive oversupply. Material control is an important managerial function which is directed to ensure that required quantity and quality of material is provided at the proper time with the minimum amount of capital.

Inventory control is affected by coordination and control activities relating to planning, sourcing, purchasing, moving and storing of materials. Inventory control and material control are synonym.

4.5.2 Scope of Inventory Control

1. Production, Planning and Control:

(a) Preparation of detailed schedule of parts and materials required to be produced by purchase or manufacture in order to realize an outlined production programmed or sales forecast approved by the top management.

(b) Control of shop loading and other activities to be carried out concurrently to avoid hold- ups in production.

2. Storage Exercises:

(a) Control on physical handling of parts and materials.

(b) Exercising control on materials in stock to prevent physical deterioration and theft. Etc.

3. Inventory Planning and Control: Control of policies and procedures to regulate systematically the parts and materials kept in stock.

4. **External Transport, Control for Efficient Usage of External Transport Activities:** These activities are concerned with the movement of materials from suppliers to the manufacturers and from the manufacturers to customers.

5. **Internal Transport and Material Handling:** Control over the efficient use of material transport and material handling instruments. The internal transport and material handling tools etc. are used for movement of material from one point to another within the factory.

4.5.3 Advantages of Material Control

(a) It eliminates wastages in use of raw materials and supplies in course of purchase , storage handling and use.

(b) Reduces the risk of fraud and theft.

(c) Ensures uninterrupted flow of materials of the right quality for use in production.

(d) Facilities preparation of accurate monthly financial statements required for various management information reports.

(e) Furnishes quickly and accurately the value of material and supplies used in various departments.

(f) Reduces to the minimum the capital locked up in inventories.

(g) Prevents production hold ups by supplying proper quantities at right time. And provides for accountability on the part of those who are responsible for exercising material management.

Activity D:

1. Discuss about inventory control in reference of various five industries.

2. Discuss advantages of inventory control.

4.6 Techniques of Inventory Control

The techniques or the tools commonly applied to effect control over the inventory are following:

Techniques of inventory control:

1. Setting of Various Stock Levels.
2. ABC Analysis.
3. Two Bin System.
4. Establishment of System of Budgets.
5. Use of Perpetual Inventory Records and Continuous Stock Verification.
6. Determination of Economic Order Quantity.
7. Review of Slow and Non-moving Materials and Stock Items.
8. Use of Control Ratios.

1. Setting of Various Stock Levels:

To avoid over-stocking and under-stocking each item of the inventory has the maximum levels, minimum levels and an order point.

(a) Minimum Level:

The lowest figure of inventory balance, which must be maintained in hand at all times, so that there is no stoppage of production due to non-availability of inventory. It is also known as **'Buffer stock'**, **'Safety stock' 'minimum limit' or 'Minimum stock'**.

The main considerations for the fixation of minimum level of inventory are as follows:

1. Information about maximum consumption and maximum delivery period in respect of each item to determine its re-order level.
2. Average rate of consumption for each inventory item.
3. Average delivery period for each item. This period can be calculated by averaging the maximum and minimum period.

The formula used for its calculation is as follows:

Minimum level of inventory = Re-order level – (average rate of consumption x average time of inventory delivery)

(b) Maximum Level:

It indicates the maximum quantity of inventory quantity held in stock at any time. It is also known as **'Maximum limit'** or **'Maximum stock'**.

The important considerations which should govern the fixation of maximum level for various inventory items are as follows:

1. The fixation of maximum level of an inventory item requires information about its re-order level. The re-order level itself depends upon its maximum rate of consumption and maximum delivery period. It in fact is the product of maximum consumption of inventory item and its maximum delivery period.
2. Knowledge about minimum consumption and minimum delivery period for each inventory item should also be known.
3. The determination of maximum level also requires the figure of economic order quantity.
4. Availability of funds, storage space, nature of items and their price per unit are also important for the fixation of maximum level.
5. In the case of imported materials due to their irregular supply, the maximum level should be high.

The formula used for its calculation is as follows:

Maximum level of inventory = Re-order-level + Re-order quantity - (Minimum Consumption x Minimum re-order period)

(c) Re-Order Level:

It is also known as **'Ordering level', 'Reorder point'**. Order point is a point at which order for supply of materials or goods is placed. This level lies between minimum and the maximum levels in such a way that before the material orders is received into the stores, there is sufficient quantity on hand to cover both normal and abnormal consumption situations. In other words, it is the level at which fresh order should be placed for replenishment of stock.

The formula used for its calculation is as follows:

Re-order level = Maximum re-order period x maximum Usage (or) = Minimum level + (average rate of consumption x average time to obtain fresh supplies).

Average Inventory level:

This level of stock may be determined by using the following equal formula:

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

Or

= Maximum level + Minimum level \ 2

(e) Danger Level:

It is the level at which normal issues of the raw material inventory are stopped and emergency issues are only made. As and when the danger level is reached, the material has to be purchased at any price at which available.

The formula used for its calculation is as follows:

Danger level = Average Consumption x Lead time for emergency purchases

Illustration: 1

Two Components, A and B are used as follows:

Normal usage	50 per week each
Maximum usage	75 per week each
Minimum usage	25 per week each
Re-order quantity	A : 300; B : 500
Re-Order period	A: 4 to 6 Weeks
	B: 2 to 4 weeks

Calculate for each component (a) Re-ordering level, (b) Minimum level,(C) Maximum level (d) Average Stock level.

Solution:

(a) Re-ordering level:

Maximum usage per week x Maximum delivery period.

Re-ordering level for component A = 75 units x 6 Weeks = 450 units
Re-ordering level for component B = 75 units x 4 Weeks = 300 units

(b) Minimum level :

Re-order leave – (Normal usage x average period)
Minimum level for component A = 450 units - 50 units x 5 weeks = 200 units
Minimum level for component B = 300 units - 50 units x 3 weeks = 150 units

(c) Maximum level :

ROL + ROQ – (Min. Usage x Minimum period)
Maximum level for component A = (450 units + 300 units) – (25 units x 4weeks) = 650 units
Maximum level for component B = (300 units + 500 units) – (25 units x 2 weeks) = 750 units

(d) Average stock level :

½ (Minimum + maximum) Stock level
Average stock level or component A = ½ (200 units + 650 units) = 425 units.
Average stock level for component B = ½ (150 units + 750 units) = 450 units.

Activity E:

1. Discuss about various stock levels.

2. ABC Analysis:

This system exercises control over different items of stores classified on the basis of the investment involved. Usually the items are divided into three categories according to their importance, namely, their value and frequency of replenishment during a period.

(i) 'A' Category of items consists of only a small percentage i.e. about 10% of the total items handled by the stores but require heavy investment about 70% of inventory value, because of their high prices or heavy requirement or both.

(ii) 'B' Category of items is relatively less important; they may be 20% of the total items of material handled by stores. The percentage of investment required is about 20% of the total investment in inventories.

(iii) 'C' Category of items does not require much investment; it may be about 10% of total inventory value but they are nearly 70% of the total items handled by store.

'A' Category of items can be controlled effectively by using a regular system which ensures neither over-stocking nor shortage of material for production. Such a system plans its total material requirements by making budgets. The stocks of materials are controlled by fixing certain levels like maximum level, minimum level and re-order level.

A reduction in inventory management costs is achieved by determining economic order quantities after taking into account ordering cost and carrying cost. To avoid shortage and to minimize heavy investment in inventories, the techniques of value analysis, variety reduction, standardization etc., may be used.

In the case of 'B' category of items, as the sum involved in moderate, the same degree of control as applied in 'A' category of items is not required the orders for the items, belonging to this category may be placed after reviewing their situation periodically.

For 'C' category of items, there is no need of exercising constant control. Orders for items in this group may be placed either after six months or once in a year, after ascertaining consumption requirements. In this case the objective is to economies on ordering and handling costs.

Illustration - 2:

A factory uses 4,000 varieties on inventory. In terms of inventory holding and inventory usage, and following information is compiled:

No. of varieties of inventory	%	%value of inventory holding (average)	%of inventory usage (in end-product)
3,875	96.875	20	5
110	2.750	30	10
15	0.375	50	85
4,000	100	100	100

Classify the items of inventory as per ABC analysis with reasons.

Solution:

Classification of the items of inventory as per ABC analysis

1. 15 number of varieties of inventory items should be classified as 'A' category items because of the following reasons:
   (i) Constitute 0.375% of total number of varieties of inventory handled by stores of factory, which is minimum as per given classification in the table.
   (ii) 50% of total use value of inventory holding (average) which is maximum according to the given table.
   (iii) Highest in consumption about 85% of inventory usage (in end-product).
2. 110 number of varieties of inventory items should be classified as 'B' category items because of the following reasons :
   (i) Constitute 2.750% of total number of varieties of inventory items handled by stores of factory.
   (ii) Requires moderate investment of about 30% of total use value of inventory holding (average).
   (iii) Moderate in consumption about 10% of inventory usage (in end-product).
3. 3,875 number of varieties of inventory items should be classified as 'c' category item because of the following reasons:
   (i) Constitute 96.875% of total varieties of inventory items handled by stores of factory
   (ii) Requires about 20% of total use value of inventory holding (average).
   (iii) Minimum inventory consumption i.e. about 5% of inventory usage (in end-product).

Advantages of ABC analysis: the advantages of ABC analysis are the following:

(i) Continuity in production: It ensures that, without there being any danger of interruption of production for want of materials of stores, minimum investment will be made in inventories of stocks of materials or stocks to be carried.

(ii) Lower cost: The cost of placing orders, receiving goods and maintaining stocks is minimized specially, if the system is coupled with the determination of proper economic order quantities.

(iii) Less attention required: management time is saved since attention need be paid only to some of the items rather than all the items as would be the case if the ABC system was not in operation.

(iv) Systematic working: With the introduction of the ABC system, much of the work connected with purchases can be systematized on a routing basis to be handled by subordinate staff.

Activity F:

1. Discuss about ABC analysis and its application in various industries.

2 . Discuss advantages of ABC analysis.

3. Two Bin System:

Under this system each bin is divided into two parts – one, smaller part, should stock the quantity equal to the minimum stock or ever the re-ordering level, and the other to keep the remaining quantity, issues are made out of the large part; but as soon as it becomes necessary to use quantity out of the smaller part of the

bin, fresh order is placed. 'Two Bin System' is supplemental to the record of respective quantities on the bin card and the store ledger card.

4. Establishment of System of Budgets:

To control investment in the inventories, it is necessary to know in advance about the inventories requirement during a specific period usually a year. The exact quantity of various type of inventories and the time when they would be require can be known by studying carefully production plans and production schedules. Based on this, inventories requirement budget can be prepared. Such a budget will discourage the unnecessary investment in inventories.

5. Use of Perpetual Inventory Records and Continuous Stock Verification

According to terminology of cost accountancy **"perpetual inventory is a system of records maintained by the controlling department, which reflects the physical movement of stocks and their current balance."**

Perpetual inventory represents a system of records maintained by the stores department. The records used for perpetual inventory are:

(i) Bin card;
(ii) stores ledger accounts;
(iii) The forms and documents used for receipts, issue and transfer of materials.

Bin card maintains a quantitative record of receipts, issues and closing balances of each item of stores. Separate bin cards are maintained for each item. Each card is filled up with the physical movement of goods i.e. on its receipt and issue.

Like bin cards, the store ledger are maintained to record all receipt and issue transactions in respect of materials. It is filled up with the help of goods received note and material issue requisitions.

A perpetual inventory is usually checked by a programme of continuous stock taking. Continuous stock taking mean the physical checking of those records (which are maintained under perpetual inventory) with actual stock. Perpetual inventory is essential for material control. It incidentally helps continuous stock taking.

The success of perpetual inventory depends upon the following:

(a) The stores ledger-(showing quantities and amount of each item).
(b) Stock control cards (or bin cards).
(c) Reconciling the quantity balances shown by store ledger & stock control cards.
(d) Checking the physical balances off number of items every day systematically and by rotation.
(e) Explaining promptly the causes of discrepancies, if any, between physical balances and book figures.
(f) Making corrective entries where called for after step analyzing discrepancies and
(g) Removing the causes of the discrepancies.

Advantages – The main advantages of perpetual inventory are as follows:

(1) Physical stocks can be counted and book balances adjusted as and when desired without waiting for the entire stock – taking to be done.
(2) Quick compilation of profit and loss account (for interim period) due to prompt availability of stock figures.

(3) Discrepancies are easily located and thus corrective action can be promptly taken to avoid their recurrence.
(4) A systematic review to the perpetual inventory reveals the existence of surplus, inactive, obsolete and slow-moving materials, so that corrective measures may be taken in time.
(5) Fixation of the various stock levels and checking of actual balances in hand with these levels assist the store keeper in maintaining stocks within limits and in initiating purchase requisitions for correct quantity at the proper time.

Continuous Stock Verification – The checking of physical inventory is an essential feature of every sound system of material control. Such a checking may be periodical or continuous. Annual stock-taking, however, has certain inherent shortcomings which tend to detract from the usefulness of such physical verification. For instance, since all the items have to be covered in a given number of days. Either the production department has to be shut down during those days to enable thorough checking of stock or else the verification must be of limited character.

Moreover, in the case of periodical checking there is the problem of finding an adequately trained contingent. It is likely to be drawn from different departments where stock-taking is not the normal work and they are about to discharge such temporary duties somewhat perfunctorily. The element of surprise, that is essential for effective control is wholly absent in the system. Then if there are stock discrepancies, they remain undetected until the end of the period. Often, the discrepancies are not corrected.

The system of continuous stock-taking consists of counting and verifying the number of items daily throughout the year so that during the year all items of stores are converged three or four times. The stock verifiers are independent of the stores, and the stores staff has no foreknowledge as to the particular items that would be checked on any particular day. But it must be seen that each item is checked a number of times in a year.

Advantages – The advantages of continuous stock-taking are:

1. Closure of normal functioning is not necessary.
2. Stock discrepancies are likely to be brought to the notice and corrected much earlier than under the annual stock-taking system.
3. The system generally has a sobering influence on the stores staff because of the element of surprise preset therein.
4. The movement of stores items can be watched more closely by the stores auditors so that chances of obsolescence buying are reduced.
5. Final accounts can be ready quickly. Interim accounts are possible quite conveniently.

6. Determination of Economic Order Quantity (EOQ) –How much to purchase at one time:

Purchase department in manufacturing concerns is usually faced with the problem of deciding the 'quantity of various items' which they should purchase. The matter under consideration is not 'how much to purchase' but 'how much to purchase at one time.' If purchases of material are made in bulk then inventory carrying cost will be high. On the other hand if order size is small each time, then the ordering cost will be high. In order to minimize ordering and carrying costs it is necessary to determine the order quantity which minimizes these two costs.

Economic order quantity is an order size. The size of the order for which both ordering and carrying cost are minimum, is known as economic order quantity.

Ordering Cost: The cost which is associated with the purchasing or ordering of material. It includes costs of staff posted for ordering for goods, expenses incurred on transportation of goods purchased, inspection cost of incoming material etc.

Carrying Cost: The cost for holding the inventories. It includes the cost of capital invested in inventories. Cost of storage, insurance cost etc.

Assumptions underlying E.O.Q.: The calculation of economic order of materiel to be purchased is subject to the following assumptions:

(i) Ordering cost per order and carrying cost per unit per annum are known and they are fixed.
(ii) Anticipated usage of material in units is known.
(iii) Cost per unit of the material is constant and is known as well.
(iv) The quantity of material ordered is received immediately i.e. the lead time is zero.

The famous mathematician Wilson derived the formula which is used for determining the size of order for each of purchases at minimum ordering and carrying costs.

The formula given by Wilson for calculating economic order quantity is as follows:

$$EOQ = \sqrt{\frac{2A\,O}{C}}$$

Where, A = Annual usage in units
O = Ordering cost per order
C = Annual carrying cost of one unit, i.e., carrying cost per unit per ann (Carrying cost percentage x cost of one unit)

Activity G:

1. Discuss about EOQ and its utility.

Illustration - 3:

Calculate the Economic order Quantity from the following information. Also state the number of orders to be placed in a year.

Consumption of materials per annum	:	10,000 kg.
Order placing cost per order	:	Rs. 50
Cost per kg. of raw material	:	Rs. 2
Storage costs	:	8% on average inventory

Solution:

$$EOQ = \sqrt{\frac{2AO}{C}}$$

A = Annual consumption in units
O = Ordering cost per order
C = Inventory carrying cost per unit per annum

$$EOQ = \sqrt{\frac{2x10,000x50}{\frac{2x8}{100}}} = \sqrt{\frac{2x10,000x50x50}{4}}$$

$$= 2,500kg$$

$$\text{No. of order to be placed in a year} = \frac{\text{Total Consumption of metrials per annum}}{\text{EOQ}}$$

$$= \frac{10,000\,\text{kg}}{2,500\,\text{kg}} = 4\,\text{order per year}$$

Illustration - 4:

The average annual consumption of a material is 18,250 units at a price of Rs. 36.50 per unit. The storage cost in 20% on average inventory and the cost of placing an order is Rs. 50. How much quantity is to be purchased at a time?

Solution:

$$EOQ = \sqrt{\frac{2AO}{C}}$$

$$\sqrt{\frac{2x18250x50}{\frac{36.50x20}{100}}}$$

EOQ = 500 Units

Illustration - 5:

From the details given below, calculate:

(1) Re-ordering level

(2) Maximum level

(3) Minimum level

(4) Danger level.

Re-ordering quantity is to be calculated on the basis of following information:
Cost of placing a purchase order is Rs. 20.
Number of units to be purchased during the year is 5,000 units.
Purchases price per unit inclusive of transportation cost is Rs. 50.
Annual cost of storage per units is Rs. 5.

Details of lead time	:	Average 10 days, maximum 15 days, minimum 6 days. For emergency purchases - 4 days.
Rae of consumption	:	Average: 15 units per day, Maximum: 20 units per day.

Solution:

O (Ordering cost per order)	=	Rs. 20
A (Number of units to be purchased annually)	=	5,000 units
Purchase price per unit inclusive of transportation cost	=	Rs. 50.
Annual cost of storage per unit	=	Rs. 5

Computations:

(1) Re-ordering level = Maximum Usage per period x maximum re-order period

(ROL) = 20 Units per day x 15 days = 300 units

(2) Maximum level = ROL + ROQ – [Min. rate of consumption x Min. re-order Period] (**Refer to working notes 1 and 2)**

= 300 units + 200 units – [10 units per days x 6 days]

= 440 units

(3) Minimum level = ROL – Average rate of consumption x average re-order-period

= 300 units – (15 units per days x 10 days)

= 150 units

(4) Danger level = Average consumption x Lead time for emergency purchase

= 15 units per day x 4 days = 600 units

Working Notes:

1. $EOQ\,(ROQ) = \sqrt{\frac{2AxQ}{C}}$

$EOQ = \sqrt{\frac{2x\,5000\,x\,20}{5}} = = \sqrt{\frac{200000}{5}}$

$\text{Average rate of Consumption} = \frac{\text{Minimum rate of cusumption} + \text{max imum rate of con sup tion}}{2}$

$15 \text{ units per day} = \frac{X \text{ units} \setminus \text{day} + 20 \text{ units per day}}{2}$

$= 10 \text{ Units per day}$

Illustration - 6:

About 50 items are required every day for a machine. A fixed cost of Rs. 50 per order is incurred for placing an order. The inventory carrying cost per item amounts to Rs. 0.02 per day. The lead period is 32 days. Computer:

(I) Economic order quantity.

(II) Re-Order level.

Solution:

Annual consumption (A) = 50 items x 365 days = 18,250 items

Fixed cost per order (O) or Ordering cost = Rs. 50

Inventory carrying cost per item per annum (C) = Rs. 0.02 x 365= Rs. 7.30

$EOQ = \sqrt{\frac{2x18250\,x\,50}{7.3}} = \sqrt{\frac{1825000}{7.3}}$

Re-order level = Maximum usage per day x Maximum lead time

= 50 items per day x 32 days

= 1,600 items

7. Ascertainment of Slow and Non- moving Materials and Stock Items:

Certain materials are slow moving. It means that their consumption rate is quite slow. Sometimes, due to high value of slow moving and non-moving raw materials, it appears that the concern has blocked huge sum of money unnecessarily in raw materials and storing costs continue to be incurred in such materials. To overcome this problem, it is necessary to dispose-off as early as possible, the non-moving items or make arrangements for their puff out with the inventories required by the concern. Besides this no new requisition should be made for the purchase of slow moving items, till the existing stock is exhausted. Computation of inventory turnover ratio may help in identifying slow moving items.

8. Use of Control Ratios:

(a) Input Output Ratio: Inventory control can also be exercised by the use of input output ratio analysis. Input-output ratio is the ratio of the quantity of input of material to production and the standard material content of the actual output.

This type of ration analysis enables comparison of actual consumption and standard consumption, thus indicating whether the usage of material is favourable or adverse.

(b) Inventory Turnover Ratio: Computation of inventory turnover ratio for different items or material and comparison of the turnover rates, provides a useful guidance for measuring inventory performance. High inventory turnover ratio indicates that the material in the question is a fast moving one. A low turnover ratio indicates over–investment and blocking of the working capital in inventories. Inventory turnover ratio may be calculated by using following formulae:-

$$\text{Inventory turnover ratio} = \frac{\text{Cost of materials consumed during the period}}{\text{Cost of average stock held during the period}}$$

Average stock = ½ (opening stock + closing stock)

By comparing the number of days in the case of two different materials, it is possible to known which is fast moving and which is slow moving. On this basis, attempt should be made to reduce the amount of capital locked up, and prevent over-stocking of the slow moving items.

Activity H:

1. List out various techniques of inventory control.

2. Analyze at least five industries about their inventory control techniques.

4.7 Summary

- **Material Control:** It is the systematic control over the procurement, storage and usage of materials to maintain even flow of materials and avoiding at the same time excessive investment in inventories.
- **Material Requisition Note:** Document is prepared by the storekeeper to initiate the process of purchases.
- **Material Transfer Note:** This document is prepared when the material is transferred from one department or job to another.
- **Material Return Note:** It is a document given with goods being returned from Factory back to the stores.
- **Bin Card:** A prime entry record of the quantity of stocks, kept on in/out/balance, held in designated storage areas.
- **Stores Ledger :** A ledger containing a separate account for each item of material.

· **Techniques of Inventory Control:** The techniques or the tools commonly applied to effect control over the inventory are following:

1. Setting of various stock levels.
2. ABC analysis.
3. Two bin system.
4. Establishment of system of budgets.
5. Use of perpetual inventory records and continuous stock verification.
6. Determination of economic order quantity.
7. Review of slow and non-moving items.
8. Use of control ratios.

Important Formula

1. **Maximum Level** = Reorder level + Reordering Quantity – (Minimum Consumption x Minimum Lead time)
2. **Minimum Level** = Reorder Level – (Average Consumption x Average Lead time)
3. **Average Stock Lever** = Maximum Level + Minimum Level / 2
   Or Minimum Level + ½ reorder quantity
4. **Reorder Level** = Maximum Consumption x maximum lead time
5. **Danger Level** = Average Consumption x Emergency delivery time
6. **EOQ** $= \sqrt{\frac{2 \times \text{Annual Consumption} \times \text{buying cost per order}}{\text{Cost of carrying one unit of inventory for one year}}}$
7. **No. of orders per year =** Annual consumption / EOQ
8. **Time between two consecutive orders =** 365 / No. of orders per year
9. **Inventory Turnover ratio** = Material Consumed / Average inventory
10. **Inventory turnover period** = 365 / inventory turnover ratio
11. **Safety Stock** = Annual Demand / 365 x Max. Lead time – Normal Lead time
12. **Total inventory cost** = ordering cost + carrying cost + purchase cost
13. **Cost of material consumed =** opening stock + purchase + direct expenses – closing Stock

Note :-

(1) For calculation of total inventory cost, average inventory should be taken as half of EOQ. Average inventory cost is normally given as a percentage of cost per unit.

(2) To decide whether discount on purchase of material should be availed or not. Compare total inventory cost before discount and after discount. Total inventory cost will include ordering cost, carrying cost and purchase cost.

4.8 Self Assessment Questions

1. What is a Bin-Card? Give a specimen and discuss its utility.
2. Write short notes on:

   (a) Bill of materials, (b) Purchase Requisition, (c) Bin-Card.

3. What are the objects of material control? State briefly the various methods for pricing the issue of materials. Also, discuss the merits, demerits and suitability of each method.

4. What do you mean by Inventory Control?

5. Discuss various techniques of inventory control.

6. What do you mean by EOQ? Write assumption of EOQ.

7. Discuss perpetual inventory system?

Practical Problems for Self Evaluation

Q.1 From the following particulars find out the Economic order quantity:

(i)	Annual Demand	12000 units
(ii)	Ordering cost	Rs. 90 per order
(iii)	Inventory carrying cost per annum	Rs. 15

Ans. 379 Units Approx

Q.2 A manufacturer buys certain equipment from outside suppliers at Rs. 30 per unit. Total annual needs are 800 units.

The following further data are available

Annual return on investment	10%
Rent, Taxes, Insurance per unit per year	Rs. 1
Cost of placing an order	Rs. 100

Determine the economic order quantity.

Ans. 200 Units

Q.3 Priya Tube Ltd. Manufactures picture tubes for T.V. from the following details ascertain -

(i) Economic order quantity (ii) Re- order level
(iii) Maximum level of stock and (iv) Minimum level of stock

Ordering cost	-	Rs. 100 per order.
Inventory carrying Cost	-	20% p.a.
Cost of Tube	-	Rs. 500 per tube
Normal Usage	-	100 Tubes per week
Minimum Usage	-	50 Tubes per week
Maximum Usage	-	200 Tubes per week
Lead time to supply	-	6-8 weeks.

Q.4 G ltd. produces a product which has a monthly demand of 4000 units. The product requires a component X which is purchased at Rs 20. For every finished product one unit of component is required. The ordering cost is Rs. 120 per order and the holding cost is 10% p.a.

You are required to calculate:

(i) Economic order quantity
(ii) If the minimum lot size to be supplied is 4000 units, what is the extra cost the company has to incur?
(iii) What is the minimum carrying cost, the company has to incur ?

Ans. (I) 2400 Units (ii) Rs. 640 (iii) Rs. 2400

Q.5 M/s Tubes Ltd. Are the manufacturers of picture tubes for T.V. the following are the details of their operations during 1997.

Average monthly market demand	2000 Tubes
Ordering costs	Rs. 100 per order
Inventory carrying cost	20% per annum
Cost of tube	Rs 500per tube
Normal usage	100 tubes per week
Minimum usage	50 tubes per week
Maximum usage	200 tubes per week
Lead time to supply	6-8 weeks

Compute from the above

(i) Economic order quantity. If the supplier is willing to supply 1500 units at discounts 5% is it worth accepting?

(ii) Maximum level of stock (iii) Minimum level of stock (IV) Reorder level.

Ans. (i) 102 Tubes (ii) 1402 Tubes (iii) 900 Tubes (iv) 1600 Tubes

Q.6 Calculate the Economic order quantity from the following information. Also state the number of orders to be placed in a year:

Consumption of materials per annum	10000 Kg
Order placing costs per order	Rs. 50
Cost per kg of raw materials	Rs. 2
Storage costs	8% on average inventory

Ans. (i) 2500 Kg. (ii) 4 Orders

4.9 Reference Books

- Prof. M.L. Agarwal & Dr. K.L. Gupta, 2010, Cost Accounting, First Edition, Sahitya Bhawan Publication.
- P.C. Tulsian, 2006, Cost Accounting, First edition, TMH.
- D.M.Wilson, 2009, Cost Accounting, First Edition, Himalaya Publication House.
- Dr. M.N.Arora, 2009, Theory & Practices of cost, First Edition, Himalaya Publication House.

Unit - 5 : Material : Issue Control, Pricing and Accounting

Structure of Unit:

5.0 Objectives

After completing this unit, you will be able to:

- Understand the various methods of pricing material issues.
- Evaluate different methods of pricing material issues.
- Understand the procedure of pricing of incoming material.
- Understand the various types of material losses, their control techniques and treatments in cost accounting.
- Understand the monitoring of consumption of materials.

5.1 Introduction

In previous unit, we have studied about material issue procedure, storage of material, inventory control and its techniques. But beyond this study there are many aspects which have equal importance in accounting for materials. These aspects are pricing of incoming materials, pricing of outgoing materials, material losses and monitoring of consumption of materials. Without knowledge of these aspects a cost accountant cannot fulfill objectives of cost accounting. In this unit, we will discuss in detail all aforesaid contents of material cost accounting.

5.2 Pricing of Incoming Material

In order to determine the accurate value of material issued for various production activities or jobs, it is necessary to determine the true actual cost of the material purchased. The invoice of material purchased from the market sometime contain items such as trade discount, quantity discount, freight, duty, insurance, cost of containers, sales tax, excise duty, cash discount etc and determination process becomes more difficult when various type of materials have been purchased from a common supplier and joint expenses were to bring the material to store. Under such a situation, following points should be taken care off:

1) The general principle is that all costs incurred up to the point of procuring and storing materials should include in the cost of materials purchased.

2) The amount of trade discount, quantity discount and excise duty (under MODVAT credit scheme) are credit items hence deducted from the invoice of material purchased.

3) The transport charges (carriage and freight), sales tax, insurance, cost of containers, customs and excise duty (without MODVAT credit) should be included in the invoice cost of materials.

4) The cash discount is considered as financial gain, so it is keep outside the area of material cost.

5) In case of containers are returnable, their resale value should also taken in the invoice price of material to ascertain the cost of material purchased correctly.

6) If common expenses incurred, these expenses should be divided either on the basis of purchase price of material, quantity of material or number of material.

7) The cost should also be inflated by an estimated percentage for wear and tear, scrap and damages also.

The cost of material purchased so determined, may be used for the entry of martial in the stores ledger.

Activity A:

1. Write items which are added in pricing of incoming materials.

2. Write items which are excluded from pricing of incoming materials.

Illustration - 1:

An invoice in respect of a consignment of chemicals A and B provides the following information:

	Rs.
Chemical A: 10,000 lbs. at Rs. 10 per lb.	1,00,000
Chemical B : 8,000 lbs. at Rs. 13 per ib.	1,04,000
Sales tax @ 10%	20,400
Railway freight	3,840
Total Cost	2,28,240

Shortages are noticed 500 lbs. in chemical A and 320 lbs. in chemical B, due to normal breakages. You are required to determine the rate per lb. of each chemical, assuming a provision of 2% for further deterioration.

Solution:

Statement of computation of effective quantity of each chemical available for use

	Chemical A	**Chemical B**
	lbs.	**lbs.**
Quantity purchased	10,000	8,000
Less: shortage due to normal breakages	500	320
	9500	7680
Less: Provision for deterioration 2%	190	53.6
Quantity available	9310	7526.4

Statement showing the computation of rate per lb. of each chemical

	Chemical A	Chemical B
	Rs.	Rs.
Purchase price	1,00,000	1,04,000
Add: Sales tax (10%	10,000	10,400
Railway freight (in the ratio of		
Quantity purchased i.e. 5:4)	2133	1707
Total Cost	**1,12,133**	**1,16,107**

Rate per lb. A: $\frac{Rs.112113}{9310\ lbs} = Rs.12.04$

Rate per lb. B: $\frac{Rs\ 116107}{7526.34\ lbs} = Rs.15.43$

Illustration - 2:

At what price, per unit would part no. B 32 will be entered in the stores ledger, if the following invoice was received from a supplier:

Invoice	Rs.
200 units of Part No.B 32 @ Rs.	1000
Less: 20 % discount	200
	800
Add: Excise duty @ 15 %	120
	920
Add: Packing charges (5 non-returnable Boxes)	50
	970

Notes:

(1) A 2% discount will be given for payment in 30 days.

(2) Document substantiating payment of excise duty is enclosed for claiming MODVAT credit.

Solution:

200 units at cost after trade discount	Rs. 800
Add: Packing charges	Rs. 50
Total cost of 200 units	**Rs. 850**

Cost per unit = $\frac{Rs.850}{200}$ **= Rs. 4.25**

5.3 Material Cost

"The material cost is the cost of commodities supplied to an undertaking" -I.C.M.A.

Material cost is following two types:

1) Direct Material Cost.

2) Indirect Material Cost.

1) Direct Material Cost:

Direct materials cost is the cost of those materials which enter into and form part of the product such as timber in furniture making; clay in brick making; cement, stones etc. in building and yarn for cloth producing etc. It includes the following:

a) Material specially purchased for requisitioned for a specific or a particular job, process, or work order & used therein;
b) Material passing for one process or operation to the other, for instance, in the process costing the finished product of a process becomes the direct materials for the next or the succeeding process;
c) The primary packing materials such as cartoons for the biscuit packing etc.

The materials cost the above is directly identified with jobs, products or cost units and is allocated to them. According to I.C.M.A. "Materials cost which can be identified with and allocated to cost centers or cost units". Direct materials are also known as 'process materials', 'prime cost materials' or 'productive materials'.

2) Indirect Materials Cost:

According to I.C.M.A indirect materials cost is "materials cost which can't be allocated but which can be apportioned to or absorbed by, cost centers or cost units".

Indirect materials cost is the cost of those materials which do not form part of the product but which help the production, for example:

a) Lubricating oil, fuel, cotton waste etc., required for operating and maintaining plant & machinery;
b) Small tools;
d) Stores use for repairs and maintenance;

Items for small values like threads, gum, nails etc, though forming part of the product and thus reckoned as direct materials are treated as indirect materials for the reason that it is difficult to calculate the cost per unit of the material. The threads or gums in book binding, nails used in shoes etc. are the examples.

5.4 Pricing of Outgoing Material

5.4.1 Pricing of Issue of Materials

Material issued from stores should be priced at the value at which they are carried in stock but there can be a situation where the material may have been purchased at different times and at different prices with varying discounts, taxes etc. Because of this the problem arises as to how the material issues to production are to be valued. There are several methods for tackle this situation. The cost accountant should select the proper method based on following factors:

1. The frequency of purchases, price fluctuations and its range.
2. The frequency of issue of materials, relative quantity etc.
3. Nature of cost accounting system.
4. The nature of business and type of production process.
5. Management policy relating to valuation of closing stock.

Several methods of pricing material issues have been evolved in an attempt to suitably answer the problem. These methods may be grouped and explained as follows:

1. Cost Price Methods:

(a) Specific price method.
(b) Fist – in first – out method.
(c) Last in – first – out method.
(d) Base stock method.

2. Average Price Methods:

(e) Simple average price method.
(f) Weighted average price method.
(g) Periodic simple average price method.
(h) Periodic weighted average price method.
(i) Moving simple average price method.
(j) Moving weighted average price method.

3. Market Price Methods:

(k) Replacement price method.
(l) Realizable price method.

4. Notional Price Methods:

(m) Standard price method.

We may now briefly discuss all the above methods:

(a) Specific Price Method- This method is useful, specially when material are purchased for a specific job or work order, and as such these material are issued subsequently to that specific job or work order at the price at which they are purchased to use this method, It is necessary to store each lot of material separately and maintain its separate account. The advantages and disadvantage of this method are :

Advantages:

1- The cost of material issued for production purposes to specific job represent actual and correct cost.

2- This method is best suited for non-standard and specific products.

Disadvantage: This method is difficult to operate, specially when purchases and issues are numerous.

(b) First –in – First Out Method (FIFO): It is a method of pricing the issues of materials. Under this method, the materials first received in the store are the first issued. In other words, the order in which the materials are received in the store are first issued at their cost price in the same order or the items longest in stock are issued first. Thus each issue of material only recovers the purchase price which does not reflect the current market price.

This method is considered suitable in times of failing price because the material cost charged to production will be high while the replacement cost of materials will be low. But in the case of rising prices, if this method is adopted, the charge to production will be low as compared to the replacement cost of materials (as in the current period) in future without having additional capital resources.

The advantages and disadvantages of the method may be stated as follows:

Advantages:

1. It is simple to understand and simple to operate.

2. Material cost charged to production represents actual cost with which the cost of production should have been charged.
3. In the case of falling prices, the use of this method gives better results.
4. Closing stock of material will be represented very closely at current market price.
5. The old material is issued first. Thus, there remains no possibility of loss of material due to spoilage or obsolescence.

Disadvantages:

1. If the price fluctuates frequently, this method may lead to clerical error.
2. Since each issues of material to production is related to a specific purchase price, the cost charged to the same job are likely to show a variation from period to period.
3. In the case of rising prices, the real profits of the concern being low, they may be inadequate to meet the concern's demand to purchase raw materials at the ruling price.

Illustration - 3:

Prepare store ledger account as per FIFO method from the following data:

Receipt of Materials			Materials Issued	
Date	Units	Rate per unit Rs.	Date	Units
April 1, 2008 opening balance	1,000	5	April 4,2008	3,000
April 3, 2008	5,000	6	April 6,2008	2,000
April12, 2008	3,000	5	April 15,2008	1,500

The weekly stock taking on April 7, 2008 showed on shortage of 150 units.

Solution:

Store Ledger Account

Date	Receipts			Issues			Balance		+
	Units	Rate	Amount	Units	Rate	Amount	Units	Rate	Amount
2007		Rs.	Rs.		Rs.	Rs.		Rs.	Rs.
Apr.1	—	—	—	—	—	—	1,000	5	5,000
Apr.3	5,000	6	30,000	—	—	—	1,000	5	35,000
							5,000	6	
Apr.4	—	—	—	1,000	5				
				2,000	6	17,000	3,000	6	18,000
Apr.6				2,000	6	12,000	1,000	6	6,000
Apr.7				150	6	900	850	6	5,100
Apr.12	3,000	5	15,000	—	—	—	850	6	
							3,000	5	20,100
Apr.15				850	6	8,350			
				650	5		2,350	5	11,750

- Wastage is treated as abnormal.

(c) Last – in – First Out Method (LIFO): It is a method of pricing the issues of materials. This method is based on the assumption that the items of the last batch (lot) purchased are the first to be issued. Therefore, under this method the price of the last batch (lot) is used for pricing the issues, until it is exhausted, and so on. If however, the quantity of issue is more than the quantity of the latest lot than earlier (lot) and its price will also be taken into consideration.

During inflationary period or period of rising prices, the use of LIFO would help to ensure that the cost of production determined on the above basis is approximately the current one. This method is also useful specially when there is a feeling that due to the use of FIFO or average methods, the profits shown and tax paid are too high.

The advantages and disadvantages of LIFO method are as follows:

Advantages:

1- The cost of materials issued will be either nearer to and or will reflect the current market price. Thus, the cost of goods produced will be related to the trend of the market price of materials. Such a trend in price of materials enables the matching of cost of production with current sales revenues.

2- The use of the method during the period of rising prices does not reflect undue high profit in the income statement as it was under the FIFO or average method. In fact, the profit shown here is relatively lower because the cost of production taken into account the rising trend of material prices.

3- In the case of falling prices profit tends to raise due to lower material cost, yet the finished products appear to be more competitive and are at market price.

4- Over a period, the use of LIFO helps to level out the fluctuations in profits.

5- In the period of inflation LIFO will tend to show the correct profit and thus avoid paying undue taxes to some extent.

Disadvantages:

1. Calculation under LIFO system becomes complicated and burdensome when frequent purchases are made at highly fluctuating rates.
2. Costs of different similar batches of production carried on at the same time may differ a great deal.
3. In time of falling prices, there will be need for writing off stock value considerably to stick to the principle of stock valuation, i.e., the cost or the market price whichever is lower.
4. This method of valuation of material is not acceptable to the income tax authorities.
5. The closing stock is priced at a very old price which does not show the correct position of the business.

Illustration - 4:

With the help of the following particulars, prepare stores account showing issue of materials on the basis of Last in, First out:

Purchases		Issues	
August 3,2008	750 kg @ Rs. 2.00	August 19,2008	850 kg
August 18,2008	350 kg @ Rs. 2.10	August 26,2008	450 kg
August 25,2008	600 kg @ Rs. 2.20	August 29,2008	510 kg
August 28,2008	500 kg @ Rs. 2.30	August 30,2008	150 kg

Solution:

Stores Ledger Account

Date	Receipts			Issues			Balance		
	Kg	Rate	Amt.	Kg	Rate	Amt.	Kg	Rate	Amt.
2008		Rs.	Rs.		Rs.	Rs.		Rs.	Rs.
Aug.3	750	2.00	1,500	—	—	—	750	2.00	1,500
Aug.18	350	2.10	735	—	—	—	750	2.00	1,500
							350	2.10	735
Aug.19	—	—	—	350	2.10	735			
				500	2.00	1,000	250	2.00	500
Aug.25	600	2.20	1,320	—	—	—	250	2.00	500
							600	2.20	1,320
Aug.26				450	2.20	990	250	2.00	500
							150	2.20	330
Aug.28	500	2.30	1,150	—	—	—	250	2.00	500
							150	2.20	330
							500	2.30	1,150
Aug.29	—	—	—	500	2.30	1,150	250	2.00	500
				10	2.20	22	140	2.20	308
Aug.30	—	—	—	140	2.20	308			
				10 0	2.00	20	240	2.00	480

(d) Base Stock Method: A minimum quantity of stock under this method is always held at a fixed price as reserve in the stock, to meet a state of emergency, if it arises. This minimum stock is known as base stock and is valued at a price at which the first lot of materials is received and remains unaffected by subsequent price fluctuations.

Thus, this is more a method of valuing inventory than a method of valuing issued because, with the base of stock valued at the original cost some other method of valuing issues should be adopted. The quantity in excess of the base stock may be valued either on the FIFO or LIFO basis. This method is not an independent method as it uses FIFO or LIFO. Its advantages and disadvantages therefore will depend upon the use of the other method viz., FIFO or LIFO.

(e) Simple Average Price Method: Under this method, materials issued are valued at average price, which is calculated by dividing the total of all units rate by the number of unit rate.

$$Material\ issue\ price = = \frac{Total\ of\ unit\ prices\ of\ each\ purchase}{Total\ number\ of\ purchase}$$

This method is useful under the following circumstances:

1. When the materials are received in uniform lots of similar quantity, otherwise, it will give wrong results.
2. When purchase prices do not fluctuate considerably.

Advantage:

1. It is simple to understand and easy to operate.
2. The method is a mixed form of market price and cost price.
3. Due to calculation of average of different purchase prices, the tendency of equality in different rates is arrived at.

Disadvantage:

1. Materials issue cost does not represent actual cost price. Since the materials are issued at a price obtained by averaging cost prices, a profit or loss may arise from such type of pricing.
2. In case the prices of material fluctuate considerably, this method will give incorrect results.
3. The prices of materials issues used are determined by averaging prices of purchases without giving consideration to the quantity. Such a price determination is unscientific.
4. It becomes difficult to calculate the average again and again.

Illustration - 5:

From the following information, write the stores ledger account based on 'Simple Average Method' of pricing issues:

May 2008	Receipts	May 2008	Issues
12	Purchased 400 unit @ Rs. 59 per unit	3	140 units
14	Refund of surplus from a work order 30 units @ Rs. 58 per unit	4	250 units
		8	210 units
20	Purchased 480 units @ Rs. 62 per unit	16	350 units
25	Purchased 640 units @ Rs. 60 per unit	24	608 units
28	Refund of surplus from a work order 24 Units (issued on 3 May)	26	524 units
31	Received from supplier 150 units @ Rs. 64 per unit		
	Opening balance on May 2008 1,100 units @ Rs. 60 per unit.		

Solution:

Stores Ledger Account

Date	Receipts			Issues			Balance	
	Qty.	Rate	Amount	Qty.	Rate	Amount	Qty.	Amount
May2008		Rs.	Rs.		Rs.	Rs.		Rs.
1	—	—	—	—	—	—	1,100	66,000
3	—	—	—	140	60	8,400	960	57,600
4	—	—	—	250	60	15,000	710	42,600
8	—	—	—	210	60	12,600	500	30,000
12	400	59.00	23,600	—	—	—	900	53,600
14	30 (Refund)	58.00	1,740	—	—	—	930	55,340
16	—	—	—	350	59[1]	20,650	580	34,690
20	480	62.00	29,760	—	—	—	1,060	64,450
24	—	—	—	608	59.75[2]	36,328	452	28,122
25	640	60.00	38,400	—	—	—	1,092	66,522
26	—	—	—	524	61.00[3]	31,964	568	34,558
28	24	60	1,440	—	—	—	592	35,998
31	150	64	9,600	—	—	—	742	45,598

1. $\frac{60+59+58}{3}=59$
2. $\frac{60+59+58+62}{4}=59.75$
3. $\frac{62+60}{2}=61$

(f) Weighted Average Price Method: This method gives due weights to quantities purchased and the purchase price, while, determining the issue price. The average issue price here is calculated by dividing the total cost of materials in the stock by total quantity of materials prior to each issue.

$$Material\ issue\ price = = \frac{Total\ of\ unit\ prices\ of\ each\ purchase}{Total\ quantity\ of\ purchase}$$

The advantages and disadvantages of this method are:

Advantages:

1. It smoothens the price fluctuations if at all it is there due to material purchases.
2. Issue prices need not be calculated for each issue unless new lot of materials is received.
3. This method is scientific and argumentative because under this method, the total cost of the material available in the bin is provided by the total quantity of material. In fact, after reaching the bin, the new and old material mix up, i.e., there remains no separate existence in the bin, of the material separately purchased on the different dates.
4. As regards calculation work, this method is simple because the issue price once calculated continues till the new material is purchased.
5. This method is a mixed form of market price and cost price.
6. In this method, the balance of the closing stock is shown at appropriate price which can be used in financial accounts also.

Disadvantage:

1. Material cost does not represent actual cost price and therefore, a profit or loss will arise out of such a pricing method.
2. If the material is purchased again and again at short intervals, the calculation work increases.
3. As the material is issued at average price, the production cost cannot be correctly estimated.

Illustration 6:

From the following particulars, prepare stores Ledger for the month January 2008 showing material issue prices on the Weighted Average Price Method:

Receipts of Materials			Issues of Materials	
Date	Units	Rate per unit (Rs.)	Date	Units
Jan.1, 2008	500	2	January 1, 2008	400
Jan.10, 2008	200	3	January 15, 2008	100
Jan.18, 2008	400	4	January 22, 2008	200
Jan.28, 2008	300	5	January 31, 2008	300
Jan.29, 2008	Returns 10 units (issued on 15th Jan.)			

2 units loss was revealed on January 28 during stock verification.

Solution:

Stores Ledger Account

Date	**Receipts**			**Issues**			**Balance**		+
	Units	***Rate***	***Amt.***	***Units***	***Rate***	***Amt.***	***Units***	***Rate***	***Amt.***
2008		Rs.	Rs.		Rs.	Rs.		Rs.	Rs.
Jan. 1	500	2	1,000	400	2	800	100	2	200
Jan.10	200	3	600	—	—	—	300	2.67	800
Jan.15	—	—	—	100	2.67	2.67	200	2.67	533
Jan.18	400	4	1,600	—	—	—	600	3.555	2,133
Jan.22	—	—	—	200	3.555	711	400	3.555	1,422
Jan.27	300	5	1,500	—	—	—	700	4.174	2,922
Jan.28	—	—	—	2(loss)*	—	—	698	4.186	2,922
Jan.29	10	2.67	26.70	—	—	—	708	4.165	2,948.70
Jan.31	—	—	—	300	4.165	1249.5	408	4.165	1,699.20

* Assumed as Normal wastage.

(g) Periodic Simple Average Price Method: This method is similar to simple average price method except that the average price is calculated at the end of the concerned period. In other words, the price paid during the period for different lots of materials purchased are added up and the total is divided by the number purchases made during the period. The rate so computed is the used to price all the issues made during the period, and also for valuing the closing inventory of the period.

Advantages:

1. It is simple to operate, as it avoids calculation of issue price after every receipt.
2. This method can usefully be employed in costing continuous processes where each individual order is absorbed into the general cost of producing large quantities of articles.

Disadvantages:

1. This method cannot be applied in jobbing industry where each individual job order is to be priced at each stage of its completion.
2. This method is unscientific as it does not take into consideration the quantities purchased at different prices.
3. This method also suffers from all those disadvantages of simple averages cost method.

(h) Periodic Weighted Average Price Method: This method is like weight average price method, except that the calculations of issue prices are made periodically (say, a month). The rate so arrived is used for the issues made during that period and also for valuing the inventory at the end of the period.

Advantage:

1. This method is superior to the periodic simple average price method as it takes into account the quantities also.
2. It overcomes or events out the effect of fluctuations.
3. In addition to above, the method also possesses all the advantages of the simple weighted average price method.

Disadvantage:

This method is not suitable for job costing because each job is to be priced at each stage of completion.

(i) Moving Simple Average Price Method: Under this method, the rate for material issues is determined by dividing the total of the periodic simple average prices of a given number of periods by the numbers of periods. For determining the moving simple average price, it is necessary to fix up first period to be taken for determining the average.

Suppose a six monthly period is decided upon and moving average rate for the month of June is to be calculated. Under such a situation, we have to make a list of the simple average prices from January to June, add them up, and divide the total by six. To calculate the moving average rate for July, we have to omit simple average rate pertaining to January and add the rate relating to July and divided the total by six.

Advantage: This method evens out price fluctuations over a longer period, thus stabilizing the charges to work-in-progress. Thus the cost of production will be stable to a significant extent.

Disadvantage: A Profit or loss arises by the use of moving simple average cost.

(j) Moving Weighted Average Price Method: Under this method, the issue, rate is calculated by dividing the total of the periodic weighted average price of a given number of periods by the number of periods.

(k) Replacement Price Method: Replacement price is defined as the price at which it is possible to purchase an item, identical to that which is being replaced or revalued. Under this method, materials issued are valued at the replacement cost of the items.

This method pre-supposes the determination of the replacement cost of materials at the time of each issue; viz., the cost at which identical materials could be currently purchased. The product cost under this method is at current market price, which is the main objective of the replacement price method.

This method is useful to determine true cost of production and to value material issues in periods of rising prices, because the cost of material considered in cost of production would be able to replace the materials at the increased price.

Advantage: Product cost reflects the current market prices and it can be compared with the selling price.

Disadvantage: The use of the method requires the determination of market price of material before each issued of material. Such a requirement creates problems.

(l) Realizable Price Method: Realizable price means a price at which the material to be issued can be sold in the market. This price may be more or may be less than the cost price at which it was originally purchased. Like replacement price method, the stores ledger would show profit or loss in this method too.

(m) Standard Price Method: Under this method, materials are priced at some predetermined rate or standard price irrespective of the actual purchase cost of the materials. Standard cost is usually fixed after taking into consideration the following factors:

a. Current prices,
b. Anticipated market trends, and
c. Discount available and transport charges etc.

Standard prices are fixed for each material and the requisitions are priced at the standard price. This method is useful for controlling material cost and determining the efficiency of purchase department. In the case of highly fluctuating prices of materials, it is difficult to fix their standard cost on long-term basis.

Advantages:

1. The use of the standard price method simplifies the task of valuing issues of materials.
2. It facilitated the control of material cost and the task of judging the efficiency of purchase department.
3. It reduced the clerical work.

Disadvantages:

1. The use of standard price does not reflect the market price and thus results in a profit or loss.
2. The fixation of standard price becomes difficult when prices fluctuate frequently.

5.4.2 Valuation of Returns and Shortages

(a) Valuation of Materials Returned to the Vendor: Materials which do not meet quality, dimensional and other specifications and are considered to be unfit for production are usually returned to the vendor. These materials can be returned to the vendor before they are sent to the stores. In case materials reach store and are noticed to be below standard quality, then also they can be returned to vendor.

The price of the materials to be returned to vendor should include its invoice price plus freight, receiving and handling charges etc. Strictly speaking, the materials returned to vendor should be returned at the stores ledger price and not at invoice price. But in practice invoice price is only

considered, the gap between the invoice price and ledger price is charged as overhead. In stores ledger the defective or sub-standard materials are shown in the issue column at the rate shown in the ledger, and the difference between issue price and invoice cost is debited to an inventory adjustment accounts.

(b) Valuation of Materials Returned to Stores: When materials requisitioned for a specific job or work-in progress are found to be in excess of the requirement or are unsuitable for the purpose, they are returned to the stores. There are two ways of treating such returns.

1. Such returns are entered in the receipt column at the price at which they were originally issued, and the materials are kept in suspense, to be issued at the same price against the next requisition.
2. Include the materials in stock as if they were fresh purchases at the original issue price.

(c) Valuation of Shortages during Physical Verification: Materials found short during physical verification should be entered in the issue column and valued at the rate as per the method adopted, i.e. FIFO or any other.

5.4.3 Selection of Pricing Methods

Several methods of charging price of materials issues have been discussed in detail. The question is as to which out these methods is best one. It is a fact that no one method can be suitable for all business or industry. No hard and fast rule or procedure has been laid down to select a method of pricing issues of material. However, the ultimate choice of a method of selection may be based on the following considerations.

(a) The method of costing used and the policy of management.
(b) The frequency of purchases and issues.
(c) The extend of price fluctuations
(d) The extent of work involved in recording, issuing and pricing materials
(e) Whether cost of materials used should reflect current or historical conditions.
(f) Type of business or industry.

Activity B:

1. Which method of pricing of material do you think is the most suitable? Why?

5.4.4 Treatment of Normal and Abnormal Loss or Materials

Whichever method may be adopted for pricing materials, certain differences between the book balance and the value of physical stock are bound to occur. These differences, which may be a gain or loss, should be transferred to inventory adjustment account pending investigation. If, after investigation, they are regarded as normal, they should be transferred to Overhead Control Account; if abnormal they should be written off to the Costing Profit and Loss account.

In the case normal losses, an alternative method is used to price per unit of material so as to cover the normal loss. It can be understood with the help of the example considered. Suppose 1,000 meters of gunny cloth are purchased at Rs. 2 per meter. It is expected that 1% would be the normal loss due to issues being made in small lots. The inflated price would be Rs. 2.02 p. i.e., (Rs. 2,000 for 990 meters). The rate of Rs. 2.02 per meter of gunny cloth covers the cost a normal loss as well.

5.5 Material Losses

There is various types of losses possible in subject of material such as waste, scrap, spoilage, and defectives. We are going to be discussing in detail their meaning, precautions and treatments.

5.5.1 Waste

"The portion of basic raw materials lost in processing having no recoverable value." Waste may be visible – bits and pieces of basic raw materials – or invisible; e.g., disappearance of basic raw materials through evaporation, Smoke etc. Shrinkage of material due to natural causes may also be a form of a material wastage.

In case of normal Wastage -Normal waste is absorbed in the cost of net output.

In Case of Abnormal Wastage -The abnormal waste is transferred to the costing Profit and loss Accounts.

For effective control of waste, normal allowances for yield and waste should be made from past experience, technical factors and special features of the material process and product. Actual yield and waste should be compared with anticipated figures and appropriate actions should be taken where necessary. Responsibility should be fixed on purchasing, storage, maintenance, and production and inspection staff to maintain standards. A systematic procedure for feedback or achievement against laid down standards should be established

5.5.2 Scrap

"It has been defined as the incidental residue from certain types of manufacture, usually of small amount and low value, recoverable without further processing." Scrap may be treated in cost accounts in the following ways:-

(1) **When the scrap value is negligible:** It may be excluded from costs. In other words, the cost of scrap is borne by good units and income scrap is treated as other income.
(2) **When the scrap value is not identifiable to a particular process or job:** The sales value of scrap net of selling and distribution cost, is deducted from overhead to reduce the overhead rate. A variation of this method is to deduct the net realizable value from material cost.
(3) **When scrap is identifiable with a particular job or process and its value is significant:** The scrap account should be charged with full cost. The credit is given to the job or process concerned. The profit or loss in the scrap account, on realization, will be transferred to the costing profit and loss account.

Control of scrap really means the maximum effective utilization of raw material. Scrap control does not, therefore, start in the production department; it starts from the stage of product designing. Thus the most suitable type of materials, the right type of equipment and personnel would help in getting maximum quantity of finished product from a given raw material.

A standard allowance for scrap should be fixed and actual scrap should be collected, recorded and reported indicating the cost centre responsible for it. A periodical scrap report would served the purpose where two or more department or cost centers are responsible for a scrap; the reports should be routed through the department concerned.

5.5.3 Spoilage

"It is the term used for materials which are badly damaged in manufacturing operations and they cannot be rectified economically and hence taken out of process to be disposed of in some manner without further processing." Spoilage may be either normal or abnormal

In case of normal spoilage:

Normal spoilage (i.e. which is inherent in the operation) costs are included in costs either charging the loss due to spoilage to the production order or by charging it to production overhead so that it is spread over all products. Any value realized from spoilage is credited to production overhead account, as the case may be.

In case of abnormal spoilage

The cost of abnormal spoilage (i.e. arising out of causes not inherent in manufacturing process) is charged to the costing profit and loss account. When spoiled work is the result of rigid specification, the cost of spoiled work is absorbed by good production while the cost of disposal is charged to production overhead

To control spoilage, allowance for normal spoilage should be fixed and actual spoilage should be compared with standard set. A systematic procedure of reporting would help control over spoilage. Corrective actions should be taken by responsible department, if any.

5.5.4 Defectives

"It signifies those units or portions of production which can be rectified and turned out as good units by application of additional material, labour or other service."

recovery of loss from defective units – In the case of articles that have been defected, it is necessary to take steps to reclaim as much of the loss as possible. For this purpose:

1. All defective units should be sent to a place fixed for the purpose;
2. These should be dismantled;
3. Goods and serviceable parts should be separated and taken into stock;
4. Parts which can be made serviceable by further work should be separated and sent to the workshop for the purpose and taken into stock after the defects have been removed; and
5. Parts which cannot be made serviceable should be collected in one place for being melted or sold.

Control: When defectives are found, the inspector will make out the defective work Report, giving particulars for the department, process or job, defective units, normal and abnormal defectives, cost of rectification etc. On receipt of the defective work report, it may be decided to rectify the defective work; all cost of rectification are collected against the rectification work order, precaution will be taken to see that number of defectives is within normal limits.

Defectives are generally treated in two ways: either they are brought up to the standard by incurring further costs on additional material and labour or where possible, they are sold as inferior products (seconds) at lower prices. The following illustration is given to explain the accounting procedure followed in either case.

Total expenses of manufacture	Rs. 5,000
Out put	Good: 450 units
	Defective: 50 units
Cost of rectifying defectives	Rs. 50

Cost per unit of production $= \frac{Rs.5,000 + Rs.50}{500} = Rs.10.10\ per\ unit$

If the defectives are not rectified but sold as 'second's say, @ Rs. 8 each then cost of goods produced will be ;

$$= \frac{Rs.5,000 - Rs.400}{450} = Rs.10.22\ per\ unit$$

Distinction between spoilage and defectives: The difference between spoilage and defective is that while spoilage cannot be repaired or reconditioned, defectives can be rectified and transferred, either back to standard production or to seconds.

Treatment of spoilage and defectives in Cost Accounting – Under Cost Accounts normal spoilage costs i.e., (which is inherent in the operation) are included in cost either by charging the loss due to spoilage to the production order or charging it to production overhead so that it is spread over all products.

Any value realized from the sale of spoilage is credited to production order or production overhead accounts, as the case may be. The cost of abnormal spoilage (i.e. arising out of causes not inherent in manufacturing process) is charged to the costing profit and loss accounts. When spoiled work is the result of rigid specifications the cost of spoiled work is absorbed by good production while the cost of disposal is charged to production overheads. The problem of accounting for defective work is the problem of accounting of the costs of rectification or rework.

The possible ways of treatment are as below:

1- Defectives that are considered inherent in the process and are identified as normal can be recovered by using the following methods:

   a. Charged to good products – The loss is absorbed by good units. This method is used when 'seconds' have a normal value and defectives rectified into 'seconds' or 'first' are normal;

   b. Charged to general overhead – when the defectives caused in one department are reflected only on further processing, the rework cost are charged to general overhead;

   c. Charged to the department overheads – If the department responsible for defectives can be identified then the rectification costs should be charged to that department;

   d. Charged to costing profit and loss accounts – If defectives are abnormal and are due to causes beyond the control of organization, the rework cost should be charged to costing profit and loss account.

2- Where defectives are easily identifiable with specific jobs, the work costs are debited to the job.

Procedure for the control of spoilage and defectives – To control spoilage, allowance for a normal spoilage should be fixed up and actual spoilage should be compared with standard set. A systematic procedure of reporting would help control over spoilage. A spoilage report (as below) would highlight the normal and abnormal spoilage, the department responsible, the causes of spoilage and the corrective action taken if any.

Spoilage Report

Units/Deptt.No…….. Date……

Production order no……....

Units Produced	Units Spoiled	Normal Qty.	Spoilage %	Abnormal Qty.	Spoilage %	Cost of Abnormal Spoilage Rs.	Reason Spoilage	Action taken

Control of defectives may convert the following two areas:
(a) Control over defectives produced
(b) Control over reworking costs.

For exercising effective control over defectives produced and the cost or reworking, standards, for normal percentage of defectives and reworking costs should be established. Actual performance should be compared with the standards set. Defective work report should be fed back to the respective centres of control.

5.5.5 Losses Due to Obsolete Stores

Obsolescence is defined as **"the loss in the intrinsic value of assets due to its supersession,"** Materials may become obsolete under any of the following circumstances:

(1) Where it is a spare part or a component of a machinery used in manufacture and that machinery becomes obsolete ;
(2) Where it is used in the manufacture of a product which has become obsolete;
(3) Where the material itself is replaced by another material due to either improved quality or fall in price.

In all three cases, the value of the obsolete material held in stock is a total loss and immediate steps should be taken to dispose it off at the best available price. The loss arising out of obsolete materials on abnormal loss does not form part of the cost of manufacture.

Losses due to obsolescence can be minimized through careful precaution and reduced stocking of spares, etc. Stores records should be continuously gone through to see whether any item is likely to become obsolete. There will be such probability if an item has not been used for a long time. (This does not apply to pare parts of machines still in use).

Activity C:

1. Discuss about various types of material losses.

2. Write treatment of various types of material losses.

5.6 Consumption of Materials

Any product that is manufactured in a firm entails consumption of resources like material, labour etc. The management for planning and control must know the cost of using these resources in manufacturing. The consumption of materials takes place say when the material is used in the manufacture of the product.

It is important to note that the amount of materials consumed in a period by a cost object need not be equal to the amount of material available with the concern. For example, during any period the total of raw material stock available for use in production may not be equal to the amount of materials actually consumed and assigned to the cost object of the production. The difference between the material available and material consumed represents the stock of material at the end of the period.

5.6.1 Identification of Materials:

For the identification of consumption of materials with products of cost centre's the followings points should be noted:

1. It is required that the concern should follow coding system for all materials so that each material is identified by unique code number.

2. It is required that each product of a cost centre should be given a unique code number so that the direct material issued for production of particular product of a cost center can be collected against the code number of that product.

   However, it may not be possible to allocate all materials directly to individual product of a cost centre e.g. maintenance materials, inspection and testing materials etc. The consumption of these materials are collected for cost centre and then charge to indicial product by adopting suitable overhead absorption rate of cost center.

   Overhead absorption rate of cost centre $= \frac{Cost\ for\ cost\ centre}{base\ relating\ to\ cost\ centre}$

   (E.g. labour hrs. or machine hrs.)

3. Each issue of materials should be recorded. One way of doing this is to use a material requisition note. This note shows the details of materials issued for product of cost centre and the cost center which is to be charged with cost of materials.

4. A material return note is required for recording the excess materials returned to the store. This note is required to ensure that original product of cost centre is credited with the cost of materials which was not used and that the stock records are updated.

5. A material transfer note is required for recording the transfer of materials from one product of cost centre to other or from one cost centre to other cost centre.

6. The cost of materials issued would be determined according to stock valuation method used.

5.6.2 Monitoring Consumption of Materials

For monitoring consumption of materials a storekeeper should periodically analyses the various materials requisitions, material return notes and material transfer notes. Based on this analysis, a material abstract or material issue analysis sheet is prepared, which shows at a glance the value of material consumed in manufacturing each product. This statement is also useful for ascertaining the cost of material issued for each product.

The material abstract statement serves a useful purpose. It in fact shows the amount of material to be debited to various products & overheads. The total amount of stores debited to various products & overheads should be the same as the total value of stores issued in any period.

5.7 Summary

Methods of pricing of issue of materials

FIFO – The materials received first are to be issued first. Material left as closing stock will be at the price of latest.

LIFO – The materials purchased last are to be issued first. Closing stock is valued at the oldest stock price.

Wastage – portion of basic raw material lost in processing having no recoverable value.

Scrap -The incidental material residue coming out certain manufacturing operations having low recoverable value.

Spoilage – Goods damaged beyond rectification to be sold without further processing.

Defectives – Goods which can be rectified and turned out as good units by the application of additional labour or other services.

5.8 Self Assessment Questions

1. Write the procedure of valuation of incoming materials.
2. Discuss in brief various methods of issue of materials.
3. Discuss the various types of material wastages. How they treated in accounting.
4. Distinguish between spoilage and defectives in manufacturing company. Discuss their treatment in cost accounting.
5. Distinguish between waste, scrap, defectives and spoilages.
6. Write advantages and disadvantages of LIFO and FIFO method.

Practical Problems for Self Evaluation

1 The following purchases and issues of tin were made during the month of May 2010.

		Received	
Date	**Quantity**	**Unit Cost**	**Amount**
1-5-2010	150	1.50	225
10.5.2010	450	1.60	720
25-5-2010	600	1.70	1,020
		Issued	
Date	Quantity		
12-5-2010	120		
18-5-2010	225		
28-5-2010	350		

There was no "opening stock". Compute the inventory value on 31st May, 2010 by LIFO method.

(Ans. 505 Units of Rs. 818)

2. Draw a stores ledger card recording the following transaction that took place in a month under FIFO & LIFO methods:

2011

1st Jan	Opening stock	200 pieces @Rs. 2 each
5th Jan	Purchases	100 pieces @Rs. 2.20 each
10th Jan.	Purchases	150 pieces @Rs. 2.40 each
20th Jan	Purchases	180 pieces @Rs. 2.50 each
2nd Jan	Issues	150 pieces
7th Jan.	Issues	100 pieces
12th Jan	Issues	100 pieces
28th Jan	Issues	200 pieces

(Ans. Stock LIFO 80 units of Rs. 172 and FIFO 80 units of Rs. 200)

3. Prepare a stores Ledger account from the following transactions assuming that the issue of stores have been priced on the principle of "last-in-first-out"& "First-in-first-out" also.

2011		
Jan.1	Received	1,000 units at Rs. 20 per unit
Jan.10	Received	260 units at Rs. 21 per unit
Jan.20	Issued	700 units
Feb.4	Received	400 units at Rs. 23 per unit
Feb.21	Received	300 units at Rs. 25 per unit
Mar.16	Issued	620 units
Apl.12	Issued	240 units
May 10	Received	500 units at Rs.22 per unit
May 25	Issued	380 units

(Ans. Stock LIFO 520 units of Rs. 10,640 and FIFO 520 units of Rs. 11,500)

4 The following transactions took place in respect of a material item:

Receipts		**Rate**	**Issue**
	Quantity	Rs.	Quantity
2-3-2006	200	2.00	
10-3-2006	300	2.40	
15-3-2006			250
18-3-2006	250	2.60	
20-3-2006			200

Prepare a priced Ledger sheet, pricing the issues at-

(a) Simple average rate :

(b) Weighted average rate

(Ans. Stock (a) 300 units of Rs. 720, (b) 300 units of Rs.726)

5 Record the following transactions in stores Ledger, pricing materials issues by (a) FIFO, (b) LIFO and (c) Average price methods. Show the balance of inventory after each transaction:

May1 Balance 50 units @ 25P. per units

May 1 Ordered 200 units, expected May 6, purchase order 55.

May 2 Issued 25 units, requisition No. 101 Dept.A

May 4 Ordered 100 units, expected May 8, purchase order 65.

May6 Received 200 units, purchase order 55 @ 30P. per unit

May 7 Issued 75 units, requisition 105, Production Order 313.

May 8 Returned to stock room 5 units from Dept. A requisition 101

May 10	Received 75 units, purchase order 65@ 38P. per unit
May 12	Ordered 50 units, Purchase Order 77, Expected May20
May 15	Issued 80 units, Requisition 125, Production Order 328.
May 18	Received 25 units, balance of Purchase Order 65@ 38P. per unit
May 21	Issued 30 units, Requisition 130, Dept.B
May 23	Returned to vendor 10 units from Purchase Order 65, received May 18.
May 25	Received 50 units, Purchase Order 77@ 25P. Per unit.
May 27	Freight on Purchase Order 77, Rs. 12.
May 29	Issued 60 units, Requisition 140, production Order 354.

(Ans. Stock FIFO 75 units @ 38P.+50 units @49P.=125 units of Rs. 53; LIFO 25 units@ 25P.+100 units@ 30.=125 units of Rs. 36.25; Weighted Av. Method 125 units of Rs. 46.63)

6 Show the stores ledger entries as they would appear when using.

(a) The weighted Average Method.
(b) The LIFO method.

Of pricing issues, in connection with the following transactions:

April	Units	Value
1. Balance in hand b/f	300	600
2. Purchased	200	440
4. Issued	150	
6. Purchased	200	460
11.Issued	150	
19.Issued	200	
22. Purchased	200	480
27. Issued	250	

(Ans. (a) 150 units of Rs. 342, (b) 150 units of Rs. 300)

7 Set up a "Stores Ledger" form and enter the following transactions adopting the weighted average method of pricing out issues:

2010

August 1	Opening Balance -50 units@ Rs. 3 per unit.
August 5	Issued out to production: 2 units.
August 7	Purchased 48 units @ Rs. 4 per unit.
August 9	Issued out 20 units to production
August 19	Purchased 76 units @ Rs. 3 per unit.
August 24	Received back into stores 19 units out of 20 units issued on 9th August, 2006
August 27	Issued to production 10 units.

(Ans. Stock 161 units of Rs. 527.70)

8 The following is a history of the receipts and issues of materials in a factory, during February.2006

Feb. 1	Opening balance	500 units @ Rs. 25.00
Feb. 3	Issued	70 units
Feb. 4	Issued	100 units
Feb. 8	Issued	80 units
Feb.13	Received from vendor	200 units @ Rs.24.50
Feb.14	Refund of surplus from a work order	15 units @ Rs. 24.00
Feb 16	Issued	180 units
Feb.20	Received from vendor	240 units @ Rs. 24.37
Feb.24	Issued	304 units
Feb.25	Received from vendor	320 units @ Rs. 24.31
Feb. 26	Issued	112 units
Feb.27	Refund of surplus from a work order	12 units @ Rs. 24.50
Feb. 28	Received from vendor	100 units @ Rs. 25.00
Feb. 29	Returned to vendor	50 units

The store verifier of the factory noted that on 15th he had found a shortage of 5 units and on the 27th another shortage of 8 units.

W rite out the complete stores Ledger Account in respect of the above material using (i) first-in-first-out and (ii) last-in-first-out principles.

(Ans. Stock FIFO 478 units Rs. 11,693; LIFO 478 units of Rs. 11,812)

5.9 Reference Books

- Prof. M.L. Agarwal & Dr. K.L. Gupta, 2010, Cost Accounting, First Edition, Sahitya Bhawan Publication.
- P.C. Tulsian, 2006, Cost Accounting, First Edition, TMH.
- D.M.Wilson, 2009, Cost Accounting, First Edition, Himalaya Publication House.
- Dr. M.N.Arora, 2009, Theory & Practices of Cost, First Edition, Himalaya Publication House.

Unit - 6 : Methods of Remunerating Labour

Structure of Unit:

6.0 Objectives

After completing this unit you will be able to know that:

- Proper Accounting and control for labour cost constitutes one of the major objectives of all business firms.
- It provides management labour cost information for effective planning of labour force in the business and for adequate monitoring of labour costs.
- Efficiency of workers mostly depends on the amount and technique of remunerating labour so while selecting a specific method of remuneration, qualification of employee, capability of employer, minimum wages and other factors should be considered.

6.1 Introduction

Labour is the second important element of production. The role of labour in production cannot be overlooked in spite of the fact that machines are being used a vast scale these days. The efficiency of production department is based on the skill of workers. In the absence of skilled workers product cannot be manufactured. Workers convert raw materials into finished goods. Skilled worker helps in decreasing the cost of product besides increasing the quality and quantity of the production.

Labour can be direct as well as indirect. Labour is treated as direct if it can be conveniently allocated to different jobs. In other words, when there is any direct relationship between labour cost and the product, process or cost per unit, it is treated as direct. Wages paid to machine shop, assembly shop, factory etc. are the examples of direct labour cost. Direct labour cost is known as the wage of those workers who are engaged in production process whose time can be efficiently and economically traceable to units of products e.g. wages paid to compositors in a printing press, labour of machine operators and assembles. It may also be defined as prime labour cost, process labour cost, operating labour cost, manufacturing wages, direct wages and productive labour cost. Whereas indirect labour costs are not related with the production. Some workers do not engage directly in conversion of output but they contribute indirectly. Labour is paid for the objective of carrying tasks intended to goods or service provided. It cannot be practically traced to particular units of output e.g. wages of store-keepers, foremen, time-keepers, supervisors, inspectors etc.

6.2 Direct and Indirect Labour

Labour involved in factory can be classified in to two categories:

1) Direct Labour 2) Indirect Labour

1) **Direct Labour:** Labour which can be conveniently identified with a particular cost centre or cost unit, the remuneration which is payable to direct workers is direct wages. Ex- wages paid to machine operators, furniture maker, shoe maker, tailor etc.

2) **Indirect labour**: Such cost cannot be conveniently identified with a specific job, product or process but can be apportioned to or absorbed by cost centres or cost units. The remuneration which is paid to indirect workers is known as indirect wages. Ex- Services of supervisor, inspector, foreman, time keeping officers, cleaners, general managers etc.

Difference between Direct Labour and Indirect Labour:

Basis of Distinction	Direct Labour	Indirect Labour
1) Identification	It can be really identified with a particular job or work order	It cannot be directly identified with a particular job or work order.
2) Variability	It changes directly with the volume of output.	It may or may not changes directly with the volume of output.
3) Treatment of cost	Direct labour cost is treated as part of prime cost	Indirect labour cost is treated as part of overhead.

6.3 Control over Labour Cost

It has been stated above that labour is an essential element of the process of production, and it also plays a vital role in producing a product. In large organisation or concerns, labour is controlled by following five departments :

1. **Personnel Department:** In personnel department, selection, appointment and placement of workers after a suitable training is made.

2. **Work Study and Engineering Department:** In work study and engineering department, work study related activities such as planning, job specification, job analysis, time and motion study, safe working conditions and supervision of the production process are performed.

3. **Time-keeping Department:** In time-keeping department, attendance of workers and calculation of wages of workers are recorded.

4. **Payroll Department:** In this department, payroll, wages sheet and distribution of wages are recorded.

5. **Cost Accounting Department:** In this department, accounting for all labour cost is recorded.

The brief study of the above department is as follows:

1. Personnel Department: All the activities of selection, appointment and placement of workers are performed by this department. The personnel manager must have the knowledge of current labour laws and labour conditions in the industry, labour policies of the company, production programme and several problems

of the workers. With the help of these information the manager is able to provide appropriate candidate to the industry and manager can remove all the problems which are persists in the industry in favour of labour. The personnel manager records all these information of workers into a card which is called workers history card.

(i) Workers History Card: Workers history card includes name of the workers, department, post, grade, date of appointment, salary and qualification of the workers. The specimen of workers history card is as follows:

Workers History card

Name . . . . . Name of Father/Husband . . . . . No. .. .. ……...

Deptt. . . . . …… . Date of Appointment . . . . . ….post ……..…....

Salary at the time of Appointment . . . .Grade . ... ……. .

Address . . . . . .Qualification. . . . . Married/Unmarried. … ..

Name and Address of Previous Employer . . ……. . Post ... . ……. . .

Reason to Leave Earlier Job . . . . . ……... . . . .

Promotion . . . . . ……..…New Grade . . ……. . . . . .

New Qualification . . . . . ……... . . . . Other Details . . . . . ……... . . . .

(ii) Labour Placement Requisition: Labour placement requisition is fulfilled by the personnel manager. He checks whether an appropriate candidate is available from within the organization. For appropriate candidate, he gives advertisement in news paper, magazine and trade journals. A specimen of labour placement requisition is follows:

Labour Placement Requisition

Requisition No. . . . . Department . . . . . .

Date…….

Please recruit workers of the following grades for my department with the effect from . . . . . This is as per the original/revised budget.

Any Special Remarks.....

No. of Workers Requisitioned	Grade	Job Specification	Description	Remarks

Approved by . . . . . Requisition by . . . . . .

Action taken by . . . . . .

2. Work Study and Engineering Department: Work study department, helps in establishing control over working conditions. This department also control over productive methods for each job and each department. The main functions of this department are as follows:

(i) Time Study: Time study determines standard time for an operation by direct time. It takes place with the help of stop watches to fix standard time for the job/operations. While fling standard time necessary time for rest is also added. Time study is very useful in standard costing and it is a base of

incentive schemes for workers. The basic purpose of time study is to find out required time for performing the job/operations. I.L.P. has defined time study as, "a technique for determining accurately as possible from a limited number of observations the time necessary to carry out a given activity at a standard of performance."

(ii) Motion Study: Motion study was developed by the American Management Expert F.B. Gilbrith. It is of motion performed by worker at an operation.

Motion study is related with the determination of standardised methods for performing several jobs. When a worker is required to perform operations at work during which his body is moving such as movement at hands, eyes and neck. With the help of this study such movements can be minimized by proper arrangement of light, place of machines and height of chairs to reduce fatigue and tiredness. Benjamin W. Niebel defined it as, "The study of the body motion used in performing an operation, with the thought of improving the operation by eliminating unnecessary motion and simplifying necessary motions and then establishing the most favorable motion sequence for maximum efficiency".

(iii) Job Analysis: Job analysis includes preparation of a description and classification of each job with a list of qualification needed by the workers. United States Department of Labour has deemed job analysis as, "Job analysis is the process of determining by observation and study, and reporting pertinent information relating to the nature of a specific job. It is the determination of the tasks which comprise the job and the sills, knowledge, abilities and responsibilities required of the workers for successful performance and which differentiates the job from all others." Thus, the main object of job analysis is to ascertain the relative worth of each job through objective evaluations.

(iv) Merit Rating: Merit rating is the qualitative and quantitative assessment of the worker's personality and performance. Merit rating is based on following factors of workers -

(a) Quality of work,
(b) Quantity of work,
(c) Attendance,
(d) Discipline and cc-operations,
(e) Job knowledge,
(f) Initiatives,
(g) Reliability and responsibility, and
(h) Aptitude of work.

3. Time-keeping Department: Generally, time keeping department records each worker's time 'in' and 'out' of the factory and the time of each employee for each department. For time recording purpose, this department maintains different cards which are as follows:

(i) Daily Muster Roll
(ii) Time Card
iii) Daily Time Sheet
(iv) Weekly Time Sheet
(v) Job Card
(vi) Idle Time Card
(vii) Piece Work Card

The detailed study of the above cards are as follows :

(i) Daily Muster Roll: The attendance register to note the exact timing 'in' and 'out' of each

worker of the factory is known as daily muster roll. The register provides sufficient number of columns for attendance of each worker. All the entries of the arrival and departure columns may be made by the foreman or the workers himself. In the case of literacy of workers they make sign on the register to avoid any dispute later on. Each department maintains a separate register for his workers. The specimen of daily muster roll are as follows :

Daily Muster Roll

Day..... Date..... Department. …….

Worker's No.	Worker's			Time		Hours		
	Name	Class	Job No.	In	Out	Normal	Over-time	Total

(ii) Time Card: It is an electronic card. In time card, time of arrival and departure or 'In' and 'out' is recorded by the machine. This card is issued to each worker and an identification number is printed on it. The time card of each worker or employee is placed near the entrance of the factory/ office in two racks. One is 'in' rack and the second is out rack. When worker/employee enters in the factory/office, he puts the time card in a device (Machine) and card device prints the time of arrival (in) and then he places this card in the 'in' rack. The same procedure is repeated at the time of departure, the worker/employee again puts the card in card device and device (machine) prints the time of departure or 'out'. This card helps to determine the time consumed or spent by the worker, for which wages of worker calculated according to the time recorded by the machine (time device). The specimen of the time card is as follows:

Time Card

Ticket No. of Worker. . …… . Department . …….
Name of the Worker……. Week Ending . . . . . ……... ….

Days	Normal Time		Over Time		Total Time	
	In	Out	In	Out	In	Out
Monday Tuesday Wednesday Thursday Friday Saturday						

Wages payable

Worker . . . . . Ordinary time . . . . . hrs. @ Rs. . . . . ……...
Wages Clerk . . . . Overtime . …… hrs. @ Rs. . . . .
……...
Less : Deductions . . . . . .
Net Amount Payable …… .

(iii) Daily Time Sheet: Daily time sheet is a special sheet which shows the times spent by a worker on each job during a day. A11 the entries in daily time sheet may be fulfilled by worker

himself or by the foremen. It is very suitable in an organisation where one worker is engaged for only one job a day. The specimen of daily time sheet is as follows:

Daily Time Sheet

Token No. of Worker. . ……. . Date . ……

Name of the Worker…….

Job No.	Department	Time		Total Hours		Rate per Hour	Amount Rs.
		Start	Finished	Normal	Over-time		

Worker . . . . . .

Cost Clerk . . . .

Foreman ….. ……. . .

(iv) Weekly Time Sheet: In weekly time sheet, weekly time consumed by the worker is recorded. This is quite similar to the daily time sheet. The specimen of weekly time sheet is as follows:

Weekly Time Sheet

Token No. of Worker…… Department . . . . . .

Nome of the Worker…….. Week Ending . . . . . .

Date	Job. No.		Job. No.		Total Time		Rate Rs.	Amount Rs.
	On	Off	On	Off	Normal	Over-time		

Worker.....

Cost Clerk . . . . . Foreman.. . . . . .

(v) Job Card: A card which is prepared for each job done by the worker is called job card. When a job is given to the worker, a card with the number of the job is also given to him. The worker shall record the time of starting the job and finishing it. The specimen of job cash is as follows:

Job Card

Token No. of Worker. . . . . Date . . . . . .

Name of the Worker. . . .' . . . . . Job No. . . . . .

Job No.	Time		Total Hours		Rate Rs.	Amount Rs.
	ON	OFF	Normal	Over-time		

Worker.....

Cost Clerk ……... Foreman .....

(vi) Idle Time Card: Idle time card is prepared to know the unproductive time in the factory during the job. Idle time card is prepared by the cost clerk, he want to know about the causes of

idle time in a factory. Idle time is the time during which the workers were idle. There are several causes of idle time. But, generally, lack of materials lack of machine, lack of power, lack at instructions, mismanagement, transfer of workers and employer- employee-tussle are treated as major causes of idle time. Idle time may be classified into two categories normal and abnormal. If idle time is inevitable even in standard conditions it is known as normal idle time. Whereas, abnormal idle time indicates the idle time noticed is an excess of normal idle time. In addition to it, idle time due to abnormal circumstance is also known as abnormal idle time. Abnormal idle time can be classified into two categories controllable and uncontrollable. Controllable idle time is that idle time which can be controlled by good planning at top level management whereas, uncontrollable idle time is that idle time which cannot be controlled by individual action. The specimen of idle time card is as follows:

Idle Time Card

Name of the Worker. . . . . Date . . . . . .

Token No. of Worker. . . . . Department . . . . . .

Reasons for Idle Time	Time			Total Hrs.	
	From	To	Period	Rate Rs.	Amount Rs.
Power Failure Breakdown of Machinery Waiting For : Tools Materials …….. Other Causes ……..					

worker . . . . . .

Cost Clerk . . . . . Foreman . . . . . .

(vii) Piece Work Card: This card is prepared for piece produced by each worker. This card records numbers of pieces produced by the worker. The specimen of piece work card is as follows:

Piece Work Card

Name of the Worker. . . . . Date of Starting Job. . . . . .

Token No. of Worker. . . . . Date of Completion job . . . . . .

Name of the Job	Quantity of Product	Quantity Accepted	Quantity Rejected	Rate per unit	Rs.	Total Time

Worker.....

Foreman . . . . . .

6.4 Labour Turnover

Labour turnover is the number of employees who leave the factory during a period in relation to the number of workers employed during the year due to resignation, new appointment, retrenchment, old age, ill health, pregnancy, death etc.

• **Causes of Labour turnover**

Causes of labour turnover in an organization can be classified as follows:

a) **Reasons Related to Employer-** labour turnover can be arise due to unhealthy environment, law wages, lack of changes for promotion and because of wrong behavior of employer towards employees.

b) **Reasons Related to Employees -** High labour turnover is sometimes due to nature and efficiency of employees. Example - Retrenchment due to inefficiency, disciplinary action, change for betterment etc.

c) **Casual Reasons -** The casual reasons such as permanent disability of employees, domestic problems and family responsibilities, retirement due to ill health or old age, marriage of employee, pregnancy etc. resulted in the labour turnover.

• **Bad Effect of Labour Turnover:** High labour turnover leads to increase in the cost of production and declines productivity by the following ways:

1) Cost of selection and training increase which result in the increment of cost.
2) It leads to more wastage of materials, scrap, defective work and monitoring cost.
3) Due to lower productivity of new recruits who may not have the similar experience as a workman who left.
4) It leads to less production because of the time lack between separation and recruitment of new employees.
5) It also leads to reduction in sales because of loss of contribution and goodwill.
6) Regular flow of production gets disturbed because of frequent changes in labour force.

6.5 Labour Turnover Rates

Labour turnover rates are calculated to facilitate comparisons between different periods and different organizations. Labour turnover rates are calculated by three methods which are as follows:

1 Separation Rate Method
2. Replacement Rate Method
3. Flux Rate Method

(1) Separation Rate Method : This method shows number of worker who separated from factory during a particular period. The following formula is used for calculation of separation rate.

$$\text{Separation Rate} = \frac{\text{No. of Workers separate during a year / period}}{\text{Average Number of Workers induring a year / period}} \times 100$$

The average number of workers is calculated by following formula:

$$= \frac{\text{No. of Workers at the beginingof period} + \text{No. of Workers at the end of period}}{2}$$

The above method may be explained by following illustration :

Illustration - 1:

In a factory, there were 1,000 workers in the beginning of the year while there were 2000 workers at the

end of the year. During the year 50 workers were retrenched and 40 workers resigned from services. Find labour turnover rate by separation rate method.

Solution:

$$\text{Separation Rate} = \frac{\text{No. of Workers separate during a year / period}}{\text{Average Number of Workers during a year / period}} \times 100$$

$$= \frac{50 + 40}{1500} \times 100 = 6\%$$

Working Notes:

(i) Average number of workers in the year = 1,000 + 2,000 /2 = 1,500

(ii) Workers left or retrenched during the year = 50 + 40 = 90

2. Replacement Rate Method: Under replacement rate method, the rate of replacement of new workers in the place of separate workers is calculated. The following formula is used to calculate the replacement rate :

$$\text{Replacement Rate} = \frac{\text{No. of Workers Replaced during the period}}{\text{Average No. of Workers during the period}} \times 100$$

The average number of workers is calculated by following formula:

$$\text{Replacement Rate} = \frac{\text{Number of workers at the beginning of period}}{\text{Number of workers at the end of period}} \times 100$$

The following illustration explain the calculation of replacement rate.

Illustration - 2

In a factory, there are 1,000 employees in the beginning of the year while they were 1400 employees at the end of the year. During the year 100 employees left and 500 employees joined out of which 80 employees joined to replace old employees, rest of employees joined in expansion programme. Find replacement rate.

Solution:

$$\text{Replacement Rate} = \frac{\text{No. of Workers Replaced during the period}}{\text{Average No. of Workersduring the period}} \times 100$$

$$= \frac{80}{1200} \times 100 = 6.67\%$$

Working Notes:

Average Number of employees in the year = 1,000+1,400/2 = 1,200

3. Flux Rate Method: The flux rate represents the total change in the composition of labour force due to sensations and replacement of workers. This is calculated by the following formula:

$$\text{Flux Rate} = \frac{\text{No. of Worker Seprated} + \text{No. of Workers Replaced}}{\text{Average No. of Workers during the period}} \times 100$$

The following illustration explains flux rate method:

Illustration - 3:

In a factory, there were 1,000 workers in the beginning of the year while 1200 workers at the end of the year. During the year 50 workers left and & 60 workers joined for their work. Remaining employees joined in an Expansion Programme. Calculate flux rate.

Solution:

$$\text{Flux Rate} = \frac{\text{No. of Worker Separated} + \text{No. of Workers Replaced}}{\text{Average No. of Workers during the period}} \times 100$$

$$= \frac{50+60}{1100} \times 100$$

$$= \frac{110}{1100} \times 100 = 10\%$$

Working Notes:

Average Number of Workers = 1000+1200 / 2 = 1100

Illustration - 4:

Calculate different labour turnover rates from the following information collected from the personnel department of Tailor manufacturing Co. for the month of January, 2008. You are also required to find out the relationship among the labour turnover rate calculated by different methods:

No. of Workers on 1st January 08	950
No. of Workers on 31st January 08	1,050
No. of Workers left the factory in January	10
No. of Workers discharged in January	30
Workers recruited in the month (including 120 for Expansion)	140

Solution:

$$\text{Sepration Rate} = \frac{\text{No. of Workers separated}}{\text{Average No. of Workers}} \times 100$$

$$= \frac{10+30}{1000} \times 100 = 4\%$$

Annual Separation Rate: = 4 x 12 = 24%

Average workers =950+1,050 / 2 = 1,000

$$\text{(2) Replacement Rate} = \frac{\text{No. of Workers Replaced}}{\text{Average No. of Workers}} \times 100$$

$$= \frac{140-120}{1000} \times 100 = 2\%$$

Annual Replacement Rate = 2% x 12 = 24%

$$\text{(3) Flux Rate Method} = \frac{\text{No. of Workers Separated} + \text{No. of Workers Replaced}}{\text{Average No. of Workers during the period}}$$

$$= \frac{40+20}{1000} \times 100 = 6\%$$

Annual Flux Rate = 6 x 12 = 72%

(4) Relationship among different labour Turnover Rate

Flux Rate = Separation Rate + Replacement Rate

72% = 48% + 24%

6.6 Cost Analysis of Specific Types of Labour Cost

Generally cost is treated as direct or indirect labour cost but still there are certain costs which sometimes may be treated as direct labour cost and other times as indirect labour cost depending upon the situation.

Few examples of specific types of labour cost are follows:-

1) Cost Benefit Analysis of Overtime Work - Any work which cannot be completed during routine or normal working hours, workers are asked to work for extra hours and the wages asked to work for extra hours and the wages paid during extra hours is known as overtime wages. The rate of wages during such additional hours is higher than normal wages so overtime is sectioned in specific circumstances only and these are -

a) Making up time lost
b) Seasonal rush of work
c) Completion of job within a specified period
d) Shortage of labour or some workers on leave
e) To utilize machine and infrastructure to the maximum extent

Effect, control and accounting of overtime

- **Effects:** If overtime is sanctioned in special situations then it is good otherwise it will cause lots of problems like workers will increase the labour cost, workers will work slowly during normal time to get sanctioned the overtime, workers will be tired so during overtime productivity will be decreased, more depreciation on plant and machinery and adverse effect on health of workers.

- **Control:** After discussing the above causes, it is clear that overtime working should be controlled and should be permitted in special circumstances only. For this some action may be taken -
  a) It should be permitted only if it is urgently required,
  b) It should be sanctioned by competent authority,
  c) Effective supervision may be exercised,
  d) Proper flow of work during normal working hours,

- **Accounting:** When we talk about accounting treatment of overtime wages, that means how excess payment i.e. overtime premium should be treated in cost accounts as another part of overtime wages i.e. normal wages in considered in the same way as wages paid during normal hours is treated. Treatment of overtime wages depends upon circumstances because of which overtime was paid for:
  1. If overtime is due to general pressure of work, it may consider as overhead.

2. It may be charged to the concerning department, if it is because of department delay.
3. If overtime is being worked because of the request of the customer or to complete an order before time, it is charged to the job or order.

2) Cost Analysis of Losses Due to Idle Time: Idle time is the time for which labour attends the work place but does not work actually, still wages is paid for the time spent in the workplace. Causes of idle time can be divided into four parts:-

1. **Relate to Production:** Causes related to production can be further categorized as avoidable and unavoidable causes which are as follows:

   i. Avoidable Causes: It includes lack of material because when enough material is not available there is idle time which can be controlled. Causes such as lack of machinery, power and lack of instructions can also be avoided.

   ii. Unavoidable Causes: Causes such as time lost between completion of one job and commencement of next job; workers getting instructions from supervisor or time for setting machines and personal needs and fatigue to a reasonable extent can't be controlled.

2. **Administrative Causes:** Idle time can also arise because of lack of proper administration, coordination and co-operation among workers. The major causes of idle time are mismanagement which occurs due to lack of discipline and control on workers. When workers are transferred to a job which is not of their liking, it increases the chances of idle time which can be controlled. When there is an dispute between employer and employee, it should be resolved at an initial stage as if it is referred to trade union, will lead to strike.

3. **Economic Causes:** In the case of seasonal industries workers may remain idle because of non-dismissal of workers in the off season, other season for the lack of demand are competition, change in export policy etc.

4. **Other Causes:** If in other concern, employees are not working efficiently or if there is no value of hard working in the factory and society, workers will tend to go slow.

6.7 Remuneration System

The remuneration of employees is a reward of services rendered by him. It is an agreement among employer and employee. For remuneration, **B.K. Bhar** has rightly point out that, "Remuneration is the reward for labour and services, whereas incentive is the stimulation of effort and effusiveness by offering monetary inducement or extra facilities."

Labour cost plays an important role in total cost. It is based on efficiency and experience of workers. Many times labour cost forming 60 per cent to 70 per cent part of total cost. **H.J. Sheldon** stated that, "Low wages do not necessarily mean low costs; in fact, it is widely recognized now that efficiently organized factories may pay the highest, and yet have lowest labour costs."

6.8 Normal Remuneration Method

It has already been stated that labour is one of the main element of production. The success of a business organization is based on the efficiency of labour. There are several methods of wage payment. These are differing from each organisation to another organization. The methods of wage payment are as follows:

1. Time Rate Method: This method is very popular method of payment of wages. Under this method, the payment is made on the basis of time devoted by worker in the factory. It is an oldest form of wage

payment. In this method wages is calculated as follows:

Wages = Hours Worked x Rate per Hour

Illustration - 5:

Calculate total weekly wages paid to Mohan, from the following information:

	Per week
Standard Hours even to him	40 Hours
Actual Hours worked	30 Hours
Rate per Hour	Rs. 20

Solution:

The total weekly wages paid to Mohan will be calculated as follows :

Formula:

Wages = Hours Worked x Rate Per Hour = 30 x Rs. 20 = Rs. 600

Thus, weekly wages paid to Mohan is Rs. 600

2. Piece Rate Method: In this method, wages is paid on the basis of units produced by the workers. The rate of payment is determined by production department. Under this method, wages of workers is calculated by following formula:

Total Wages = No. of Units Produced x Rate Per Unit

Illustration - 6:

From the following information, calculate total wages by piece rate method and time rate method.

Standard Hours	60
Actual Hours Worked	50
No. of Unit Produced	500
Rate per Hour	Rs. 20
Rate per unit produced	Rs. 5

Solution:

The total wages paid to workers is calculated as follows:

Time Rate Method

Formula = Actual Hours Worked x Rate per Hour = 50 x Rs. 20 = Rs. 1,000

6.9 Incentive Wages Method

Generally, incentive may be deemed as an extra payment paid by employer to worker/employees for his additional efficiency. The main object of an incentive plan to induce a worker to produce more to earn higher wages. Incentive plans increase the efficiency and capacity of workers. Some important incentive plans are as follows:

1. Halsey Premium Plan
2. Rowan Bonus Plan
3. Taylor's Plan
4. Emerson's Efficiency Plan
5. Merric's Plan

1. Halsey Premium Plan: This plan was developed by **F.A. Halsey** an American Engineer in 1891. They developed this plan for the payment of bonus. Under this plan, a worker is entitled to get bonus if he finished his work before his standard time. The total wages is paid to him as normal wages (Actual time x Rate per hour) plus a bonus on the basis of time saved by him on production. The rate of bonus may be 30 per cent to 70 percent of wages for time saved by workers. But, in the absence of any Information the rate of bonus may be taken at 50 percent. According to this plan, time saved can be calculated as follows:

Time saved = Standard Time - Actual Time

or TS = ST - AT

Therefore, the total wages of a workers in this plan can be calculated as follows :

Normal Wages (Actual Time x Rate per Hour) =		x x x
Bonus (Time Saved x Rate x 50/100) =		x x x
	Total Wages	x x x

The above calculation can also be solved as follows:

Total Wages = (Actual Hour worked X Rate per Hour) + (Time saved X Rate per hour X 50/100)

Illustration - 7:

Calculate the amount of total wages from the following information:

Standard Output in 11 hours :	120 units
Actual Output in 10 hours :	132 units
Wages Rate per hour :	Rs. 15

Solution:

At first standard time (ST) is calculated for 132 units and than total wages is calculated as follows :

= (10 x 15) + [(11-10) x 15 x 50/100]

= 150 + 7.5 = Rs. 157.50

2. Rowan Bonus Plan: In 1901, this plan was developed by **James David Rowan.** This plan is similar to Halsey Premium Plan. But, the calculation of bonus is made on the proportion of time taken and time allowed to him. In this plan the bonus is calculated as follows:

Bonus: Actual Time / Standard Time x Time saved x Rate per Hour

Therefore, the total wages is calculated as follows:

Normal Wages = (Actual Hours x Rate per Hour)	x x x
Bonus = (Actual Time/standard Time x Time Saved x Rate per hour)	x x x
Total Wages	x x x

The above calculation can also be solved as follows :

Total wages = (AT x R) + (AT / ST x TS x R)

Illustration - 8:

Calculate the total wages under Rowan Bonus plan with the help of illustration 7.

Solution :

Total wages = (AT x R) + (AT / ST x TS x R)

= (10 x 15) = (10 / 11 x 1 x 15)

= 150 + 13.63 = Rs. 163.63

3. Taylors Plan: This plan was developed by the father of scientific management, F.W. Taylor. This plan is based on time and motion study. Under this plan, the wages is paid according to the capacity of workers. If the workers use less than 100% capacity then the low price rate equal to 80% of standard piece rate is given to him. But, if they use 100% or more than 100% capacity then higher price rate equal to 120% of standard piece rate is payable.

The piece rate is also expressed as follows :

	Rate
Below 100% Capacity	: 80 % of Normal
100% or More capacity	: 120% of Normal Rate

Illustration - 9:

When standard output in 40 units per hour and standard rate Rs. 4 per hour. The following differential piece rate is applied:

75% of piece rate when below standard. 125 of piece rate when above the standard. The workers have produced in a day 8 hours as follows :

Ram	240 units
Shyam	400 units

Solution:

Given, Standard time = 40 per hour

Standard Rate = Rs. 4 per hour

On completing 40 units in one hour, a worker receives Rs. 4. Hence, the piece rate is 4 / 40 = 10 .

Differential Piece Rates :

Low Price Rate : 75% of Piece Rate = 75 x .10 / 100 = Rs. 0.075

High Price Rate : 125% of piece Rate = 125 x .10 / 100 = Rs. 0.125

Thus, at 40 units per hour, the standard output is 320 units per day. Ram produced 240 units and Shyam produced 400 units. In this question, performance of Ram is below standard while Shyam's performance is above standard. Hence, Ram is paid at lower rate and Shyam is paid at higher rate. i.e. Ram is paid = 240 x.075 = Rs. 18, Shyam is paid = 400 x0.125 = Rs. 50

4. Emerson's Efficiency Plan: This plan was developed by **Emerson**. Under this plan, minimum wages is guaranteed but, bonus is paid on the efficiency of workers. There are several slabs for efficient workers. The standard output is fixed at 100% efficiency. If the worker uses less than 100% efficiency, bonus is not paid to him. The bonus slabs in this plan is as follows:

Efficiency of Worker	Bonus
(i) Below 66.67% or 66 2/3% (ii) 66.67% to 100% (iii) Above 100%	No Bonus of actual wages 20% Bonus 20% Bonus + 1% bonus for each increase of 1% in efficiency

Illustration - 10:

Calculate the amount of bonus and total wages under Emerson plan with the help of following information:

Standard Output in 10 Hours : 120 units

Actual Output in 10 hours : 132 units

Wages Rate : Rs. 15 per hour

Solution:

At first, the efficiency of worker is calculated:

$$\text{Efficiency of worker} = \frac{\text{Actual Output}}{\text{Standard Output}} \times 100$$

$$\frac{132}{120} \times 100 = 110\%$$

As efficiency of worker is more than 100% rate of bonus is calculated as follows : Rate of Bonus = 20% + (Efficiency of worker - 100%)

= 20% + (110% - 100%)
= 20% + 10% = 30%

Particulars	Amount (Rs.)
Wages For Actual Time = AT x AR = (10 x 15)	150
Bonus for Efficiency = AW x 30% = (150 x 30%)	45
	195

5. Merric's Plan: This is a updated form of Taylor's plan. Taylor's plan gives two rates while merric's plan gives three rates.

Level of Efficiency	Price Rate
Upto 83.33% 83.33% to 100% Above 100%	Ordinary Piece Rate 110% of Piece Rate 120% of Piece Rate

6.10 Group Bonus Plans

Group bonus refers to bonus paid for the collective efforts made by group of workers. Under a group bonus scheme, bonus is paid to a team of employees working together. This scheme is generally introduced where individual efficiency cannot be established for the payment of bonus. If any incentive is to be offered, it should be offered to the team as whole. The quantum of bonus is determined on the basis of the production

of the team and the bonus is shared by individual workers in a certain proportions, mostly in the proportion of wages on time basis:

There are five schemes of group bonus plan -

- Priestman's Production Bonus
- Cost Efficiency Bonus
- Town Gain Sharing Plan
- Budgeted Expenses Bonus
- Waste Reduction Bonus

Illustration - 11:

Calculate the earnings of workers, x, y and z under straight piece state system from the following particulars:

Normal state per hour	Rs. 10.80
Standard time per unit	30 seconds

Output per day is as follows:

Worker x - 780 units; Worker B - 900 units and Worker C - 1200 units.

Working hours per day are 8.

Solution:

Calculation of Normal wage rate per unit:

Normal wage rate per hour	Rs. 10.80
Standard output per hour	120 units
Normal wage rate per unit (Rs. 10.8/120 units)	0.09

Efficiency Level

	X	Y	Z
Actual Output per day (Units) (a)	780	900	1200
Standard output per day (b)	960	960	960
Efficiency level achieved (a/b x 100)	81.25%	93.75%	125%

Efficiency of workers under straight Piece rate system:

Worker x (780 units x Rs. 0.09)	70.2
Worker y (900 units x Rs. 0.09)	81.0
Worker y (1200 units x Rs. 0.09)	108.0

Earnings of workers under Mercies' Multiple Piece Rate System

	X	Y	Z
Efficiency Level	81.25%	93.75%	125%
Actual output per day (units) (i)	780	900	1200
Applicable wage state per unit (ii)	0.09	0.09	0.09
Wages (Rs.)	70.2	81.0	108

6.11 Summary

Labour is the second major element of cost which converts the raw materials into finished products. The remuneration payable to direct labour is known as direct wages and the labour which acts as ancillary to the direct labour which is used in completing the production. Each concern should constantly strive to raise the productivity of labour and the efforts for the control of labour cost should begin from the very beginning. The various schemes are introduced which depends upon nature of work and circumstances of each industry.

6.12 Self Assessment Questions

1. What so you mean by 'Labour Turnover'? Mention the various methods of its measurement and explain what is the impact of Labour Turnover' on working of a manufacturing concern?

2. Write short notes on the following -
   a. Overtime.
   b. Idle time.
   c. Direct and Indirect labour.

3. A worker takes 9 hours to complete a job on daily wages and 6 hours on scheme of payment by result. His wage rate is Rs.1.50 an hour, the material cost of the product is Rs.8 and the overhead is150% of total direct wages. Calculate the factory cost of the product under following plans.
   (a) Piecework Plan,
   (b) Halsey Plan, and
   (c) Rowan Plan

4. During one week the worker X manufactured 200 units. He received wages for a guaranteed 45 hours week at the rate of Rs.14 per hour. The time allowed to produce one unit is 15 minutes which is increased by 20% in case of piece rate system. Calculate his gross wages under each of following method remunerating labour:
   a. Time Rate;
   b. Piece Rate;
   c. Halsey Premium Plan;
   d. Rowan Premium Plan;

6.13 Reference Books

- Agrawal, Shah, Mendiratta, Agarwal, Sharma, Tailor, Cost and Management Accounting, (Malik and Co.)
- Jain, Khandelwal, Pareek, Cost Accounting (Ajmera Book depot, Jaipur)
- Oswal, Maheshwari, Modi, Cost Accounting (RBD, Jaipur)
- Agrawal, Jain, Sharma, Shah, Mangal, Cost Accounting (RBD, Jaipur)

Unit - 7 : Overheads – I

Structure of Unit:

7.0 Objectives

After studying this unit you should be able to understand:

- The meaning of overheads.
- Classify the overheads into different categories.
- Distribute factory overheads as per the different stages involved in distribution.
- Understand the primary and secondary distribution of factory overheads.
- Use different methods for apportionment of inter service departmental problems.
- Explain the meaning of certain key terms.

7.1 Introduction

Overhead costs refer to those items of cost which cannot be identified with particular products or processes or specific jobs or work orders. These are nither direct material nor direct wages, nor are these expenses of a direct nature, so these cannot become the direct cost of manufacturing.

According to **Blocker and Weltmer** "Overhead costs are the operating costs of a business enterprise which cannot be traced directly to a particular unit of output."

CIMA defines overhead cost as "The total cost of indirect material, indirect labour and indirect expenses.

Thus, overhead is the cost of material, labour and expenses which cannot be economically identified to any one cost unit, but they constitute an essential element of cost as they are incurred for producing a commodity or making it ready for sale. Overhead costs are also termed as 'indirect cost' or 'supplementary cost' or 'non productive cost' or on cost etc.

Steps in accounting of overheads

The important steps involved in accounting of overheads is as follows:

A. Classification and codification of overheads
B. Collection of overheads

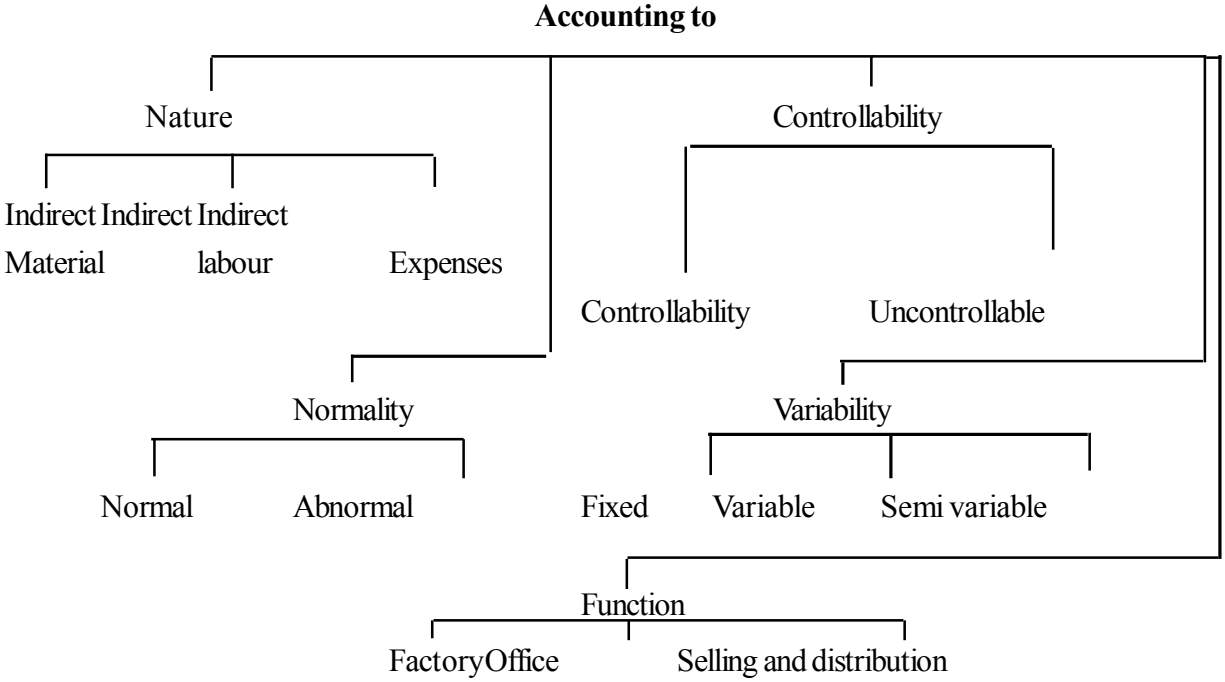
C. Distribution of overheads using

- Allocation
- Apportionment
- Absorption

7.2 Classification of Overheads

CIMA defines classification as "the arrangement of items in logical groups having regard to their nature (subjective) or the purpose to be fulfilled (objective classification)" It is the process of arrangement of items into groups according to their degree of similarity. The classification can be summarized as follows

Classification of overheads



A. According to Nature:

(i) Indirect Material
(ii) Indirect Labour
(iii) Indirect Expenses

Each of these terms has been explained in detail in previous units.

B. According to Normality:

(i) Normal Overheads: These are expected to be incurred in attaining a given output and are unavoidable in nature. They are included in production cost.

(ii) Abnormal Overheads: These are not expected to be incurred in attaining a given output. These arise due to some abnormal reasons e.g. cost of abnormal idle time. They are charged to costing profit and loss account.

C. According to Controllability

(i) Controllable overheads: Indirect costs which can be controlled by executive action at the point of their incurrence. Normally variable overheads are controllable overheads.

(ii) Uncontrollable overheads: Indirect costs, which cannot be controlled by executive action at the point of their incurrence. Normally fixed overheads come under this category.

D. According to Variability

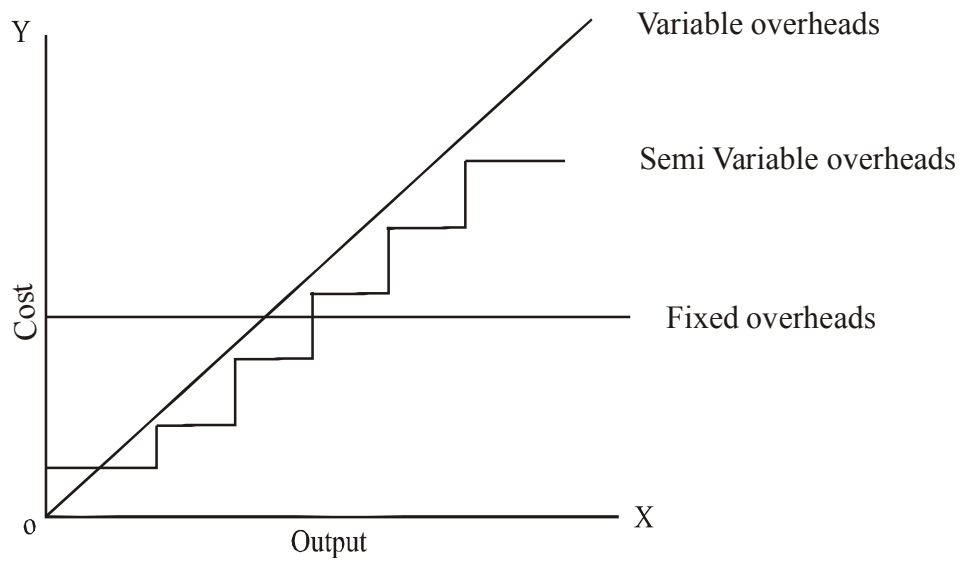
(i) Fixed Overheads: Indirect costs which tend to remain unaffected by changes in the volume of production or sale are known as fixed overheads. Factory rent, rates, insurance, staff salary etc. are fixed in nature irrespective of the level of capacity utilized or units produced.

It must be noted that fixed costs are not absolutely fixed for all times. If there is a change in the capacity of production or sale these costs also tend to change. Since the amount of this type of cost is fixed over a period of time, fixed cost per unit decreases as production increases and per unit fixed cost increases as production decreases. These overheads are also termed as shut down overheads or period cost.

(ii) Variable Overheads: Indirect cost which vary in direct proportion to changes in the volume of production or sale are known as variable overheads. Since the amount varies in relation to volume, the cost per unit tends to remain constant. For example, fuel and power, packing charges freight, selling commission etc.

(iii) Semi Variable Overheads: Some overhead costs tend to vary with changes in output or sales but not in direct proportion to the change. They are neither perfectly variable nor absolutely fixed in relation to changes in volume. These costs remain constant over a relatively short range of variation in output and then change to a new level with an increase or decrease in the volume of activity. These costs are partly fixed and partly variable. The examples of such costs are – repairs and maintenance cost of supervision, depreciation of plant etc.

Chart showing the nature of overheads



Semi variable overheads are segregated into fixed and variable overheads by using either of the following methods: (i) High and Low Method (ii) Degree of Variability Method (iii) Scatter Diagram Method (iv) Least Square Method and Generally (v) Level of Output Compared with level of expenses method is used, which is as follows:

$$\text{Variable cost per unit} = \frac{\text{Change in overhead}}{\text{Change in output}}$$

Variable overhead = variable overhead per unit × No. of units producted

Fixed overhead = Total overhead - variable overhead

Illustration - 1:

The cost of producing 3000 units is as follows:

Material Rs. 36000, wages Rs. 24000, overhead charges (fixed and variable) Rs. 10000.

The company produces 8000 units and sells at Rs. 25 each and earns a profit of Rs. 20000. Find out the amount of fixed and variable overheads.

Solution : Calculation of total overheads for producing 8000 units

Selling price	8000×25	=	2,00,000
Less profit			20,000
	Total Cost		1,80,000

$$\text{Less Material} = \frac{36000}{3000} \times 8000 = 96000$$

$$\text{Labour} = \frac{24000}{3000} \times 8000 = 64000$$

1,60,00

Total overheads (B/W) 20,000

$$\text{Variable overhead per unit} = \frac{\text{Change in overhead}}{\text{Change in output}}$$

$$= \frac{20000 - 10000}{8000 - 3000} = \frac{10000}{5000} = \text{Rs. 2 per unit}$$

So, variable overhead for producing 3000 unit = 3000×2 = Rs. 6000

Fixed overheads = 10000-6000 = Rs. 4000

Activity A:

1 Distinguish between fixed variable and semi variable overhead costs, giving two examples of each.

E. According to Function

(i) Factory Overhead
(ii) Office or Administration Overhead
(iii) Selling and Distribution Overhead

In this unit we will discussed in detail about factory overheads only.

7.3 Factory Overheads

Factory overheads include all expenses which arise in connection with manufacturing operations but

cannot be directly identified with particular products or jobs. It starts with supply of materials and ends with primary packing of the product.

Factory overhead is also called as 'manufacturing overhead' or 'production overhead', or 'factory on cost' or 'works overhead'. Examples of factory overheads are:

1. Rent rates and insurance of factory building.
2. Depreciation and repairs of plant and machinery.
3. Depreciation and repairs of factory building.
4. Store keeping expenses, cost of consumable stores.
5. Wages of indirect labour, normal idle time etc.
6. Salary of works manager, foreman.
7. Power used by machines.
8. Drawing office expenses.

7.3.1 Codification

Codification means collecting similar overhead cost items under one heading. Each item of overhead is properly analysed and written under its head. A code number is allotted to it which is known as standing order number. It may consist number or latter or a combination of both. This also helps in adopting mechanized system of accounting.

7.3.2 Collection

After classification and codification of overheads these are collected from the following sources:

1. Store requisition slip – Indirect material
2. Job cards and wage book – Indirect labour
3. Vouchers of expenses – Total amount of indirect expenses
4. Cash book
5. Other registers, books and special reports for depreciation wastage, residuals etc.

7.3.3 Allocation - Primary Distribution

Certain items of overheads can be clearly identifiable to the related job or cost unit e.g. repairs and maintenance incurred for specific department, indirect wage or other expenses for particular department etc.. Allotment of such items to specific department is known as allocation. Thus, charging the whole amount of particular expense to particular department or cost centre is called as allocation of overheads.

7.3.4 Apportionment of Overheads

Certain items of overheads cannot be clearly allocated to any particular department or cost centre. In fact, these are combined expenses or overheads. Distribution of these combined overheads to various departments is known as apportionment of overheads. This is an indirect process to proportionate the amount of overhead on some equitable basis. This is also called as primary distribution of overheads, because in this distribution all the overhead cost should be allocated or apportioned to the production and service departments. The criteria on which apportionment of overhead is based may be as under:

1. Utility and Benefit Received Method: It is based on the theory that greater the amount of service, utility or benefit received by a particular department, the larger should be the share of overhead to be borne by that department. If all the service rendered was utilized by only one department, then total of that service will be charged to that department only. The following are some of the common bases in use:

(i) **Capital Value of Asset:** Overheads related to the value of property like depreciation, insurance of plant and machinery of building can be apportioned on this basis.

(ii) **Ratio of Area Occupied:** Overheads which are related to the floor area, such as rent of the premises, remuneration to watchman, repairs of building, lighting and heating are distributed by using the ratio of area covered or occupied by the departments or cost centers.

(iii) **Number of Employees:** Expenses of canteen, pensions department, labour welfare section, library, club, hospital etc.

(iv) **Departmental Wages:** Overheads which are closely related to the departmental wages, like employers contribution towards provident fund, holiday pay, ESI etc. can be apportioned in the ratio of departmental wages.

(v) **Direct Labour Hours:** Supervision expenses can be apportioned on this basis.

(vi) **Machine Hours Worked:** Expenses closely related with the running of machine e.g. depreciation, repairs of machine, general overheads etc. can be apportioned on the basis of machine hours.

Note: Sometimes special related bases are given, then priority is given to these e.g. electricity charges or power if separate sub meters are there, kilowatts hours used is preferred, otherwise floor area or other nearest related base is used. Similarly for carriage inward value of material issued is useful. For lighting number of light points or area occupied can be used.

Illustration - 2:

A factory has two production departments and two service departments. Following figures have been extracted from the books of the respective departments.

	Production Department X		Service Department A	
		Y		B
Wage (Rs.)	80000	60000	30000	30000
Area sq. meter	1500	1100	900	500
No. of employees	400	300	200	100
Value of plant (Rs.)	160000	120000	80000	40000
Value of stock (Rs.)	25000	15000	-	-
Lighting units	500	300	150	50

The following figures of actual costs were taken from the financial books

	Rs.
Rent	800
Depreciation	2000
Insurance	800
Power	1000
Canteen expenses	100
Supervision	3000
Repairs of plant and machinery	1200
Light	1000
Employers contribution to ESI	200

Apportion the above costs to various departments on most equitable bases and draw an overhead analysis sheet.

Solution:

Overhead Analysis Sheet

Note: In absence of any indication, power has been apportioned on the basis of value of plant and machinery.

2. Technical Estimates: Technical experts suggest equitable proportions in which these expenses should be shared by the cost centers. Examples of these are oil and grease, internal transport, consumption of water, fire prevention etc.

3. Ability to Pay: According to this principle, centres making higher profits take a higher share of the expenses. The presumption is that larger profit earners can afford larger share of overhead costs.

4. Neutrality and Equity or Fairness: It implies that the distribution scheme should produce an allocation which is neutral, just and fair to all departments involved.

7.4 Secondary Distribution of Service Department Overheads

If service department render service to production department only

Since actual production is confined only to production departments, so all factory overheads must be ultimately charged to the production departments for costing purposes. Service departments overheads can be apportioned on the basis of actual benefits received by the respective department (which is most commonly used) or ability to pay (higher the revenue, higher is the proportionate charge for services) or the ease and convenience with which benefits can be directly traced and measured in respect of the various production departments can also be taken into account.

Illustration - 3:

The following figures are taken from the accounts of a manufacturing concern for the month of August 2010.

Indirect material: Production departments-

A-Rs. 8000 B. Rs. 15000 C.Rs. 4000

Service departments X- Rs. 16000 Y Rs. 6000

Indirect wages – Production departments A. Rs. 8000 B. Rs. 12000 C. Rs. 4000 Service department X Rs. 12000 Y Rs. 7000.

Other expenses (Total) – Power and light Rs. 30000 Rent and Rates Rs. 14000, Supervision charges Rs. 15000, Insurance of asset Rs. 5000, depreciation at 6% on capital value of asset per annum.

Departmental Data

Items	A	B	C	X	Y
Area (Sq. ft.)	1500	2000	2000	500	1000
Kilowatt hours	800	2200	2000	250	750
Number of employees	60	240	180	40	80
Capital value of asset (Rs.)	400000	600000	500000	200000	300000

Service rendered by service departments

	A	B	C
X	30%	50%	20%
Y	40%	20%	40%

From the above data prepare a overhead distribution sheet.

Solution:

Distribution Sheet

Items	**Basis**	**Total Rs.**	**Production Departments Rs.**			**Service Departments Rs.**	
			A	**B**	**C**	**X**	**Y**
Indirect material	Actual	49000	8000	15000	4000	16000	6000
Indirect labour	Actual	43000	8000	12000	4000	12000	7000
Rent and Rates	Area	14000	3000	4000	4000	1000	2000
Power and light	Kilowatt hours	30000	4000	11000	10000	1250	3750
Insurance	Value of assets	5000	1000	1500	1250	500	750
Supervision	No. of employees	15000	1500	6000	4500	1000	2000
Depreciation	Value of asset	10000	2000	3000	2500	1000	1500
Total		166000	27500	52500	30250	32750	23000
Distribution of service overheads							
X		-	9825	16375	6550	(32750)	
Y		-	9200	4600	9200		(23000)
Total overheads		166000	46525	73475	46000	-	-

Inter departmental service

When two or more service departments are mutually dependent then the overhead cost of any one department cannot be determined until the costs of other departments are known, while the cost of later cannot be determined units the cost of former is known. For example, power house gives power to the maintenance department and in turn maintenance department carries out maintenance work of power house also. So, the power house must bear a proportionate part of maintenance overheads. Similarly maintenance dept. must bear the overhead cost of power house. The following are the main methods available for dealing with such inter departmental distribution.:

1. Simultaneous Equation Method: Under this method the total overhead cost for each service department is expressed in the form of an algebraic equation with the help of the percentage distribution of the service cost. But this method may not be easy and practicable to apply if the number of interdependent service departments are more than two. This method is illustrated in illustration 4.

2. Repetitive Distribution Method or Continuous Allotment Method: Under this method, service department costs are apportioned over other departments, production as well as service, according to agreed percentage. This process continues till the amount to be transferred to a particular service department becomes very small or nil. This method is illustrated as under:

Illustration - 4:

X Ltd. have three productions departments P Q and R and two service departments S and T. The details pertaining to which are as under:

Items	Total Rs.	Production Department			Service Department	
		P Rs.	Q Rs.	R Rs.	S Rs.	T Rs.
Rent	8000	2000	3000	2000	600	400
Depreciation	2000	400	800	300	300	200
Power	800	160	320	120	120	80
Indirect Wages	400	100	160	60	40	40
General Lighting	800	100	100	100	200	300
Estimated Machine hours	-	2000	5000	3600		

The expenses of the service departments are allocated as under:

	P	Q	R	S	T
S	30%	40%	20%	-	10%
T	10%	20%	50%	20%	-

Distribute the service departments overheads as per (i) Repeated distribution method (ii) Simultaneous equations method. Calculate machine hour rate under each method.

Solution:

(A) Repeated Distribution Method

Overheads Distribution Sheet with Machine Hour Rate

Particular	Basis	Production Departments Rs.			Service Departments Rs.	
		P	Q	R	S	T
Total departmental expenses	Actual	2760	4380	2580	1260	1020
Distribution of service overheads: **First cycle**						
Department- S	30:40:20:10	378	504	252	-1260	126
Total		3138	4884	2832	-	1146
Department- T		115	229	573	229	-1146
Total		3253	5113	3405	229	-
Second Cycle						
Department- S		69	92	46	-229	22
Total		3322	5205	3451	-	22
Department- T		2	4	12	4	-22
Total		3324	5209	3463	4	-
Third Cycle						
Department- S		1	2	1	-	-
Total overheads		3325	5211	3464	-	-
Estimated machine hours		2000	5000	3600		
Machine hours rate		1.663	1.042	0.962		

Note : Total Departmental expenses is the total of rent depreciation power, indirect wages and general lighting of each department.

(B) Simultaneous Equations Method

Let, the total overheads of service department S be x Rs. and total overheads of service department T be y. Then we get the equations:

$x = 1260 + .2\,y$ and

$y = 1020 + .1\,x$

$x - .2\,y = 1260$ (i)

$-.1\,x + y = 1020$ (ii)

On multiplying equation (i) by 5

$5x - y = 6300$ (iii)

$-.1\,x + y = 1020$ (iv)

Adding equations (iii) and (iv)

$4.9\,x = 7320$

$x = 1494$ (Approximately)

By puting the value of x in equation (iv)

$-149 + y = 1020$

$y = 1020+149 = 1169$ (Approximately)

Distribution Summary

Particulars	P	Q	R	S	T
Allocated overheads (Rs.)	2760	4380	2580	1260	1020
Department-S (Apportioned) (Rs.)	448	598	299	-1494	149
Total (Rs.)	3208	4978	2879	-234	1169
Department-T (Apportioned) (Rs.)	117	234	584	234	-1169
Total overheads (Rs.)	3325	5212	3463	-	-
Estimated machine hours	2000	5000	3600	-	-
Machine hour rate (Rs.)	1.663	1.0424	0.962	-	-

3. Step Ladder Method: The following procedure is followed in this method-

(i) The service departments are arranged in the order of their importance to other service departments. This is decided by the net value of the services rendered which is the difference between the value of service rendered and the value of service received.

(ii) After determining the order of service departments the percentage for apportionment of service departments are proportionately inflated and apportionment is done by these inflated percentages. This method is illustrated as under.

Illustration - 5:

The distribution summary of overheads of a factory's different departments is as follows:

Production Departments			Service Departments	
A	Rs.	40000	X	8000
B	Rs.	30000	Y	32000
C	Rs.	20000	Z	16000

Percentage of service departments for overhead distribution.

	A	B	C	X	Y	Z
X (%)	30	20	30	-	10	10
Y (%)	20	30	20	20	-	10
Z (%)	10	20	30	30	10	-

Apportion the expenses of service departments to the production departments by step ladder method.

Solution:

(i) Statement showing service rendered and received by service departments.

Service Departments	Total overheads	Production Departments	Service Departments			Total Service Rendered
			X	Y	Z	
X	8000	6400	-	800	800	1600
Y	32000	22400	6400	-	3200	9600
Z	16000	9600	4800	1600	-	6400
Service Received			11200	2400	4000	17600

(ii) Statement showing order for apportionment.

Service Department	Service Rendered	Service Received	Net Product Received	Order
X	1600	11200	-9600	3
Y	9600	2400	+7200	1
Z	6400	4000	+2400	2

(iii) Statement showing apportionment of overheads.

Particulars	Service Department			Production Departments		
	Y Rs.	Z Rs.	X Rs.	A Rs.	B Rs.	C Rs.
Total overheads	32000	16000	8000	40000	30000	20000
Service department –Y	-32000	3200	6400	6400	9600	6400
Service department –Z		-19200	6400	2134	4266	6400
Service department –X			-20800	7800	5200	7800
Total overheads				56334	49066	40600

The percentage of apportionment of overheads is as follows:

	Z	X	A	B	C
Y (%)	10	20	20	30	20
Z (%)	-	$\frac{30}{90}\times 100$ $= 33.33\%$	$\frac{10}{90}\times 100$ $= 11.11\%$	$\frac{20}{90}\times 100$ $= 22.22\%$	$\frac{30}{90}\times 100$ $= 33.33\%$
X (%)	-	-	$\frac{30}{80}\times 100$ $= 37.5\%$	$\frac{20}{80}\times 100$ $= 25\%$	$\frac{30}{80}\times 100$ $= 37.5\%$

4. Ignoring Inter Service Department Transfers: For this purpose the distribution percentage of the production departments are inflated (up to 100%). Thus the overheads of service department are not apportioned to other service department and vice-versa. However this method can be used only when the inter service departmental service is comparatively insignificant.

Activity - B:

1 Write a note on 'classification' 'allocation' and 'absorption' of overheads. How does it help in controlling overheads.

7.5 Summary

Overhead cost refers to the cost which cannot be wholly debited directly to a particular job, or work orders. It includes cost of indirect material, indirect labour and indirect expenses. This cost is also termed as supplementary cost.

Overheads may be classified according to their nature, normalcy, variability, controllability and functions. The distinction between fixed and variable overhead is helpful in preparation of budget estimates, for effective

cost control and decision making and also helpful in the study of marginal costing and break even analysis. The functional classification is the conventional method of classifying overheads in order to calculate the cost of each main function with the ultimate objective of controlling the costs, therefore allotment apportionment and absorption is normally done on this basis.

Key Terms

Overhead cost	:	It refers to those items of cost which cannot be identified with particular products or jobs or work orders.
Fixed overheads	:	Which will not vary with output but remains constant.
Variable overheads	:	Which vary in direct proportion to changes in the volume of production or sales, are known as variable overheads.
Factory overheads	:	Those items of costs which have been incurred in connection with production of a commodity before it comes out of the workshop.
Allocation of overheads:		It implies identification of overhead cost with particular production or service department or cost centres.
Apportionment	:	Distribution of overheads among various production and service departments or cost centres on an equitable basis.

7.6 Self Assessment Questions

1. Explain the classification of overheads according to variability, controllability, normalacy and functions.

2. State the basic difference between allocation and apportionment.

3. The cost of producing 800 units of an article was Rs. 2400. When 1200 units of the same article were produced, the cost incurred was Rs. 3000. Segregate the fixed and variable part of the cost.

   (Ans. Variable cost per unit Rs. 1.50 and fixed cost Rs. 1200)

4. What is meant by semi variable overheads.

5. What will be the impact on variable cost per unit and fixed cost per unit if the level of activity is changed.

6. Z Ltd. has three production departments P, Q and R and one service department T. The actual costs for a period are as follows:

	Rs.		Rs.
Rent	20000	Power	18000
Repairs to Plant	12000	Supervision	30000
Depreciation of Plant	9000	Fire insurance	10000
Lighting	8000	Workmen's insurance	3000

   The following information is available in respect of these departments

	P	Q	R	T
Area in sq ft.	1500	1100	900	500
Value of plant (Rs.)	120000	90000	60000	30000
Value of stock (Rs.)	30000	18000	12000	-
Total wages (Rs.)	30000	20000	15000	10000
No. of employees	60	45	30	15
Kilowatt hours	240	180	120	60

Apportion the costs on the most equitable basis and re-apportion the expenses of service department T in the ratio of 4:3:3.

(Answer : P –Rs. 48620, Q – Rs. 35440 and R – Rs. 25940)

7.7 Reference Books

- Ghosh,P.K., 'Cost Accounting', National Publishing House, New Delhi.
- Maheshwari, Mittal, 'Cost Accounting and Financial Management', Shri Mahaveer Book Depot, Delhi.
- Ravi. M. Kishore, 'Cost Accounting', Taxmann Publication, New Delhi.
- Jain, Narang, 'Cost Accounting', Kalyani Publication, New Delhi.
- Arora M.N., 'Cost Accounting - Principles and Practice', Vikas Publication, New Delhi.

Unit - 8 : Overheads – II

Structure of Unit:

8.0 Objectives

After studying this unit you should be able to-

- Understand the meaning of Administrative Selling and Distribution Overheads.
- Use different methods of absorption of factory, office, selling and distribution overheads.
- Compare different methods and use the particular method as per requirement.
- Treat under and over absorption of overheads.
- Explain the meaning of certain key terms.

8.1 Introduction

As stated in previous unit in functional classification overheads can be of three types namely factory overheads, administrative overheads, selling and distribution overheads. Office overheads are the cost of formulating policies where as selling and distribution overheads incurred in obtaining, retaining a customer by executing the orders received from him. After determining all the overheads these are allotted to cost unit which is called absorption. In this unit we will discuss in detail about office overheads selling and distribution overheads and absorption methods of overheads.

8.2 Administrative Overheads

Administrative overheads include all indirect expenses relating to the administration and management of an undertaking. This includes all expenses incurred in planning directing controlling or for general administration of an enterprise.

CIMA, London defines it as "The cost of formulating the policy, directing the organization and controlling the operations of an undertaking, which is not related directly to any production, selling, distributions, research or development activity or functions are included in administrative cost. Thus, this is the cost of policy formulation and its implementation to attain the objectives of the organization. These overheads are also known as establishment expenses, office on cost, office indirect expenses etc. These generally comprise of the following costs.

(i) Printing, stationery and postage used in the office.

(ii) Salary, allowance and fees of directors, general manager, executive staff, legal advisor, auditors.

(iii) Rent, rates and taxes and insurance of office building.

(iv) Office lighting, heating and cleaning expenses.

(v) Depreciation, insurance, repairs and maintenance of office furniture, buildings, equipments and fittings.

(vi) Audit fee, legal fee and bank charges.

(vii) Telegram, Telephone and other general expenses.

(viii) Air-conditioning expenses of office.

8.2.1 Collection and Codification

Office overheads may be collected from stores requisition slip (for indirect material), vouchers, cash book and wage book for indirect wages and indirect expenses, office registers and other records for depreciation etc. The code number given to an office overhead is termed as 'Cost Account Number' A card is maintained for every cost account number in which entries are made from journal, cash book, wages book etc. This facilitates identification of the cost of an item.

8.2.2 Departmentalization or Allocation and Apportionment

Office overheads should form a part of total cost of production. But they are not directly connected with production or service activities. It is therefore necessary that they should be charged to cost units on suitable basis. This is allocation and apportionment of overheads. These cost centres may be personnel department, general office, accounts department etc.

8.3 Selling and Distribution Overheads

Selling and distribution overheads refer to indirect costs relating to marketing and sale of product i.e. the cost of activities relating to create and stimulate and maintain demand for companies' products and to secure orders. These expenses are entirely divorced from production function and hence charged to the cost of sales.

These overheads may be divided into two brand categories- (a) Selling overheads (b) Distribution overheads.

(a) Selling Overheads: CIMA London defines selling overheads as "This item includes all the expenditure incurred or cost of seeking to create and stimulate demand and securing orders. Sometimes it is also termed as marketing cost." Some examples are as follows:

1. Cost of advertising.
2. Sales office and showroom's rent.
3. Depreciation, insurance, repairs and maintenance of sales office, furniture and equipments.
4. Cost of preparing tenders-samples and folders.
5. Salaries of sales and publicity staff.
6. Commission brokerage etc. on sales.

7. Travelling expenses of sales men.
8. Stationery, Postage, Telephone expenses of sales department.
9. Bad debts and cost incurred for collection of bad debts.

(b) Distribution Overheads: This item includes – "the cost of the sequence of operations which begins with making the packed products available for dispatch and ends with making the reconditioned returned empty packages, if any, available for reuse." CIMA London, Thus, it refers to all expenses incurred in executing orders. It is also known as distribution on cost. Some examples of such items are:

1. Warehouse expenses
2. Upkeep and running of delivery vans.
3. Carriage outward.
4. Salary of drivers, warehouse staff.
5. General packing expenses and packing materials.
6. Wastage of goods in transit.
7. Administrative cost of distribution outlets.

Collection- Documents from which selling and distribution overheads are collected are stores requisition slips for indirect material, job cards for indirect labour, vouchers and cash book for indirect expenses, sales registers and other documents for depreciation, wastages etc.

Codification of Overheads – For proper collection of selling and distribution overheads, codification under proper heading is very much essential in which similar overheads cost items should be grouped under one heading. This is done by allocating Cost Accounting Numbers. This code number is written on every requisition note or job card so that indirect cost (distribution cost) of each department can easily be found.

Illustration - 1:

A manufacturer produces the following details of his expenses.

	Rs.
Rent, Rates and Insurance Office	1620
Rent, Rates and Insurance Warehouse	660
Directors Remuneration	4000
Travelling Expenses	860
Office Salaries	3000
Bad Debts	500
Warehouse Repairs	620
Warehouse Wages	2000
Agent's Commission	5000
Income Tax	2970
Bank Charges	220
Donations	500
Trade Magazine	150
Printing, Stationery etc.	2500

Lighting of Warehouse	200
Lighting of Office	160

From the above information prepare a revised statement showing separate totals for (a) Administration overheads (b) Selling overheads (c) Distribution overheads and (d) Expenses which you would disregard in estimating the cost.

Solution: **Statement showing expenses in related heads**

(a)	**Administration overheads**	Rs.	Rs.
	Office salaries	3000	
	Directors Remuneration	4000	
	Rent, Rates and Insurance	1620	
	Lighting of Office	160	
	Printing, Stationery etc.	2500	
	Trade Magazine	150	
	Bank Charges	220	11650
(b)	**Selling overheads**		
	Agent's Commission	5000	
	Bad Debts	500	
	Traveling Expenses	860	6360
(c)	**Distributions overheads**		
	Rent, Rates and Insurance	660	
	Warehouse Repairs	620	
	Warehouse Wages	2000	
	Lighting of Warehouse	200	3480
(d)	**Expenses excluded from cost**		
	Income Tax	2970	
	Donation	500	3470

8.4 Absorption of Overheads

After knowing the departmental overheads of each production department, the next step is to search for an appropriate basis for absorbing these overheads on different jobs, so that each job or cost unit may be reasonably charged with that overheads and the cost of production or sale of the unit or job can be ascertained.

CIMA defines it as "The process of absorbing all overheads, cost allocated or apportioned over a particular cost centre or production department by the units produced."

The Institute of Cost and Management Accountants (UK) defines overhead absorption as "The allotment of overheads to cost units." Absorption of overhead is also known as overhead appreciation, recovery, levy, burden rate etc.

8.4.1 Methods of Absorption of Factory Overheads

An absorption rate is determined to charge overheads costs to the products or jobs. This rate can be determined using any one of the following methods:

1. Percentage on Direct Material Cost Method.
2. Percentage on Direct Labour Cost Method.
3. Percentage on Prime Cost Method.
4. Direct Labour Hour Rate Method.
5. Machine Hour Rate Method.
6. Combined Rate Method.
7. Production Units Method.

1. Percentage on Direct Material Cost Method: Under this method the overhead rate is expressed as a percentage of direct material cost. Arithmetically the operation may be expressed as follows:

$$\text{Percentage of direct material cost} = \frac{\text{Budgeted or actual factory overhead}}{\text{Budgeted or actual material cost}} \times 100$$

For example of budgeted overhead is of Rs. 200000 and the budgeted direct material cost is Rs. 500000 then overhead absorption rate is:

$$= \frac{200000}{500000} \times 100 = 40\% \text{ of direct material}$$

If a job consumes Rs. 10000 worth of material it will be charged Rs. 4000 as its share of factory overheads.

Advantages –

(i) This method is simple to understand and easily applicable.

(ii) This method is useful if material plays a major part.

(iii) It produces fairly accurate results if the prices and grades of materials do not fluctuate widely from time to time and where output is uniform.

Disadvantages –

(i) This is a very unrealistic assumption that overheads are based on cost of material consumed.

(ii) It ignores the time factor.

(iii) If articles made of more expensive material are over charged with a high portion of factory overheads, sales prices will also tend to be high, which will lead to loss of market.

(iv) The quality of labour and the way machines are used by them constitute most of the factory overhead, but in this method we ignore their effect.

(v) If different types of materials are used in different jobs at the same time, this will charge different value of overheads which is not appropriate.

Thus it is clear that this method is not very appropriate.

2. Percentage on Direct Labour Cost Method: Under this method the absorption rate is calculated on the basis of direct labour cost, using the formula given below:

$$\text{Rate} = \frac{\text{Budgeted or actual factory overhead}}{\text{Budgeted or actual direct labour cost}} \times 100$$

For example, if the budgeted overheads are of Rs. 200000 and the budgeted labour paid is of Rs. 400000 the absorption rate will be of= $= \frac{200000}{400000} \times 100 = 50\%$ of direct labour

If a job which consumes Rs. 100000 worth of material 50000 worth of labour cost it will be charged with Rs. 25000 as its share of factory overheads.

Advantages –

(i) It is simple to understand and easy to apply and popular also.

(ii) This method is useful where labour cost is an important part of total cost units.

(iii) Labour rates are more stable than material prices, so it gives constant results.

Disadvantages –

(i) Under this method, wages paid would be more for skilled labour and relatively less for unskilled workers. But the time taken to complete such jobs may be relatively less than those which involve employment of unskilled labour. Thus, applying this method may give improper results.

(ii) This method ignores the significance of all other factors in production, sometimes use of machine gives rise to certain overheads like power, deprecation, oil etc.

(iii) If labour are paid on piece rate basis this method is not appropriate and has no significance, so if (i) the nature of work under different jobs and their rate of wages is the same (ii) ratio of skilled and unskilled workers is almost equal (iii) not too much use of machines. Then, this basis is suitable.

Activity A:

1 For costing purposes works expenses (indirect) may be charged to production by various methods, two of which are (a) a percentage on the cost of direct material (b) a percentage on the cost of direct wages.

You are required to describe these two methods briefly stating under what circumstances they may be adopted,

3. Percentage on Prime Cost Method:

$$\text{Absorption Rate} = \frac{\text{Budgeted or actual factory overhead}}{\text{Budgeted or actual prime cost}} \times 100$$

Prime Cost = Direct Material + Direct Labour + Direct expenses.

For example of the budgeted overheads are of Rs. 200000 and the budgeted prime cost is of Rs. 1000000. Then

$$\text{Rate} = \frac{200000}{1000000} \times 100 = 20\% \text{ of prime cost}$$

If a job consumes Rs. 100000 worth of material, 50000 worth of labour and 10000 as direct expenses it will be charged (160000×20%) or 32000 as its share of factory overheads.

This method is simple to understand and easy to apply but (i) This method suffers from the disadvantages of both the above mentioned methods. (ii) if the ratio of direct material and direct labour on different jobs is different, this method charges same amount of overhead which is not appropriate, so this method is used in rare cases.

The use of all the above three methods are illustrated as follows:

Illustration -2:

The following figures have been extracted from the department P of Q Ltd.

Direct material used	Rs. 20000
Direct Wages	Rs. 30000

Total overheads allocated to this department are Rs. 25000. On an order the department carried out job no. 163. The details of job no. 163 are as follows:

Direct material used	Rs. 600
Direct Wages	Rs. 1200

Find out the overhead amount absorbed on job no. 163 under each of the following methods –

(i) Percentage on direct material cost basis.
(ii) Percentage on direct labour cost basis.
(iii) Percentage on prime cost basis.

Solution:

The rates for absorption of overheads on different basis will be as follows-

(i) On the basis of direct material cost

$$=\frac{25000}{20000}\times 100 = 125\%$$

(i) On the basis of direct labour cost.

$$=\frac{25000}{30000}\times 100 = 83.33\%$$

(i) On the basis of prime cost

$$=\frac{25000}{50000}\times 100 = 50\%$$

Statement showing factory cost of Job No. 163

	Direct material cost basis	Direct labour cost basis	prime cost basis
Direct Material	600	600	600
Direct Labour	1200	1200	1200
Prime Cost	1800	1800	1800
Factory Overheads	750	1000	900
Factory Cost	2550	2800	2700

4. Direct Labour Hour Rate Method: This is actually a time rate. In other words, the factory overheads are charged to production on the basis of time involved. This is the modified form of the percentage of direct labour cost method.

$$\text{Absorption Rate} = \frac{\text{Budgeted or Actual Factory Overheads}}{\text{Budgeted or Actual Direct Labour Hours}}$$

If the factory overheads for a certain period of time are Rs. 24000 and labour hours worked during the

period is 8000, Then $\text{rate} = \frac{24000}{8000} = \text{Rs.}3$ per direct labour hour. If Rs. 400 hours are spent on a specific job, it will be charged with 400×3 = Rs. 1200 as its share of factory overheads.

The labour hour rate provides a reasonably satisfactory method for absorption but this basis can be best used in the industries where human labour is more important. Thus, it is not suitable in mechanized and capital intensive production. Secondly, in this method no distinction is made of hours spent by skilled and unskilled labour.

Illustration – 3:

From the following details, calculate the direct labour hour rate of department P.

(i) The number of workers – 300
(ii) The department works for 325 days in a year.
(iii) The department works for one shift of 8 hours.
(iv) 10% of the man – hours is expected to be lost in idle time and,
(v) The total factory overheads of department P are Rs. 105300.

Also find out the overhead amount absorbable on job number 55 if the net direct labour hours spent on this job are 5000.

Solution:

(i) Calculation of labour hour rate

Number of working hours-	
325 days × 8 hours per day	2600 hours
Less: 10% for idle time	260 hours
Effective working hours	2340 hours
Total effective hours in the department (2340×300)	702000 hours
Total factory overhead of the department	105300 Rs.
Direct labour hour rate = $= \frac{105300}{702000} = 15$ paisa	

(ii) Absorption of factory overhead on job number 55

= Direct labour hours × rate per hour

= 5000×.15 = Rs. 750

5. Machine Hour Rate Method: CIMA defines machine hour rate as an "Actual or predetermined rate of cost apportionment or overhead absorption, which is calculated by dividing the cost to be apportioned or absorbed by the number of hours for which a Machine or machines are operated or expected to be operated.

Thus, $$\text{Absorption Rate} = \frac{\text{Budgeted or Actual Factory Overhead}}{\text{Budgeted or Actual Machine Hours}}$$

Steps –

(i) Sort out the overheads department wise.

(ii) Departmental overheads are redistributed over the machines. For this, machines of different types working in the department are classified in groups or we can take each machine separately. These overheads can be of two types (a) Standing charges (b) Machine or running charges.

(a)	Standing charges		
	Rent and Rates	-	Floor area for each machine.
	Insurance and taxes	-	Sum insured or value of machines.
	Supervision	-	Time devoted to each machine or No. of workers or Area.
	Lighting and Heating	-	No. of light points or area.
	Other indirect overheads	-	Direct charges or allocated.
(b)	Machine Running charges		
	Power	-	Horse power or meter reading.
	Repairs	-	Actual or per Hour
	Depreciation	-	Per hour

Note – if the rate is based on time basis, depreciation will be added in standing charges.

Normally a overhead distribution sheet is prepared for this redistribution.

(iii) The total or individual working hours of machines are estimated for that period.

(iv) The sum of standing charges is divided by estimated machine hours to find standing charges per machine hour while machine hour is calculated separately for each individual item of machine running expenses. Total of both is machine hour rate. This method provides a satisfactory basis where machine operations are predominant. But it requires detailed information of various kinds and thus proves to be somewhat typical and experisive.

Activity B:

1 What are the principal factors to be considered while fixing a machine hour rate? Give a specimen computation.

Illustration – 4:

Compute the machine hour rate from the following data.

(i)	Departmental overheads (annual)		
	Rent and Rates	Rs.	100000
	Heat and Light	Rs.	40000
	Supervision	Rs.	260000
(ii)	Departmental Area		70000 Sq. ft.
	Machine Area		2500 Sq. ft.

(iii) Total cost of machine to be depreciated Rs. 460000, life – 10 years

(iv) Annual cost of reserve equipments for the machine Rs. 2800.

(v) Power cost Rs. .75 per hour of running time.

(vi) Indirect labour rate @ Rs. 6 per hour

(vii) Labour (a) when Setting and adjusting – full time attention (b) when producing – one man can look after three machines.

(viii) Hours run – (a) on production - 1800
(b) for setting and adjusting - 200

Solution:

Computation of Machine Hour Rate

	Rs.	Rs.
Standing charges		
Rent and rates	100000	
Heat and light	40000	
Supervision	260000	
Reserve equipments		
Overheads for machine $= \frac{402800}{70000} \times 2500$	2800	14385.71
	402800	
indirect labour $(1800 \times \frac{6}{3} + 200 \times 6)$		4800
Total standing charges		19185.71
Hourly rate for standing charges (19185.71÷1800)		10.65
Machine expenses		
Depreciation 460000÷18000		25.55
Power		0.75
Machine hour rate		36.95

6. Combined Rate Method: Where both manual and machine operations are involved two separate rates may be computed. It will require apportionment of overheads between machine centres and other general sections of factory.

7. Production Unit Method:

$$\text{Rate Per Unit } \frac{\text{Budgeted or Actual Factory Overhead}}{\text{Budgeted or Actual No. of Units Produced}}$$

(i) This is simple and easy method.

(ii) If the company makes only one product, this method can be used.

8.4.2 Methods of Absorption of Administrative Overheads

(i) Transfer to costing profit and loss account. If the amount is small or it is difficult to find out a suitable basis for charging it to products, it is transferred to costing profit and loss account.

(ii) Separate rate of absorption – which is generally based on factory cost. Thus,

$$\text{Rate} = \frac{\text{Total office overheads}}{\text{Total factory cost}} \times 100$$

8.4.3 Methods of Absorption for Selling and Distribution Overheads

Selling and Distribution overheads may be said to belong to one of the following categories- (a) some items such as special advertising for particular product may be directly allocated to individual products. (b) Expenses which are fixed over time and are incurred irrespective of sale should be apportioned on any one of the following basis:

(i) Estimated rate per unit – This may be computed by dividing the total overheads by the number of units normally expected to be sold.

(ii) As a percentage on works cost – Though factory cost have no bearing on selling and distribution expenses. This basis may be used when the amount of selling and distribution overhead is small.

(iii) As a percentage on selling price- If the products are sold at standard prices and proportion between different products is stable, this method can be used. Percentage rate is computed in advance on the basis of normal level of such expenses and the normal sales volume.

Illustration – 5:

A factory incurred the following expenditure in 2011		Rs.
Direct Material		100000
Direct Labour		60000
Factory overheads:		50000
Variable	20000	
Fixed	30000	
Total		210000

In 2012 it is expected that:

(a) There will be an increase in output on account of 50% more workers.

(b) Efficiency will come down by 10% on account of employment of new workers.

(c) There will be an increase of 30% in fixed overheads.

(d) The cost of direct material will decrease by 10%.

(e) Variable overheads will vary with number of workers employed.

Draw up the budget for 2012.

Solution:

Budget for 2012

	Rs.	Rs.	Rs.
Direct material	100000		
Add. 35% due to increase in output	35000		
	135000		
Less 10% decrease in price	13500		121500
Direct wages	60000		
Add- 50% increase	30000		90000
Prime cost			211500
Factory overhead			
Fixed	30000		
Add.- 30% increase	9000	39000	
Variable	20000		
Add. 50% increase	10000	30000	69000
Factory cost			280500

Working Note:

Output in 2011	100%	
Add. Increase on account of labours	50%	
Less decline in efficiency by 10%		150%
		15%
Total output		135%

Therefore, these is a net increase of 35%. in output

Illustration - 6:

The manufacturing cost of 10000 units of a commodity is as follows:

Material Rs. 40000, Wages Rs. 50000, Direct Expenses Rs. 800, Fixed overheads 32000, Variable overheads Rs. 8000.

For manufacturing every 1000 extra units, the cost increases as follows:

(a) Material – proportionately

(b) Wages – 5% less than proportionately

(c) Direct expenses- proportionately

(d) Fixed overhead- Rs. 400 extra

(e) Variable overheads 20% less than proportionately.

You are required to calculate the estimated cost of manufacturing 16000 units.

Solution:

Particulars	Cost of production Rs.		Total 16000 Units Rs.
	10000 Units	Extra 6000 Units	
Direct Material	40000	24000	64000
Direct Wages	50000	28500	78500
Direct Expenses	800	480	1280
Prime Cost	90800	52980	143780
Add: Fixed overheads	32000	2400	34400
Variable overheads	8000	3840	11840
Estimated Cost	130800	59220	190020

Working note-

(i) Direct wages for 6000 units.

$$= \frac{50000}{10000} \times 6000 \quad = 30000$$

Less 5 % 1500

Rs. 28500

(i) Fixed overheads – Rs. 400 extra for every 1000 units. So for 6000 units.

$$= \frac{400}{1000} \times 6000 \quad = 2400 \text{ Rs.}$$

8.5 Over and Under Absorption of Overheads

As we have already discussed overheads may be absorbed either on the basis of predetermined rates or actual rates. The problem of under or over absorption arises when predetermined rates are used. Since there are seasonal differences, so the difference between the budgeted overhead and actual overhead incurred is bound to happen.

If the actual overhead is more than the overhead absorbed, then this excess is termed as under absorption as this portion remains uncharged to production.

On the other hand if the overhead absorbed is more than the actual overhead, this difference is called as 'over absorption' as the amount charged to production has not been incurred.

Under or over absorption of overheads may arise due to the following reasons:

1. The overhead absorption rate may have wrongly been computed.
2. The seasonal fluctuations in the overhead costs in some industries.
3. Unforeseen changes in the capacity of production. Unexpected change in the volume of output.

Treatment of under or over absorption:

1. Use of Supplementary Rate – if the difference is considerable then supplementary rate is calculated.
2. Transfer to Costing Profit and Loss Account – if difference is due to abnormal reasons which are beyond the control of management, then such amount should be transferred to Costing Profit and Loss Account.
3. Transfer to Overhead Suspense Account- if the difference is seasonal (for which it is possible that by the end of the accounting period it will wipe out) then it should be transferred to overhead suspense or adjustment account.

Illustration – 7:

In X Ltd, overheads were recovered at a predetermined rate of Rs. 25 per machine hour. The total factory overheads incurred were Rs. 83 lakhs and machine hours actually worked were 3 lakh. 80000 units of a product were produced out of which 70000 were sold. It was found that 60% of the unabsorbed overheads were due to defective planning and the rest were attributable to increase in overhead cost.

How would unabsorbed overhead be treated in cost accounts.

Solution:

	Rs.
Actual factory overheads	83 lakhs
Less: Factory overheads recovered Rs. 25×3 lakhs machine hours	75 lakhs
unabsorbed overhead	8 lakhs

Treatment:-

(i) 60% of 8 lakh i.e. Rs. 480000 should be transferred to costing profit and loss account.

(ii) The balance of Rs. 320000 should be recovered from this year's production for this supplementary rate i.e. Rs. 4 (320000 ÷ 80000) is used , which is charged as follow –

(a)	Cost of sales account	70000×4	=	Rs. 280000
(b)	Closing stock account	10000×4	=	Rs. 40000
			Total Rs.	320000

Activity C:

1 In X ltd., two products are made. For a particular period production costs are as under:

	Product- X	Product –Y
Material used (Rs.)	1200	400
Direct labour cost (Rs.)	1600	800
Overheads actual (Rs.)	900	450

Overheads are charged at a rate of 25% on prime cost. Is there any difference in actual and absorbed overhead?

8.6 Summary

Besides the indirect expenses in the factory, there are many expenses which have to be incurred for smooth running and functioning of business. The cost which relates to general administration of business is termed as administrative overheads. On the other hand, expenditure incurred to create and stimulate demand and secure orders is selling cost. The cost which begins with making the packed product available for dispatch and ends with making the returned packages available for reuse is distribution overheads.

After calculating the departmental overheads they are ultimately charged to or absorbed to cost units or different jobs passing through that centre. This is known as the allotment of overhead to cost unit or absorption.

The purpose of cost apportionment is to charge expenses in an equitable proportion to the various departments; where as the purpose in overhead absorption is to distribute the total overheads of each manufacturing department in a given period, so that overhead cost per unit of each product can be arrived. Absorption rates are determined for the purpose of charging factory, office, selling and distribution overheads to various units. The chances of actual and absorbed overheads are same is rare. This difference is termed as 'under or over absorption of overheads,' which may be disposed off by using of supplementary rate or transferred to Costing P&L Account or can be carried to next year.

Key Terms

Administrative overheads	-	The cost of incurred on general administration of the business.
Selling overheads	-	All expenses incurred in obtaining and retaining a customer.
Distribution overheads	-	It includes all expenditure incurred from the time the product is completed until it reaches its destination.
Absorption	-	The allotment of overhead to cost units.
Machine Hour Rate	-	The cost of running a machine for one hour.
Over absorption	-	If the amount absorbed is greater than the actual amount of overhead, this difference is over absorption.
Under absorption	-	If the amount absorbed is less than the actual amount of overhead incurred, this difference is termed as under absorption.

8.7 Self Assessment Questions

1. What is machine hour rate? Explain briefly the situations in which a machine hour rate may suitably be used in cost accounting.

2. Define administrative overheads and state briefly the treatment of such overheads in cost accounts.

3. Write a short note on "Documents for collection of overheads".

4. Explain how under absorption and over absorption are treated in cost accounts.

5. How will you treat the following items in cost accounts of a manufacturing concern (i) carriage outward (ii) idle time (iii) packing charges (iv) Interest on capital.

6. If in an industry estimated cost is – direct material Rs. 20000, direct wages Rs. 30000 and factory overheads Rs. 5000. on this basis calculate the total cost of a particular product in which direct material cost Rs. 1000, direct wages Rs. 600 and direct expenses Rs. 400 if the factory overheads are charged on the basis of (a) direct material (b) direct labour and (c) prime cost.

(Answer- (a) Rs. 2250 (b) Rs. 2100 and (c) Rs. 2200)

7. Calculate machine hour rate for a machine from the following data-

Cost of machine	Rs.	19200
Estimated scrap value	Rs.	1200
Average repairs charges per month	Rs.	150
Standing charges allocated to the machine per month	Rs.	50
Effective working life of machine	10000 hours	
Running hours per month	160 hours	

Power used by machine -5 unit per hour @ 19 Paisa per unit

(Answer – Machine hour rate Rs. 4.00)

8. A manufacturer has shown an amount of Rs. 32380 in his books as establishment which includes the following:

Insurance:	Rs.
Office	460
Warehouse	620
Travelling expenses	1520
Directors Remuneration	2800
Office salaries	2260
Office lighting	140
Ware house repairs	1020
Ware house wages	3600
Agent's commission	11500
Bad debts	340
Discount allowed	3940
Bank charges	200
Donations	300
Trade magazines	140
Printing stationery etc.	3000
Lighting warehouse	540

From the above information prepare a statement showing totals of: (a) administration overheads (b) selling overheads (c) distribution overheads (d) expenses you would disregard in estimating the cost.

9. Calculate the tender price of 3000 units if the details of actual cost of 2000 units are as follows:

Material cost Rs. 4500, labour cost Rs. 2500, direct expenses Rs. 500, factory overheads Rs. 1000, office overheads Rs. 800 and selling and distribution overheads Rs. 400. The further details in this connection are as follows-

(a) An increase of 10% is expected in the cost of raw material and 5% in the cost of labour.
(b) 70% of factory overheads are fixed.
(c) The ratio of fixed and variable expenses in administrative overhead is 6:4.
(d) 50% of selling and distribution overheads is variable.
The management desires to charge 25% profit on the sales price. Ascertain the selling price.

(Answer. Selling price of 3000 units Rs. 19630)

8.8 Reference Books

- Ghosh,P.K., 'Cost Accounting', National Publishing House, New Delhi.
- Maheshwari, Mittal, 'Cost Accounting and Financial Management', Shri Mahaveer Book Depot, Delhi.
- Ravi. M. Kishore, 'Cost Accounting', Taxmann Publication, New Delhi.
- Jain, Narang, 'Cost Accounting', Kalyani Publication, New Delhi.
- Arora M.N., 'Cost Accounting - Principles and Practice', Vikas Publication, New Delhi.

Unit - 9 : Activity Based Costing

Structure of Unit:

9.0 Objectives

After completing this unit, you will be able to understand:

- Nature and concept of activity based costing
- The process and application of activity based costing
- The advantages and disadvantage of activity based costing
- The need and emergence of ABC in current era

9.1 Introduction

Activity based costing is framed to provide accurate information about the production and the supporting activities so that management can focus on products and processes with the most leverage for increasing profits. It assists the management for making better decisions about designing of products, pricing, marketing and it leads to continued operating improvement.

Activity based costing focuses on the need for better understanding of the overhead costs behavior so it helps in ascertain causes of costs and how they relate to product or services or in other words in activity based costing the business is reviewed simultaneously on the collection of activities which are operated to design, produce, market deliver and support its goods or services. The CINA Under defines ABC as "cost attribution to cost units on the basic of benefits received from indirect activities e.g.:- ordering, setting-up, assuring quality."

Thus the ABC system is a system based on activities, linking, spending on resources to the products or services produced or delivered to the customers.

9.2 Nature or Characteristics of Activity Based Costing (ABC)

The following are the characteristics of activity based costing:-

i) It provides a more refined approach to cost analysis for modeling.
ii) It clearly defines the difference between different cost behavior patterns related to scale, scope, event & period.

iii) It focuses on determination of cost drivers related to various organizational functions.

iv) Activity measures brought by this system, bridges the gap between the cost of the product and resources.

v) Under ABC system the cost model is more descriptive.

9.3 Concept of Activity Based Costing

Activity based costing is a new and scientific term which focuses on activities as fundamental cost objects and make use of the costs of these activities as building blocks and compiling the costs of other cost objects.

It is not an alternative to job costing or process costing but it is a modern and active tool of charging overhead costs in which firstly costs are traced to activities further to the specific products or jobs.

To understand clearly the concept of the activity based costing system the following definitions are given by the experts are as under:-

- Computer aided manufacturing international (CAM-I) has defined, "Activity based costing (ABC) is a methodology that measures the cost and performance of the activities, resources and cost objects. Resources are assigned to cost objects based on their use. Activity based costing recognizes the casual relationship of cost drivers to activities. "
- Peter B.B. Turney has said, "ABC is a system that first accumulates overhead costs for each of the activities of an organization and then assigns the costs of activities to the products, services or other cost objects that caused such activity. It measures the cost and performance of activities, resources, and cost objects. "

Elements of Activity Based Costing:

The following are elements of activity costing:-

i) Resources Available: These are the thing that an enterprise pays for such as machinic, men, equipments and facilities provided.

ii) Activity: These are processes performed by human and mechanical resources for example; receiving orders from customers, interacting with production regarding capacity to produce and giving commitment to the customer regarding delivery time etc.

iii) Activity Cost Pool: The result of assigning the resources cost to an activity is known as activity cost pool.

iv) Cost Driver: It is used to trace costs to products by use a major of resources consumer by each activity, for example, in a manufacturing firm, number of machine and setup of material handling; in case hotel industry number of rooms occupied.

v) Process: An aggregation of related function specific activities is a process for instance, activities like inspection of material, receiving material, recording and testing for its standards are all related when can be grouped under material handling process.

vi) Cost Object: It is an item for which cost measurement is required; these are linked to the organization for instance, if the objective is to select a most profitable customer an individual customer is the cost object.

vii) No Value Holding Activity: Those activities which continue to be carried on particularly in certain old factories and do not contribute to the value of a product for example - Movement of raw material from one place to another and not adding any value to the product.

9.4 Need for Emergence of ABC

One of the techniques for maintaining sustainable competitive advantage is lost leadership through economics of scale learning curve effects and lost control this means the cost leadership fall within the territory of cost. Reduction programme that requires several managerial intervention and are possible only if the manager are availed with relevant correct cost related information. Therefore activity based costing provide such information essential to achieve cost leadership. The need for activity based costing arises due to :

1) It generates accurate product cost information.
2) It reduces cross subsidization of one product by the other.
3) It identifies and differentiates between value adding activities and non-value adding activities.
4) It also provides information about the cost and performance of activities and resources for tracing cost accurately to cost object other then products such as customers and channels of distribution.

9.5 Process of Activity Based Costing

ABC is the process of tracing cost just from resources to activities through the activity drivers and then partner from activities to specific products on the basis of cost drivers.

The following steps are involved to conduct the activity based costing:

1) **Identification and Classification of the Activities:** Activities are identified and then classified into different categories that have relationship with different parts of the production process for e.g. machine related activities, labour related activities and various supporting activities.

2) **Creation of Cost Pools for Each Activity:** To compute and classify overhead cost of different activities into homogenous cost pools is the second step in the ABC system.

3) **Identification of Cost Drivers:** After the second step the next step in to determine the cost drivers for every activity that can be used to select the costs collected in cost pools to the cost objective this is based on the factor that drivers the consumption of the activity.

4) **Calculation and Interpretation of Cost of Earn Activity:** the next step in ABC system is to determine the resource and cost of each activity. It is already known that each activity consumes resources which increase the cost of the product.

5) **Assigning Activity Cost to Products:** The final step in the ABC system is the assigning or tracing activity cost to products or outputs using activity drivers which requires calculation of activity 'cost driver state' or 'pool state' for each activity. This is determined by dividing the actual cost of cost pool by actual activity level of cost driver. Activity driver assign activity cost to product which is based on consumption of individual products and calculated by multiplying the actual activity level on quantity consumed by cost driver state.

9.6 ABC vs. Traditional Based Costing

The difference between ABC system and traditional costing is as follows:

1) **Cause and Effect Relationship:** ABC brings accuracy and reliability in product cost determination by emphasis on cause and effect relationship in the cost incurrence where as traditional costing does not pay attention to the cost and effect relationship between resources used and production activities.

2) **Cool Pools:** ABC generates separate cost pool for service activities as well and overhead cost of these activities are assigned directly to specific products through applying cost driver states where as in traditional system overhead cost of services departments is allocated to production departments.

3) **Product Specification:** ABC allocates directly a major portion of overhead cost to specific products whereas traditional costing uses more arbitrary bases for appointment of overhead cost.

4) **Assignment of Overhead Cost:** Under ABC system overhead cost are to be assigned to earn important activity and not to the departments whereas in traditional costing system, overheads are collected department wise.

9.7 Application of Activity Based Costing

Activity based costing is more relevant in companies where product mix is diverse in batch sizes, physical sizes, degrees of complexity and raw material characteristics. It also provides information required in decision making for the service industry where range of service provided are diversified for instance a restaurant may decided to sun its fast food section on self service basis, therefore eliminates the cost of waiters therefore ABC system can be used when overheads are high, products are diverse in complexity, volume, amount of direct labour; cost of error are very high and profit margin cannot be easily explained.

Illustration - 1:

ABZ Co. Ltd. produces three, product A, B and Z for which the standard cost and output are as follows:

Products		**A**	**B**	**C**
Output (units)		20,000	40,000	60,000
Direct material per unit	Rs.	50	40	32
Direct labour per unit	Rs.	30	40	48
Labor hours per unit		3	4	5
Machine hours per unit		4	4	7
No. of purchase requisitions		600	900	1,000
N0. of machine set-ups		120	130	150

Production overhead split by departments:

Department	X	Rs. 12,00,000
	Y	Rs. 15,00,000
Total		Rs. 27,00,000

Department X is labour intensive and Y is machine intensive.

Total labour hours in Dept. X = 2,00,000;

Total machine hours in Dept. Y = 5,00,000

Production overhead split by activity :

Receiving and inspection	Rs. 14,00,000
Production scheduling/set up	Rs. 13,00,000
Total	27,00,000

No. of batch received/inspected - 2,500

No-of batches for scheduling/set up - 400

Required: Prepare cost statement under traditional absorption costing and activity based costing methods. Also compare the result of the two methods and give your comments.

$$\text{Department X} = \frac{\text{Rs. } 12,00,000}{2,00,000 \text{ labour hours}} = \text{Rs. 6 per labour hour}$$

$$\text{Department Y} = \frac{\text{Rs. } 15,00,000}{5,00,000 \text{ machine hours}} = \text{Rs. 3 per machine hour}$$

Statement of Cost

Cost per unit

	A	**B**	**C**
	Rs.	**Rs.**	**Rs.**
Direct materials	50	40	32
Direct Wages	30	40	48
Overhead - Dept. X			
A - 3 hrs. @ Rs. 6	18		
B - 4 hrs. @ Rs. 6		24	
Z - 5 hrs. @ Rs. 6			30
Dept. Y			
A - 4 hrs. @ Rs. 3	12		
B - 4 hrs. @ Rs. 3		12	
Z - 7 hrs. @ Rs. 3			21
Product cost	110	116	131

ABC Method

Cost driver rates = Overhead Cost of the activity / Cost drivers

Receiving and inspection = Rs. 14.00,000 / 2,500 batches = Rs. 560 per batch

Scheduling and set up = Rs. 13,00,000 / 400 batches = Rs. 3,250 per set up.

Statement of Cost

Cost per unit

	A	B	C
	Rs.	Rs.	Rs.
Direct materials	50.00	40.00	32.00
Direct wages	30.00	40.00	48.00
Overhead receiving*	16.8	12.6	9.34
- Set up**	19.5	10.57	8.13
Product cost	116.3	103.17	97.47

*Receiving overhead per unit

Product A = (Rs. 560 x 600 requisitions) ÷ 20,000 units = Rs. 16.8

Product B = (Rs. 560 x 900 requisitions) ÷ 40,000 units = Rs. 12.6

Product C = (Rs. 560 x 1,000 requisitions) ÷ 60,000 units = Rs. 9.34

**Machine set-up overhead per unit

Product A = (Rs. 3,250 x 120 requisitions) ÷ 20,000 units = Rs. 19.5

Product B = (Rs. 3,250 x 130 requisitions) ÷ 40,000 units = Rs. 10.57

Product C = (Rs. 3,250 x 150 requisitions) ÷ 60,000 units = Rs. 8.13

Comments:

Statements of cost prepared under traditional method and activity costing produce different results. Under traditional method, product Z appears quite costly as compared to activity based costing. On the contrary, product A shows higher cost under activity based costing than traditional method. As the ABC approach is considered more Logical, it may be presumed that results produced by ABC are more accurate. If selling prices are fixed on the basis of cost, product Z would be priced higher on traditional costing and product A would be priced lower. This will result in loss of sales of Z and loss per unit on A, Leading to a loss to the company.

Illustration - 2:

XYZ Company produces two types of radio. Activity data are given below:

Particulars	Product-costing data		
	A	B	Total
Units produced per year	12,000	12,000	1,32,000
Prime cost (Rs.)	80,000	70,000	7,80,000
Direct labour hours	14,000	1,26,000	1,40,000
Machine hours	18,000	1,62,000	1,80,000
Production runs	12	6	18
Number of moves	160	80	240

Activity Cost data

Activity	Activity Cost (Rs.)
Set up equipment	1,30,000
Material handling	1,70,000
Power	80,000
Testing	1,20,000
Total	4,00,000

You are required to

(i) Calculate the consumption ratios for each activity.

(ii) Calculate the pool rate for each pooled group of activities.

(iii) Calculate the cost per unit.

Solution:

(i) Consumption Ratios:

Overhead Activity	A	B	Activity Driver
Set up	0.67[a]	0.33[a]	Production runs
Material handling	0.67[b]	0.33[b]	Number of moves
Power	0.10[c]	0.90[c]	Machine hours
Testing	0.10[d]	0.90[d]	Direct labour hours

(a) 12/18 (A); 6/18 (B)

(b) 160/240 (A); 80/240 (B)

(c) 18,000/ 1,80,000 (A); 1,62,000/1,80,000 (B)

(d) 14,000/1,40,000 (A); 1,26,000/1,40,000 (B)

(ii) Pool Rate

Batch even Pool		Unit Level Pool	
Set up	1,30,000	Power	Rs. 80,000
Material hands	70,000	Testing	Rs. 1,20,000
Total	2,00,000		Rs. 2,00,000
Runs	÷ 18	Machine hours	1,80,000
Pool Rate = Rs. 11,111 per run		Pool Rate = Rs. 1.11 per machine hour	

(iii) Per Unit Cost ABC System

Particulars	A	B
Prime cost	80,000	7,00,000
Overhead costs :		
Batch level pool:		
(Rs. 11111.1 x 12)	1,33,333.2	-
(Rs. 11111.1 x 6)	-	66,667
Unit Level costs		
(Rs. 1.11 x 18,000)	19,980	-
(Rs. 1.11 x 1,62,000)	-	1,79,820
Total manufacturing costs	2,33,313.2	9,46,487
Units produced	12,000	1,20,000
Per Unit Cost (Total Costs/units)	**Rs. 19.45**	**Rs. 7.90**

9.8 Advantages of Activity Based Costing

The benefits of ABC are specifically essential in service industry where the variety of products is more and cost of facilities rather than the direct cost are important:

1) In ABC cost can be ascertain for specific distribution channel customer segments or geographical regions.
2) It brings accuracy and reliability cost by focusing on causes and effect relationship.
3) It helps to reduce cost by providing true and accurate information on the opportunities available for reducing cost.
4) Under ABC system various activities are identified and the cost incurred for them is specified.
5) ABC provides accurate cost information which is important for most of the recent productivity improvement approaches total quality management (TQM) business process reengineering (BPR) etc.
6) It helps in strategic decision making and the decisions selected to make or buy.
7) It assists in providing reliable cost information for evaluating the performance of the transferor and transferee departments.

9.9 Disadvantages of Activity Based Costing

Following are the short comings of activity based costing system:

1) ABC requires segregation of management process into planning and operation. The lack of clarity in the segregation security in the faulty application of ABC concept.
2) It is essentially not the panacea for all its.
3) It may lead to weaker customer segmentation and also absorbs a lot of resources.
4) The implementation of ABC agenda should be driver by the top management because if it is not

driver so and moved by the accountant, it will not get firm white support for this concept.

5) ABC needs total commitment from the members of the non finance operations also, otherwise the initiatives which are highly integrated with the operating team could not be implemented.

6) The information and reports required due consideration by the operation departments.

9.10 Summary

"Activity based costing is a new blend of old wines in a new bottle". ABC system helps in calculating and assigning cost to cost objects such as products and services on the basis of activities which are undertaken for the production of each product or service. ABC system aims in rectifying the issue of inaccurate cost information because of selection of wrong basis of indirect cost appointment, hence ABC is an emerging and more refined approach for charging in direct cost to products and determining more accurate cost of products.

9.11 Self Assessment Questions

1. Do you agree the activity based costing is a more refined system of charging of overhead cost to products than the traditional method? Explain.
2. Discuss the various step involved in activity based costing.
3. Discuss the key role of activity based costing in the present business and market environment.
4. A manufacturing company has been using a cost system that allocates all factory overhead costs to products based on 100% of direct labour cost. The company has just decided to use activity based cost system that traces indirect costs to products based on consumption of major activities as indicated below:

Activity	Annual Cost Driver Quantity	Cost (Rs.)	Product Cost Driver Consumption
Labour	1,00,000 hours	23,40,000	60,000
Machining	60,000 hours	12,00,000	1,800 hours
Production order	4,000 orders	9,00,000	40 orders
Material handling	3,000 requisitions	1,20,000	14requistions
Setup	10,000 hours	1,20,000	120 hours

Compare the total annual overhead costs using both the traditional volume based and new activity based costing system.

9.12 Reference Books

- Agrawal & Agrawal, 'Management Accounting', (RBD. Jaipur)
- Khan, Jain, 'Management Accounting', (S. Chand & Sons.)
- I. M. Pandey, 'Management Accounting', (S. Chand & Sons.)
- M.N. Arora, 'Management Accounting', (Himalaya Publication House).

Unit - 10 : Single or Output Costing

Structure of Unit:

10.0 Objectives

After completing this unit, you will be able to understand:

- How costs are accumulated and analysed under various elements of cost.
- The cost per unit is ascertained by dividing the total cost by the number of units produced or in other words how the calculation of cost per unit is being done.

10.1 Introduction

Unit costing refers to the cost procedure, which is used in concerns where production is made at a large level and manufacture is continuous. The products manufactured are of homogenous nature and units are identical. From the point of view of cost analysis this method is very simple because total cost is divided by total number of unit produced. It is a form of process costing. This method is also known as single costing, output costing, single-output costing, etc. A Concern where same products or few grades of same products are produced unit costing method is used.

According to J.R. Batliboi, "single or output cost system is used in business where a standard production is turned out and it is desired to find the cost of a basis unit of production".

According to Harold J. Sheldon, "Single output or unit costing is a method of costing by the unit of production where manufacture is continuous and the units are identical or can be made by means of ratios".

Above definitions clears that this method is used in concern where production activities operate continuously at a large level, units of identical type are manufactured or can be turned out in an identical manner on proportionate basis, can be measured in physical units conveniently and per unit cost of goods manufactured, total production cost and proportionate amount of every element of cost is to be ascertained.

Name of industries where unit costing is most suitable:

Unit costing method may be used in mining industry sugar industry, brick industry, cement industry, leather industry, milk industry, cotton industry, flour mill, paper industry, textile industry etc.

Main Features of Single-Output Costing

(1) Unit costing is used in industries where production is on a large scale.

(2) Industries where units of production are homogenous, this method is used.

(3) Cost per unit of production to be ascertained.

(4) It is used in industries where production is continuous.

(5) This method is used where units are physical and natural.

(6) The cost units may be expressed in terms of weight, number, volume and time etc.

10.2 Objects of Single Costing

The main objects of unit costing are as follows:

(i) **To Find Out Total Cost and Cost Per Unit**: Main object of this method is to determine total cost and cost per unit of goods produced in a certain period of time.

(ii) **Analysis of Expenses Incurred on Cost Unit**: To analyse element-wise total cost and cost per unit of each element unit costing method is useful. Cost is divided into four parts prime cost, works cost, cost of production and total cost.

(iii) **Comparative Study**: If we want information regarding any increase or decrease in any expense is possible through comparative analysis for the year and years. Over expenses can be controlled under output costing method by providing data in case of any increase.

(iv) **To Find Out Percentage of Each Element of Cost to Total Cost:** Under this method proportionately share of each element in total cost can be determined. This will help in estimating cost of each element in future. Control can be exercised through this method on the elements having large amounts.

(v) **To Find Out Selling Price and Profit**: selling price per unit computed after adding a certain percentage of profit in per unit, Profit or Loss can be ascertained by comparing total cost when Amount of sales has been given.

(vi) **To Find Out Tender Price**: Selling price of a commodity is to be informed to customer prior to its order or estimate for a work is to be given termed as "Tender price". This price is ascertained on the basis of previous year's costs.

10.3 Collection of Cost

Under this method, costs are classified and analysed under various elements, viz. Material, direct expenses and overheads. To ascertain the cost per unit, total cost of a particular period is divided by the total number of units produced in the period. Cost Sheet or Statement of Cost or Production Account is prepared to find out the total cost. Cost Sheet is prepared to fulfill the objective containing following types of expenses:

(1) Direct Materials - Information concerning materials used in production according to its quantity and value can be taken from material abstract. Consumption of raw materials can be calculated by adding purchase of raw materials and subtracting closing stock of raw materials in the amount of opening stock. Carriage inward incurred on purchase of materials also added.

Opening Stock of Raw Materials	
Add : Purchases of Raw Materials	.....
Add : Carriage Inward	.....
	…….
Less : Closing stock of Raw Materials	.....
Raw Materials Consumed	…….

As materials account for the larger portion of total cost so controls over material is required. Effective control helps for continuous supply of material and prevent from overstocking. If material cost is collectively ascertained and can't be allocated like lubricates, cotton waste, cement etc. than it should relate to factory, office or selling overhead.

(2) Direct Wages: Labour is the post sensitive elements of cost. Cost of labour is collected from the wages bill, payrolls and relevant vouchers. Amount of direct wages can be known from wages abstract. If only one type of article is produced then wages are divided into direct and indirect. Thereafter, direct wages is included in prime cost while indirect wages is included in factory cost.

(3) Direct Expenses: Direct expenses are directly related to production activity and their amount may be ascertained by financial accounts. It includes royalty, excise duty, drawing and design expenses, special moulds etc.

(4) Indirect Expenses or Overhead: Overheads are indirect expenses which can't be identified with particular products. These indirect expenses are collected under the heads of factory, office and selling.

10.4 Unit of Cost

Unit of Cost means unit of productions or service for which cost is to be incurred. The unit cost in some of the industries are as under:

S.No.	Industry	Unit
1.	Tea Production	Per quintal
2.	Steel Industry	Per ton
3.	Liquor Production	Per bottle
4.	Flour Production	Per quintal
5.	Paper Production	Per ton or per kg.
6.	Cotton Production	Per quintal
7.	Cement Production	Per ton
8.	Coal Production	Per ton
9.	Milk Production	Per litre
10.	Sugar Production	Per quintal
11.	Brick Production	Per 1000 bricks

10.5 Methods of Ascertaining Unit Cost

Total cost and cost per unit may be computed by three methods. Basic principles in preparation of all the three format of ascertaining cost are some. All the three types of format are as follows : (1) Cost Sheet (2) Statement of Cost (3) Production Account

10.6 Cost Sheet

Main definitions of cost sheet are as under :

According to **C.I.M.A, London**, "Cost sheet is a cost schedule or document which provides for the assembly of the estimated detailed cost in respect of a cost center or cost unit".

According to **Wheldon**, "Cost sheets are prepared for the use of management and consequently, they must include all the essential details which will assist the manager in checking the efficiency of production"

According to the above definitions, it is clear that cost sheet is an analytical statement of expenses relating to production of an article which provides information about total cost, per unit and quantity of production.

Specimen of Cost Sheet

Cost Sheet may be prepared in two format i.e. (i) Simple Cost Sheet and (ii) Detailed Cost Sheet:

(i) **Simple Cost Sheet**: In simple cost sheet only final item of different types of cost is shown and details of each item is shown separately, Format of simple cost sheet is as follows :

Format of Simple Cost Sheet

Cost Sheet of …….. for the period ……

Output ……Units Unit …….

Particulars	Total Cost Rs.	Cost per Unit Rs.
Direct Materials or Raw Materials consumed	x x	x x
Direct labour/ Wages	x x	x x
Other Direct Expenses/chargeable Expenses	x x	x x
Prime Cost	x x	x x
Add : Work or factory overheads	x x	x x
Work/Factory Cost	x x	x x
Add : Office/ Adm. Overhead	x x	x x
Cost of output/Cost of Production	x x	x x
Add : Selling & Distribution Overhead	x x	x x
Total Cost/ Cost of sales	x x	x x
Add : Profit (% on Cost or Selling Price)	x x	x x
Selling Price	x x	x x

(ii) **Detailed Performa of Cost Sheet**: In the following statement calculation of raw material consumed, work-in-progress and adjustments opening & closing stock has been included and a detailed list regarding each element of cost has been given.

Format of Detailed Cost Sheet

Cost Sheet of …….. for the Period ……

Output ……Units Unit …….

Particulars	Total Cost.		Cost per Unit
	Rs		Rs
Direct Materials Consumed	x x		
Opening Stock of Materials	x x		
+ Purchases	x x		
+ Carriage Inwards	x x		
+ Custom Duty and Octroi	x x		
+ Dock Charges	x x		
+ Freight Inward	x x		
+ Primary Packing Materials	x x		
	x x		
Less : Closing Stock of Materials	x x	x x	
Direct Wages		x x	
Royalty		x x	
Other Direct Expenses/chargeable Expenses		x x	
Prime Cost			x x
Add : **Factory Overheads** :			
Factory Rent, Rate, instances	x x		
Factory Lighting	x x		
Factory Supervision	x x		
Drawing Office Salaries	x x		
Motive Power	x x		
Fuel & Oil	x x		
Grease, Water etc.	x x		
Steam	x x		
Welfare Expenses	x x		
Laboratory Expenses	x x		
Depreciation of Plant & Machinery	x x		
Depreciation of Factory Building	x x		
Repairs & Maintenance of Factory	x x		
Indirect Wages	x x		
Technical Director's Fees	x x		
Haulage	x x		
Loose Tools Written-off	x x		
Materials Storage Expenses	x x		
Materials handling Charges	x x		
Factory Stationery	x x		
Works Manager's Salary	x x		
Supervisor's Salary	x x		
Storekeeper's Salary	x x		
Service Department's expenses	x x		
Factory Cleaning	x x		
All other Factory Expenses	x x	x x	

Add: Opening Work-in-progress		x x	
		x x	
Loss : Closing Work-in-progress		x x	x x
Factory Cost/Works Cost			x x
Add : **Office Overheads :**			
Office Rent, Rates & Taxes	x x		
Staff Salaries	x x		
Office Lighting	x x		
Office Cleaning	x x		
Printing & Stationery	x x		
Postage & Telegram	x x		
Office Convenyance	x x		
Depreciation of Office Building & Furniture	x x		
All Expenses of Directors	x x		
Depreciation of Office Equipments	x x		
Office Repairs	x x		
Sundry Expenses	x x		
General Expenses	x x		
Legal Expenses	x x		
Audit Fees	x x		
Bank Charges	x x		
Total Office Overhead		x x	
Cost of Production/cost of Output		x x	
Add : Opening Stock of Finished Goods		x x	
Loss : Closing Stock of Finished Goods		x x	xx
Cost of Finished Goods Sold			**xx**
Add : **Selling Overheads**			
Advertisement	x x		
Show Room Expenses	x x		
Travelling Expenses	x x		
Commission on Sales	x x		
Salesman Salaries	x x		
Expenses on Market Research	x x		
Bad Debts	x x		
Samples & Gifts	x x	x x	xx
Add : **Distribution Overheads**			
Counting House Salaries	x x		
Service Expenses	x x		
Demonstration Expenses	x x		
Packing Expenses	x x		
Loading and Carriage Charges on sales	x x		
Rent of Warehouse (of finished goods)	x x		
Insurance & Lighting of Warehouse	x x		
Expenses of Delivery Van	x x		
Salaries of Packing Department	x x		
Collection Charges	x x		
Cost of Catalogues	x x		
Cost of Mailing Literature	x x		
Cost of Tenders	x x		
Branch Expenses	x x	x x	xx

Total Selling and Distribution Overhead		x x
Total Cost or Cost of Sales		x x
Profit		x x
Sales		x x

10.7 Statement of Cost

Cost sheet and statement of cost are prepared in a same manner. When cost per unit of production is not necessary to calculate then a statement of cost is prepared to ascertain total cost and profit or loss on production.

10.8 Difference between Cost Sheet and Statement of Cost

1. Total quantity, total cost and per unit cost is presented in cost sheet on the other hand only total cost is presented in statement of cost.
2. Normally profit is not shown is cost sheet while cost, selling price and profit is shown in statement of cost.
3. Cost sheet is prepared to calculate actual cost of units produced in a period while statement of cost is prepared to estimate cost for a future period for determination of tender price.
4. Cost Sheet is prepared only when production quantity is given while statement of cost is prepared when quantity of production has not been given.
5. Comparative study of cost of two types of articles or two periods may be studied in cost sheet which it is not feasible in statement of cost.

Illustration 1 :

From the following particulars, prepare a statement of cost showing different components separately for the period ending 31st March, 2012:

Stock of Materials	Rs.	Depreciation	Rs.
1st April, 2011	34,300	Plant and Machinery	2,800
31st March, 2012	29,400	Office Buildings	1,500
Purchased of Materials	65,100	Delivery Vans	400
Productive Wages	45,000	Office Stationery	1,000
Direct Expenses	4,000	Loose Tools written off	500
Unproductive Wages	12,300	Rent and Taxes (Office)	800
Factory Rent and taxes	8,400	Bad Debts	200
Factory Lighting	2,800	Advertisement	300
Factory Insurance	1,500	Upkeep of Delivery Vans	600
Office Insurance	700	Bank Charges	80
Legal Expenses	400	Commission on Sales	1,920
Rent of Warehouse	500	Sales Department	
Factory Heating	1,800	Salaries	1,800
Motive Power	4,600	Water Supply	1,200
Director's Fees (Works)	1,500	Haulage	3,500
Director's Fees (Office)	3,000	Factory Stationary	400
Factory Cleaning	700	Estimating Expenses	750
		Sundry Office Expenses	250

Solution:

Statement of Cost for the year ended 31st March, 2012

Particulars	Rs.	Rs.	Amount Rs.
Opening Stock of Raw Materials	34,300		
Add : Purchases	65,100	99,400	
Less : Closing Stock of Raw Materials		29,400	
Raw Materials consumed			70,000
Productive Wages			45,000
Direct Expenses			4,000
Prime Cost			1,19,000
Add : Factory Overhead			
Unproductive Wages		12,300	
Factory Rent & Taxes		8,400	
Factory Lilting		2,800	
Factory Insurance		1,500	
Depreciation of Plant & Machinery		2,800	
Factory Heating		1,800	
Motive Power		4,600	
Haulage		3,500	
Director's Fee (Works)		1,500	
Factory Cleaning		700	
Factory Stationery		400	
Loose Tools written-off		500	
Water-supply		1,200	42,000
Factory Cost			1,61,000
Add : Administrative overhead			
Office Insurance		700	
Legal expenses		400	
Directors Fees (Office)		3,000	
Sundry Office Expenses		250	
Printing Expenses		750	
Office Stationery		1,000	
Rent & Taxes (Office)		800	
Depreciation of Office Buildings		1,500	
Bank Charges		80	8,480
Cost of Production			1,69,480
Add : Selling & Distribution Overheads			
Commission on Sales		1,920	
Bad-Debts		200	
Advertisement		300	
Sales Department Salaries		1,800	
Rent of Warehouse		500	
Depreciation of Delivery Vans		400	
Upkeep of Delivery Vans		600	5,720
Total Cost			1,75,200

10.9 Adjustment of Work – in – Progress

Work-in-progress refers to semi-finished goods or part of work which is still in production or process on the date of preparing accounts. It is necessary to compute the value of opening and closing work-in-progress. Valuation of work-in-progress is made according to stage of completion, if there is no direction in question it should be done at factory cost. Opening stock of work-in-progress is added to factory overhead and closing stock of work-in-progress is deducted.

Adjustment of opening and closing value of work in progress is done as under:

Valuation of Work-in-Progress at Prime Cost

Direct Materials	.....
Direct Wages	.....
Direct Expenses	.....
Add: WIP (Opening)	.....
Less: WIP (Closing)	.....
Prime Cost	.....

Valuation of Work in Progress-in-Progress at Work Cost

Prime Cost	.....
Add: Factory Overhead	.....
Add: WIP (Opening)	.....
Less: WIP (Closing)	.....
Works Cost	.....

10.10 Valuation and Adjustment of Opening and Closing Stock of Finished Goods

Production cost of goods sold is essential to find out profit. Cost of production shows cost of all produced units during a certain period. Opening and closing stocks of finished goods are adjusted before calculating production cost of goods sold. If quantities of opening and closing stocks of finished goods are given but the values of stocks are not given they are valued at current cost per unit.

The following formula is used for the valuation of opening and closing stock of finished goods:

Opening Stock or Closing Stock of finished goods × Per Unit Cost of Production

It is shown in a cost sheet/statement of cost as under :

	Rs.
Cost of Production	……...
Add : Opening Stock of finished goods	……...
	……
Less : Closing stock of finished goods	……
Cost of Goods sold	……

Illustration - 2:

From the following information prepare a cost sheet giving (a) Cost of materials consumed', (b) Prime cost; (c) Factory overhead and its percentage on wages; (d) Factory cost; (e) General overhead and its percentage on factory (f) Total cost, and (g) Profit.

Stock of materials (Opening)	65,000
Stock of materials (Closing)	50,000
Productive wages	1,30,000
Director's fees	8,000
Drawing office salaries	10,000
Purchase of Materials	1,90,000
Carriage and cartage inwards	8,000
Carriage and cartage outwards	4,500
General expenses	4,000
Counting House salaries	13,000
Sales of finished articles	5,00,000
Bad debts written off	7,000
Manager's Salary (Three-fourth factory and one-fourth office)	12,000
Cash Discount allowed	2,000
Rent, Rates, Taxes and Insurance (Factory)	9,000
Rent, Rates, Taxes and Insurance (office)	4,000
Gas and water (Factory)	2,000
Gas and water (Office)	600
Depreciation written off on plant, Machinery and Tools	7,000
Repairs of plant Machinery and Tools	5,000
Depreciation written off on office furniture	500
Travelling expenses	3,000
Traveler's Salaries and Commission	8,000

Solution :

Cost Sheet of…for the year ended ……

Particulars	**Rs.**	**Rs.**
Stock of Raw Materials (Opening)	65,000	
Add : Material purchased	1,90,000	
	2,55,000	
Less : Stock of Materials (Closing)	50,000	
	2,05,000	
Add : Carriage Inward	8,000	
Materials Consumed		2,13,000
Productive Wages (direct)		1,30,000
Prime Cost		3,43,000
Factory overheads		
Drawing office salaries		10,000
Repairs of plant etc.		5,000
Rent of factory		9,000
Depreciations of plant etc.		7,000
Gas and water		2,000
Manager's salary (3/4th)		9,000
Factory Cost		3,85,000

Particulars	Rs.	Rs.
General Overheads		
Counting house salaries	13,000	
Carriage outwards	4,500	
Bad debts	7,000	
Rent etc. of office	4,000	
Travelling expenses	3,000	
Traveler's salaries etc.	8,000	
Depreciation of furniture	500	
Director's fees	8,000	
Gas and water	600	
Manager's salary	3,000	
General expenses	4,000	55,600
Total Cost		4,40,600
Profit		59,400
Sales (Given)		5,00,000

- Cash Discount is a financial item.
- Some authors distribute overheads into factory and General Overhead.

Illustration - 3 :

From the following' information compute (a) Value of materials consumed, (b) Total cost of production, (c) Cost of goods sold (d) Profit on goods sold, (e) Net profit for the month.

	Rs.
Purchase of raw materials	25,000
Selling and distribution expenses	6,000
Stock in hand on 1st January	
Raw materials	30,000
Finished goods	20,000
Stock in hand on 31st January	
Raw materials	28,000
Finished goods	17,000
Non-productive wages	10,000
Office and Administrative expenses	4,000
Direct wages	47,000
Sales of finished goods	75,000

Solution:

Cost Sheet of…

For the Month of January

Particulars	Rs.	Rs.
Stock of raw materials (Opening)	30,000	
Add : Purchase of raw materials	25,000	
	55,000	
Less : Stock of raw materials (Closing)	28,000	
Value of materials consumed		27,000
Direct wages		20,000
Prime cost		47,000
Non-productive wages		10,000

Works cost	57,000
Office and administrative expenses	4,000
Cost of production	61,000
Add : Stock of finished goods (Opening)	20,000
	81,000
Less : Stock of finished goods (Closing)	17,000
Production cost of goods sold	64,000
Profit on goods sold (sales-cost of sales)	11,000
Sales of finished goods	75,000
Profit on goods sold (Gross profit)	11,000
Less : Selling and Distribution expenses	6,000
Net profit for January	5,000

- Opening Stock of finished goods is added and closing stock of finished goods is deducted from the cost of production.

10.11 Comparative Cost Sheet of Two Periods

For comparative study of cost of two periods a comparative cost sheet is to be prepared to find out total cost and cost per unit of both the period. Thereafter, cost of current period is computed with the cost of previous period. If any increase or decrease is found out in it, causes are searched by analytical study. While preparing such cost sheets data of current period are shown on right hand side and cost data related with the previous period are shown on left side of the cost sheet.

Illustration - 4:

From the following information prepare a comparative cost sheet showing cost per ton.

	Three months ended	
	31.3.2011	30.6.2011
	Rs.	Rs.
Direct expenses	2,000	2,000
Taxes and Insurance (factory)	1,200	1,200
Productive wages	1,10,000	1,50,000
Raw materials	60,000	75,000
Unproductive labour	50,000	65,000
Output was 10,000 and 15,000 tons, respectively		
Light and water	2,000	2,000
Factory repairs	5,000	10,000
Plant depreciation	5,000	5,000
Administrative expenses	20,000	30,000
Factory rent	2,500	2,500

Solution:

Cost Sheet

Three months ended 31.3.2011 10,000 tons		Particulars	Three months ended 30.6.2011 15,000 tons	
Rs.	Cost per unit		Rs.	Cost per unit
60,000	6	Raw material	75,000	5
1,10,000	10	Productive wages	1,50,000	10
15,000	1.5	Direct Wages	20,000	1.33
1,85,000	18.5	**Prime Cost**	2,45,000	10.33
50,000	5	Unproductive labour	65,000	4.33
2,500	.25	Factory rent	2,500	.16
5,000	.50	Factory repairs	10,000	.66
2,000	.20	Light and water	2,000	.13
1,200	.12	Taxes and insurance	1,200	.06
5,000	.5	Plant depreciation	5,000	.33
2,50,700	25.07	**Work Cost**	3,30,000	22.00
20,000	2.00	Administration expenses	30,000	2.00
2,70,700	27.07	**Total Cost**	3,60,700	24.00

10.12 Absorption of Overhead

Factory, office & administrative overheads, selling and distribution overheads are included in overheads. Although there are many methods to absorb overheads but generally, factory overheads are absorbed as a percentage of direct wages, office and administrative overheads are absorbed as a percentage of work cost and selling and distribution overheads are as a percentage of work cost or on the basis of per unit sold. Data of previous period are used to ascertain the percentage for this purpose.

Illustration - 5:

In a factory two types of ratios are manufactured, viz. Orient and Sujon models. From the following particulars, prepare a statement of cost showing cost and profit per ratio sold. There is no opening and closing stock.

	Orient	Sujon
	Rs.	Rs.
Materials	27,300	1,08,680
Labour	15,600	62,920

Works overhead are 80% of labour and office overhead 15% of works cost. Unit produced 78 and 286 respectively.

Solution:

Statement of Cost and Profit

Particulars	**Orient**	**Sujon**
	Rs.	Rs.
Materials	27,300.00	1,08,680.00
Labour	15,600.00	62,920.00
Prime Cost	42,900.00	1,71,600.00
Works Overhead (80% of Labour)	12,480.00	50,336.00
Work Cost	55,380.00	2,21,936.00
Office Overhead (15% on Works Cost)	8,307.00	33,290.40
Total Cost (i)	63,687.00	2,55,226.00

No. of Units Produced (ii)	78.00	286.00
Cost per unit (i) ÷ (ii)	816.50	892.40
Profit per Unit (Balance)	183.50	107.60
Selling Price per Unit	1,000.00	1,000.00

10.13 Treatment of Defective or Scrap Materials

Produced unit which are not according to predetermined standard are termed as spoilage or defective. If these units can be improved and sold after incurring additional expenses then such additional expenses are added to factory overheads.

If there is no chance of improvement, then it is sold and factory overhead will be realized from the realized amount. Part of material which is left at the end of production process and cannot be used next process is known as scrap. It's quantity and value is quite ignorable.

If it is related to raw material then amount realised from its sale will be reduced from the amount of cost of material. It is due to production process then its sale value will be reduced from factory cost. Abnormal loss will be transferred to profit and Loss Account.

Illustration - 6:

The following information is available from the records of a manufacturing Company for a month:

	Rs.
Opening Stock of Raw Materials	15,000
Closing Stock	12,000
Raw Materials Purchase	77,000
Manufacturing wages	20,000
Non-Productive Wages	5,000
Experiment Expenses	2,000
Wastage of Materials	200
Establishment Expenses	10,000
Other Work Expenses	42,800
Selling and Distribution Expenses	30,000
Finished Goods stock :	
Opening	6,000
Closing	16,000
Sales of Finished Goods	2,00,000

You are asked to prepare a Statement of Cost showing: (i) Cost of raw materials used; (ii) Prime Cost, (iii) Works Cost; (iv) Cost of production; (v) Cost of goods sold; (vi) Total cost; (vii) Profit on sales.

Solution: **Statement of Cost**

	Rs.	Rs.
Raw materials purchased	**77,000**	
Add : Opening stock	**15,000**	
	92,000	
Less : Closing stock	**12,000**	
(i) Raw Material Used		**80,000**
Manufacturing wages		**20,000**
(ii) Prime cost		**1,00,000**

Add : Work Overhead:		
Non-Productive Wages	**5,000**	
Experiment Expenses	**2,000**	
Wastage of Materials	**200**	
Other Works Expenses	**42,800**	**50,000**
(iii) Works Cost		**1,50,000**
Add : Establishment Expenses		**10,000**
(iv) Cost of Production		**1,60,000**
Add: Opening stock of finished goods		**6,000**
		1,66,000
Less: Closing stock of finished goods		**16,000**
(v) Cost of Goods Sold		**1,50,000**
Add: Selling and distribution of Overheads		**30,000**
(vi) Total Cost		**1,80,000**
Profit (Balancing figure)		**20,000**
Sales (given)		**2,00,000**

Note: Wastage of materials is part of works overhead.

10.14 Determination of Selling Price or Tender Price

The price to be quoted before receiving any sale order or prior to complete a job is known as "Tender Price". As the receipts of orders greatly depend upon the tender price, it is suggested that a tender should be made very carefully. Experience of preceding periods is required to determine tender price.

While preparing the tender, change in material cost, labour cost and in-other overheads should be considered, the time of preparation of tender, the past percentage of factory overhead generally on wages, office, selling and distribution overheads on factory cost should be considered. When there is no information.

Illustration - 7:

A manufacturer of coolers finds that in 2011, it costs him Rs. 7,20,000 to manufacture 175 coolers, which he sold for Rs. 5,400 each. The cost was made up of:

	Rs.
Materials	2,82,000
Direct Wages	3,24,000
Factory Overheads	48,600
Office Overheads	65,460

For the next year he estimates that:

a. Each cooler will require materials of Rs. 1,600 and labour Rs. 1,800;
b. The factory overheads will bear the same relation to wages as in the previous period; and
c. The office overheads percentage on factory cost will be the same as in the past.

Prepare a Statement of Cost showing the profit he would make per unit, if he reduces the price of coolers by Rs. 200

Solution:

Statement of Cost for 2011

Particulars	**Total Amount**
	Rs.
Materials	2,82,000
Wages	3,24,000
Prime cost	6,06,000

Add: Factory Overhead	48,600
Factor cost	6,54,600
Add: Office Overhead	65,460
Total cost	7,20,060
Profit (Balance)	2,24,940
Sales (5,400 x 175)	9,45,000

Percentage of Factory Overhead to Wages:
48,000/ 3,24,000 x 100 = 15%
Percentage of office overhead to factory cost
65,400/ 6,54,600 x 100 = 10%

Statement Showing Estimated Cost and Profit per Cooler

Particulars	**Total Amount Rs.**
Materials	1,600
Wages	1,800
Prime Cost	3,400
Add : Factory Overhead (15% of wages)	270
Factory Cost	3,670
Add : Office overheads (10% of factory cost)	367
Total Cost	4,037
Profit	1,163
Selling price (5,400 – 200)	5,200

Illustration - 8:

In respect of a factory, the following figures have been obtained for the year 2011.

Cost of materials	6,00,000
Wages for labour	5,00,000
Factory overloads	3,00,000
Administration Charges	3,36,000
Selling charges	2,24,000
Distribution charges	1,40,000
Profit	4,20,000

A work order has been executed in 2009 and the following expenses have been incurred:

Materials	8,000
Wages for labour	5,000

Assuming that in the year 2012 the rate for factory overhead has gone up by 20%. Distribution Charges have gone down by 10% and selling and administration charges each have gone up by 12½%. At what price should the product be sold so as to earn the same percentage of profit as on the selling price in the year 2011? Factory Overhead is based on direct labor and Administration, Selling and Distribution overhead on factory cost. Prepare necessary statement of cost.

Solution:

Statement of Cost for the year 2011

Particular	**Total Amount Rs.**
Cost of Material	6,00,000
Wages for labour (Direct wages)	5,00,000
Prime cost	11,00,000

Add : Factory overhead	3,00,000
Factory cost	14,00,000
Add : Office overhead (Administration)	3,36,000
Cost of production	17,36,000
Add : Selling and distribution charges (2,24,000 + 1,40,000)	3,64,000
Total cost	21,00,000
Add : Profit	4,20,000
Sales	25,20,000

(i) Percentage of factory overhead to wages:

= Factory overhead x 100 = 3,00,000 x 100 = 60%

Direct wages 5,00,000

(ii) Percentage of Administration Overhead to Factory cost

= Administrative Overhead x 100 = 3,34,000 x 100 = 24%

Factory Cost 14,00,000

(iii) Percentage of Distribution Overhead to factory cost

= Selling Overhead x 100 = 2,24,000 x 100 = 16%

Factory Cost 14,00,000

(iv) Percentage of Distribution Overhead to Factory cost

= Distribution Overhead x 100 = 1,40,000 x 100 = 10%

Factory Cost 14,00,000

(v) Rate of Profit on sales

= Profit x 100 = 4,20,000 x 100 = 16.67%

Sales 25,20,000

Statement of Cost of Work Order for the year 2012

Particulars		**Amount**
		Rs.
Materials		8,000
Wages		5,000
Prime cost		13,000
Add : Factory Overhead (60% of wages)	3,000	
Add : 20% Increase	600	3,600
Factory Cost		16,600
Add : Administration charges:		
24% of Factory Cost	3,984	
Add : 12.5% Increase	498	4,482
Cost of Production		21,082
Add : Selling and Distribution expenses		
Selling expenses (16% of Factory cost)	2,656	
Add : 12.5% Increase	312	2,988
Distribution Expenses (10% of Factory cost)	1,660	
Less : 10% Decrease	166	1,494
Total cost		25,564
Profit		5,103
Selling price		30677

10.15 Production Account

Cost Sheet and Cost Statement have been explained in previous pages to ascertain unit cost. Cost statement may be presented m the form of ledger account termed as "production account". Production account presents information of production cost in an analytical manner according to double entry system. Cost of production and profit can be computed in this ledger. It is prepared in two parts. Debit side of first part reveals cost of production under different headings after adjusting opening and closing stock of work-in-progress. Such cost of production is carried over to debit side of second part of production account. Opening stock of finished goods is shown in debit side while closing stock appears in credit side. Amount of sales is also shown in credit side thereafter amount of difference is computed. If the total of credit side is more than debit side the amount of difference will be recorded as profit or vice versa it will be loss.Separate Production Account will be prepared for two or more products.

10.16 Difference between Cost Sheet and Production Account

Basis of difference	Cost Sheet	Production Account
1. Form	It is prepared in the from of a statement.	It is prepared like an account.
2. Double entry	It is not based on double entry system.	It is based on double entry system and there are debit and credit side.
3. Period	It is prepared with a view ascertain total-cost as well as per unit cost of production.	It is prepared after completion of production.
4. Comparative system	Comparative study for two periods or two type of production is feasible.	Such comparative study is not possible in this methods.
5. Comparison with results of Financial accounts	Results cannot be compared with financial account's results.	Results of Production Account can be compared with financial account's results.
6. Cost analysis	Detailed analysis of cost is made to control different elements of cost, viz. material labour and exp.	Different items of cost are shown as totals and are not analysed.

Performa of Production Account

Particulars	Rs.	Particulars	Rs.
To Direct Materials	-	By Sales of Waste	-
To Direct Labour	-	By Cost of Production c/d	-
To Direct Expenses	-		
Prime Cost	-		
To Works Overhead	-		
Add: Opening			
Work in Progress	-		
Less: Closing			
Work – in – Progress	-		
Work Cost	-		
To Office Overheads	-		
To Cost of Production b/d	-	By Sales	-
To Opening Stock of		By Closing Stock of	
Finished Goods	-	Finished Goods	-
To Selling & Distribution		By Transfer to other	

Overhead	-	Production a/c	-
To Profit (Balance figure)	-	By Loss (Balancing figures)	-
	---		---
	---		---

Illustration - 9:

The following are the balances of the Impersonal Ledger of a Colliery relating to revenue at the end of the year 2011.

	Rs.
Wages for coal production	5,80,000
Coal for colliery consumption	45,000
Timber used in coal production	64,000
Ropes used in coal production	12,000
Stores used in coal production	76,000
Royalties paid for coal production	42,000
General charges for coal production	70,000
Salaries for coal production	36,000
Coal sold (including colliery consumption) 1,12,000tons	8,84,000
Wages paid for coke-making	50,000
Stores used for coke-making	37,000
Salaries paid for coke-making	8,000
Coke sold 43,500 tons	5,40,000

The stock of coal at the beginning of the year amounted to 7,000 tons valued at Rs. 5 per ton and at the end of the year 15,000 tons valued at similar rate. The stock of coke at the beginning of the year amounted to 2,000 tons valued at Rs. 10 per ton and at the end of the year 500 tons valued at a similar rate. The total production of the colliery was 1,85,000 tons of coal and 42,000 tons of coke, 65000 tons of coal being used for coke- making . Prepare separate Production Accounts for coal and coke, showing the cost per ton taking coal used for coke-making at cost price.

Solution:

Coal Production Account

Particulars	Cost Per ton Rs.	Total Cost Rs.	Particulars	Cost per ton Rs.	Total Cost Rs.
To Wages paid	3.14	5,80,000	By Cost of	5.00	9,25,000
To Coal used	0.24	45,000	production		
To Timber used	0.35	64,000	(1,85,000 tons)		
To Ropes used	0.06	12,000			
To Stores used	0.41	76,000			
To Royalties	0.23	42,000			
To General Charge	0.38	70,000			
To Salaries	0.19	96,000			
	5.00	9,25,000		5.00	9,25,000
To Opening stock			By Sale		
(7,000 tons)			(1,12,000 tons)		8,84,000
@ Rs. 5 per ton		35000	By Coke production		
To Cost of production			a/c 65,000 @ 5		3,25,000
(1,85,000 tons)		9,25,000	By closing stock		
To Profit		3,24,000	15,000 @ Rs. 5		75,000
		12,84,000			12,84,000

Coal Production Account

Particulars	Cost per ton Rs.	Total cost Rs.	Particulars	Cost per ton Rs.	Total cost Rs.
To Coal used (65,000 tons @ Rs. 5.00 per ton)	7.74	3,25,000	By Cost of production of 42, 000 ton	10.00	4,20,000
To Wages	1.19	50,000			
To Stores used	0.88	37,000			
To Salaries paid	0.19	8,000			
	10.00	4,20,000		10.00	4,20,000
To Opening stock (2,000tons @ Rs. 10 per ton)		20,000	By Sales (43,500 tons)		5,40,000
To Cost of production 42,000 tons		4,20,000	By Stock Closing 500 Tons @ Rs. 10 Per ton		5,000
To Profit		1,05,000			
		5,45,000			5,45,000

10.17 Summary

Unit or output costing is a basic costing method which is applied to ascertain the cost per unit of the production, where production activities operates continuously at a large level, units of identical type are manufactured or can be turned out in an identical manner on proportionate basis, can be measured in physical units conveniently and per unit cost of goods manufactured, total production cost and proportionate amount of every element of cost is to be ascertained. It is used in mining industry, cotton industry, paper industry, textile industry, cement industry, brick industry etc.

10.18 Self Assessment Questions

1. Write short notes on:-
   a) Valuation of work-in-progress.
   b) Valuation of finished goods.
   c) Production Account
   d) Direct and Indirect Expenses.

2. What is Tender Price? How it is determined?

3. The following figures have been obtained from the cost records of Megha Ltd., for the year 2011.

	Rs.		Rs.
Cost of materials	2,40,000	Administration expenses	1,34,400
Wages of labour	2,00,000	Selling expenses	89,600
Factory overhead	1,20,000	Profit	1,68,000
Distribution expenses	56,000		

A work order has been executed in the year 2011 for which cost of materials was Rs. 32,000 and wages was Rs. 20,000.

Assuming that in the year 2011 the rate for factory overhead went up by 20%. Distribution charges

went down by 10% and selling and administration charges went up by 12½%.

At what price should the product of the job be quoted so as to earn the same (earlier) rate of profit on the selling price? Administration, Distribution and Selling Overheads are based on the Factory Cost.

4. Pratap Ltd. has received an order for the supply of three types of casting weighing 36, 90 and 54 tons respectively. 10% of the raw materials used are wasted in manufacturing and are sold as scrap for 25% of the cost price of raw material. Materials cost Rs. 500 per ton and the wages would amount to Rs. 12,000; Rs. 31,500 and Rs. 16,500 respectively. The cost of moulds, for casting is Rs. 1,200; Rs. 1,000 and Rs. 900 respectively. Factory overheads are to be charged at 30% of wages and administration and other overheads at 20% of works cost. It is desired to earn a profit of 25% on selling price. Ascertain the price to be quoted for the supply of these different types of costing.

10.19 Reference Books

- Agrawal & Agrawal, 'Management Accounting', (RBD. Jaipur)
- Khan, Jain, 'Management Accounting', (S. Chand & Sons.)
- I. M. Pandey, 'Management Accounting', (S. Chand & Sons.)
- M.N. Arora, 'Management Accounting', (Himalaya Publication House).

Unit - 11 : Contract Costing

Structure of Unit:

11.0 Objectives

After studying this unit, you should be able to:

- Understand the meaning of contract costing
- Understand recording of contract costs
- Understand the terminology regarding contract costing
- Learn the Computation of profit on incomplete contracts
- Understand cost of certified and uncertified work

11.1 Introduction

A contract usually takes several years to get it completed. If the profit on such contracts is recorded only after their completion, then wide fluctuations may be noted in the profit figures of contractors from year to year. To avoid these fluctuations in the reported profits and to reflect the revenue in the accounting period during which the activity is undertaken, the profit in respect of each contract in progress is transferred to the profit and loss account of the year by calculating the notional profit. The portion of notional profit to be transferred to the profit and loss account depends on the stage of completion of a contract. To determine such a profit figure the knowledge of various concepts as discussed below is essential in contract costing.

11.2 Meaning of Contract Costing

Contract or terminal costing, as it is termed, is one form of application of the principles of job costing. In fact a bigger job is referred to as a contract. Contract costing is usually adopted by building contractors engaged in the task of executing civil contracts. Contract costing have the following distinct features:

1. The major part of the work in connection with each contract is ordinarily carried out at the site of the contract.

2. The bulk of the expenses incurred by the contractor are considered as direct.
3. The indirect expenses mostly consist of office expenses of the yards, stores and works.
4. A separate account is usually maintained for each contract.
5. The number of contracts undertaken by a contractor at a time is not usually very large.
6. The cost unit in contract costing is the contract itself.

11.3 Recording of Contract Costs

Material Cost: All materials supplied from the stores or purchased directly for the contract are debited to the concerned contract account. In the case of transfer of excess material from one contract to other contract, their costs would be adjusted on the basis of material transfer note, signed both by the transferee and the transferor foreman. In case the return of surplus material appears uneconomical on account of high cost of transportation, the same is sold and the concerned contract account is credited with the sale price. Any loss or profit arising there from is transferred to the Profit and Loss Account. Any theft or destruction of material by fire represents a loss and as such, the same is transferred to the Profit and Loss Account. If any stores items are used for manufacturing tools, the cost of such stores items are charged to the work expenses account. If the contractee has supplied some materials without affecting the contract price, no accounting entries will be made in the contract account, only a note may be given about it.

Labour Cost: Labour actually employed on the site of the contract is regarded as direct (irrespective of the nature of the task performed) and the wages paid to them are charged to the concerned contract directly or on the basis of a wage analysis sheet (if concurrently a number of contracts are carried on and labours are required to devote their time on two or more contracts).

Direct Expenses: Direct expenses (if any) are directly charged to the concerned contract.

Indirect Expenses: Indirect expenses (such as expenses of engineers, surveyors, supervisors etc.) may be distributed over several contracts as a percentage of cost of materials, or wages paid or of the prime cost. If however, the contracts are big, the labour hour method may be used for the distribution of expenses.

Plant and Machinery: The value of the plant in a contract may be either debited to contract account and the written down value thereof at the end of the year entered on the credit side for closing the contract account, or only a charge (depreciation) for use of the plant may be debited to the contract account.

Sub-Contract: Sub-contract costs are also debited to the Contract Account.

Extra Work: The extra work amount payable by the contractee should be added to the contract price. If extra work is substantial, it is better to treat it as a separate contract. If it is not substantial, expenses incurred should be debited to the contract account as "Cost of Extra work".

11.4 Cost of Work Certified

All building contractors received payments periodically known as "running payment" on the basis of the architect's or surveyor's certificates. Normally payments are not equal to the value of the work certified, a small percentage of the amount due is retained as security for any defective work which may be discovered later within the guarantee period.

Cost of work certified = Cost of work to date - (Cost of work uncertified + Material in hand + Plant at site)

The amount retained is called retention money. The full value of the work certified should be credited to the Contract Account and debited to the account of the contract. Since the cash received from him will be less, the balance in his account will be shown as an asset in the balance sheet.

11.5 Work Uncertified

It represents the cost of the work which has been carried out by the contractor but has not been certified by the contractor's architect. It is always shown at cost price. The cost of uncertified work may be ascertained as follows:

	Rs.
Total cost to date	—
Less: Cost of work certified	—
Material in hand	—
Plant at site	—
Cost of work uncertified	—

11.6 Retention Money

A contractor does not receive full payment of the work certified by the surveyor. Contractor retains some amount (say 10% to 20%) to be paid, after sometime, when it is ensured that there is no fault in the work carried out by contractor. If any deficiency or defect is noticed in the work, it is to be rectified by the contractor before the release of the retention money. Retention money provides a safeguard against the risk of loss due to faulty workmanship.

11.7 Cash Received

It is ascertained by deducting the retention money from the value of work certified i.e., Cash received = Value of work certified - Retention money.

11.8 Work-in-Progress

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

(i) The cost of work completed, both certified and uncertified;
(ii) The cost of work not yet completed; and
(iii) The amount of profit taken as credit.

In the Balance Sheet, the work-in-progress is usually shown fewer than 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 yet reached the stage of completion are shown under the head "uncertified" work-in-progress.

11.9 Notional Profit

It represents the difference between the value of work certified and cost of work certified. It is determined:

Notional profit = Value of work certified - (Cost of work to date - Cost of work not yet certified)

11.10 Estimated Profit

It is the excess of the contract price over the estimated total cost of the contract.

11.11 Accounting Standard - 7

This standard issued by the Institute of Chartered Accountant of India of relates to 'Accounting for Construction Contracts for the financial Statements of Contractors. In the initial years, this accounting standard will be recommendatory in character.'

Detail:

(1) This standard deals with accounting for construction Contracts in the financial statements of contractors.

(2) The feature which characterises a construction contract dealt with in this Statement is the fact that the date at which the contract is secured and the date when the contract activity is completed fall into different accounting periods. The specific duration of the contract performance is not used as a distinguishing feature of a construction is essentially a process of measuring the results of relatively long- term events and allocating those results to relatively short-term accounting periods.

(3) For the purposes of this statement a construction contract is a contact 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, dam's ships, buildings and complex pieces of equipment.

(4) Contracts for the provision of services come within the statement to the extent that they are directly related to a contract or the construction of an asset.

(5) The principal problem relating to accounting for construction contracts is the allocation of revenues and related costs to accounting periods over the duration of the contract.

(6) **Types of Construction Contracts:** Construction contracts are formulated in a variety of ways but generally fall into two basic types:

i) **Fixed price contracts:** the contractor agrees to a fixed contract price, or rate, in some cases subject to cost escalation clauses;

ii) **Cost plus contracts:** the contractor is reimbursed for allowable or otherwise defined costs, and is also allowed a percentage of these costs or a fixed fee.

Both types of contracts are within the scope of this Statement.

Illustration - 1:

Compute a conservative estimate of profit on a contract (which has been 90% complete) from the following particulars:

	(Rs.)
Total expenditure to date	22, 50,000
Estimated further expenditure to complete the contract (including contingencies)	2, 50,000
Contract price	32, 50,000
Work certified	27, 50,000
Work uncertified	1, 75,000
Cash received	21, 25,000

Solution:

Calculation of conservative Estimate of Profit	(Rs.)
Total expenditure to date	22, 50,000
Estimated further expenditure to complete the contract (including contingencies)	2, 50,000
	25, 00,000
Estimated profit on contract	7, 50,000
Contract price	32, 50,000

Profit to be transferred to Profit and Loss A/c

$$\text{Estimated Profit} \times \frac{\text{Cash received}}{\text{Contract price}}$$

$$= \text{Rs. } 7{,}50{,}000 \times \frac{\text{Rs. } 21{,}25{,}000}{\text{Rs. } 32{,}50{,}000} = \text{Rs. } 4{,}90{,}385$$

11.12 Profit/Loss on Incomplete Contracts

To determine the profit to be taken to Profit and Loss Account, in the case of incomplete contracts, the following four situations may arise:

(i) Completion of contract is less than 25 per cent. In this case no profit should be taken to profit and loss account.

(ii) Completion of contract is up to 25 per cent or more than 25 per cent but less than 50 per cent. In this case one-third of the notional profit, reduced in the ratio of cash received to work certified, should be transferred to the Profit and Loss Account. Mathematically:

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

(iii) Completion of contract is up to 50 per cent or more than 50 per cent but less than 90 per cent. In this case, two-third of the notional profit, reduced by proportion of cash received to work certified, is transferred to the Profit and Loss Account. Mathematically:

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

(iv) Completion of contract is up to 90 per cent or more than 90 per cent i.e. it is near to completion: In this case the profit to be taken to Profit and Loss Account is determined by determining the estimated Profit and using any one of the following formulas:

(a) $$\text{Estimated Profit} \times \frac{\text{Work certified}}{\text{Contract price}}$$

(b) $$\text{Estimated Profit} \times \frac{\text{Work certified}}{\text{Contract price}} \times \frac{\text{Cash received}}{\text{Work certified}}$$

OR

$$\text{Estimated Profit} \times \frac{\text{Cash received}}{\text{Contract Price}}$$

(c) $$\text{Estimated Profit} \times \frac{\text{Cost of work to date}}{\text{Estimated total cost}}$$

(d) $$\text{Estimated Profit} \times \frac{\text{Cost of work to date}}{\text{Estimated total cost}} \times \frac{\text{Cash received}}{\text{Work certified}}$$

(e) $$\text{Notional Profit} \times \frac{\text{Work certified}}{\text{Contract price}}$$

(This formula may be preferably used in the absence of estimated profit figure)

It is preferable to use formula (b) in the absence of specific instructions.

11.13 Cost plus Contract

Under Cost plus Contract, the contract price is ascertained by adding a percentage of profit to the total cost of the work. Such type of contracts are entered into when it is not possible to estimate the contract cost with reasonable accuracy due to unstable condition of material, labour services, etc.

Cost plus contracts have the following advantages and disadvantages:

Advantages:

(i) The Contractor is assured of a fixed percentage of profit. There is no risk of incurring any loss on the contract.

(ii) It is useful especially when the work to be done is not definitely fixed at the time of making the estimate.

(iii) Contractee can ensure himself about 'the cost of the contract', as he is empowered to examine the books and documents of the contractor to ascertain the cost of the contract.

Disadvantages:

The contractor may not have any inducement to avoid wastages and effect economy in production to reduce cost.

11.14 Escalation Clause

If during the period of execution of a contract, the prices of materials, or labour etc., rise beyond a certain limit, the contract price will be increased by the agreed amount. Inclusion of such a clause in a contract deed is called as "Escalation Clause".

Illustration - 2:
The following expenses were incurred on a contract:

	Rs.
Material purchased	6, 00,000
Material drawn from stores	1, 00,000
Wages	2, 25,000
Plant issued	75,000
Chargeable expenses	75,000
Apportioned indirect expenses	25,000

The contract was for Rs. 20, 00,000 and it commenced on January 1, 2010. The value of the work completed and certified up to 30th November, 2010 was Rs. 13, 00,000 of which Rs. 10, 40,000 was received in cash, the balance being held back as retention money by the contractee. The value of work completed subsequent to the architect's certificate but before 31st December, 2010 was Rs. 60,000. There were also lying on the site materials of the value of Rs. 40,000. It was estimated that the value of plant as at 31st December, 2010 was Rs. 30,000. Prepare contract account and the amount which will be shown in the balance sheet of contractor

Solution:

Contract Account

Dr.			Cr.
Particular	Rs.	Particular	Rs.
To Material purchased	6,00,000	By Work-in-progress:	
To Stores issued	1,00,000	By Work certified	13,00,000
To Wages	2,25,000	By Work uncertified	60,000
To Plant	75,000	By Material unused	40,000
To Chargeable expenses	75,000	By Plant less depreciation	30,000
To Indirect expenses	25,000		
To Profit and Loss Account, (2/3rd of Profit on Cash basis)	1,76,000*		
To Work in progress balance of profit c/d	1,54,000		
	14,30,000		14,30,000
To Balance b/d: Work certified	13,00,000		
Uncertified	60,000		
Material at site	40,000		
Plant at site	30,000		
	14,30,000		
Less : Reserve	1,54,000		
	12,76,000		

* Computation of Profit	Rs.
Apparent profit	3,30,000
2/3rd of that since 66.67% of the work is complete	2,20,000
80% of that on cash basis (22000x80%)	1,76,000

An alternative method of presentation can be to deduct the balance of profit to be carried down (Rs. 1, 54,000 in the above case) from the work certified before it is entered in the contract account. It will be Rs. 11, 46,000 in the illustration given above. Of course, the reserve to be so deducted from the work certified will have to be first ascertained by considering the value of the work certified.

Illustration - 3:

A contractor prepares his accounts for the year ending 31st December each year. He commenced a contract on 1st April, 2010.

The following information relates to the contract as on 31st December, 2010:

	Rs.
Material issued	2, 51,000
Labour charges	5, 65,600
Salary to Foreman	81,300

A machine costing Rs. 2, 60,000 has been on the site for 146 days, its working life is estimated at 7 years and its final scrap value at Rs. 15,000.

A supervisor, who is paid Rs. 8,000 p.m., has devoted one-half of his time to this contract. All other expenses and administration charges amount to Rs. 1, 36,500. Material in hand at site costs Rs. 35,400 on 31st December, 2010.

The contract price is Rs. 20, 00,000. On 31st December, 2010 two-third of the contract was completed. The architect issued certificates covering 50% of the contract price, and the contractor had been paid Rs. 7, 50,000 on account.

Prepare Contract A/c and show how much profit or loss should be included in financial accounts to 31st December, 2010.

Solution:

Contract Account

Dr.				Cr.
Particular	Rs.	Particular		Rs.
To Material issued	2,51,000	By	Machine	2,46,000
To Labour charges	5,65,600		(See Note 1)	
To Foreman salary	81,300	By	Material (in hand)	35,400
To Machine	2,60,000	By	Works cost	10,49,000
To Supervisor's salary (Rs. 8,000 x 9)/2	36,000			
To Adm. charges	1,36,500			
	13,30,400			13,30,400
To Works cost	10,49,000	By	Work certified	10,00,000
To Notional profit	2,13,250	By	Work uncertified	2,62,250
			(See Note 2)	
	12,62,250			12,62,250
To Profit & Loss A/c	1,06,625	By	Notional Profit	2,13,250
To Work-in-Progress	1,06,625			
	2,13,250			2,13,250

Notes:

1. Machine:

$$[(\text{Rs. } 2,60,000 - \text{Rs. } 15,000) + 7] * \frac{146}{365} = \text{Rs. } 14,000$$

Hence the value of machine after the period of 146 days is Rs. 2,60,000 - Rs. 14,000 = Rs. 2,46,000

2. The cost of 66.67% of the contract is Rs. 10,49,000

$$\therefore \text{ Cost of 100\% of the contract is Rs. } \frac{10,49,000}{66.67} \text{ x } 100 = \text{Rs. } 15,73,500$$

∴ Cost of 50% of the contract which has been certified by the architect is Rs. 7, 86,750. Also the cost of 16.67% of the contract, which has been completed but not certified by the architect, is Rs. 2, 62,250.

Illustration - 4:

M/s. Bansalas Construction Company Ltd. took a contract for Rs. 60, 00,000 expected to be completed in three years. The following particulars relating to the contract are available:

	2008 Rs.	2009 Rs.	2010 Rs.
Materials	6,75,000	10,50,000	9,00,000
Wages	6,20,000	9,00,000	7,50,000
Cartage	30,000	90,000	75,000
Other expenses	30,000	75,000	24,000
Cumulative work certified	13,50,000	45,00,000	60,00,000
Cumulative work uncertified	15,000	75,000	-

Plant costing Rs. 3,00,000 was bought at the commencement of the contract. Depreciation was to be charged at 25% per annum, on the written down value method. The contractee pays 75% of the value of work certified as and when certified, and makes the final payment on completion of the contract.

You are required to make a contract account and contractee account as they would appear in each of the three years. Also show how the work-in-progress and other items should appear in the balance sheet.

Solution:

Contract Account

Dr. Cr.

2008	Rs.	2008	Rs.	
To Materials	6,75,000	By Plant at site c/d		2,25,000
To Wages	6,20,000	By work-in-progress c/d		
To Cartage	30,000	Work certified	13,50,000	
To Other expenses	30,000	Work uncertified	15,000	13,65,000
To Plant	3,00,000	By Profit & Loss A/c (Loss transferred)		6,5,000
	16,55,000			16,55,000

Dr. **Contract Account** Cr.

2009		**Rs.**	**2009**		**Rs.**
To Work-in-progress b/d :			By Work-in-progress c/d		
Work certified	13,50,000		Wok certified	45,00,000	
Work uncertified	15,000		Work uncertified	75,000	
		13,65,000			45,75,000
To Plant b/d		2,25,000	By Plant at site c/d		1,68,750
To Materials		10,50,000			
To Wages		9,00,000			
To Cartage		90,000			
To Other expenses		75,000			
To Notional profit c/d		10,38,750			
		47,43,750			47,43,750
To Profit & Loss A/c		5,19,375	By Notional profit b/d		10,38,750
To Work-in-progress c/d (Profit in reserve) (Refer to working note 2)		5,19,375			
		10,38,750			10,38,750

2010		Rs.	2010		Rs.
To Work-in-progress b/d :			By Work-in-progress c/d		5,19,375
Work certified	45,00,000		(profit in reserve)		
Work uncertified	75,000				
		45,75,000			
To Plant b/d		1,68,750	By Plant at site		1,26,562
To Materials		9,00,000	By Contractee's A/c		60,00,000
To Wages		7,50,000	(Contract price)		
To Cartage		75,000			
To Other expenses		24,000			
To Profit & Loss A/c		1,53,187			
		66,45,937			66,45,937

Working Notes:

1. In 2008 there is a loss, and so the whole of it will be transferred to the profit and loss account.
2. In 2009, the contract is 3/4th complete. Hence, the profit to be transferred to the profit and loss account will be determined as under:

$$= \frac{2}{3} \times \text{Notional Profit} \times \frac{\text{Cash received}}{\text{Work received}}$$

$$= \frac{2}{3} \times 1038750 \times \frac{\text{Rs.}33,75,000}{45,00,000} = \text{Rs.}5,19,375$$

Contractee Account

2008	Rs.	2008	Rs.
To Balance c/d	10,12,500	By Bank	10,12,500
2009		**2009**	
To Balance c/d	33,75,000	By Balance b/d	10,12,500
		By Bank	23,62,500*
	33,75,000		33,75,000
2010		**2010**	
To Contract A/c	60,00,000	By Balance b/d	33,75,000
(Contract price)		By Bank	26,25,000
	60,00,000		60,00,000

* The total value of work certified at the end of 2009 was Rs. 45,00,000 of that worth Rs. 13,50,000 was certified in 2008. Hence, the cash to be received in 2009 is 75% of Rs. 31,50,000 (Rs. 45,00,000 - Rs. 13,50,000) i.e. Rs. 23,62,500.

Balance sheet (Extract) 2008

Liabilities	Rs.	Assets		Rs.
Capital	—	Plant at site		2,25,000
Less ."Loss during the year	65,000	Work in Progress	Rs.	
		Work certified	13,50,000	
		Work uncertified	15,000	
			1365000	
		Less : Cash Received	10,12,500	3,52,500

Balance sheet (Extract) 2009

Liabilities	Rs.	Assets		Rs.
Capital	—	Plant at site		1,68,750
Add: Profit during the year	5,19,375	Work in Progress	Rs.	
		Work certified	45,00,000	
		Work uncertified	75,000	
			45,75,000	
		Less : Profit in Reserve	5,19,375	
			40,55,625	
		Less : Cash Received	33,75,000	6,80,625

Balance sheet (Extract) 2010

Liabilities	Rs.	Assets	Rs.
Capital	—	Plant at site	1,26,562
Add: Profit during the year	1,53,157		

Illustration - 5:

Compute a conservative estimate of profit on a contract (which has been 90% complete) from the following particulars. Calculate the proportion of profit to be taken to Profit & Loss Account under various methods and give your recommendation.

	Rs.
Total expenditure to date	4,50,000
Estimated further expenditure to complete the contract (including contingencies)	25,000
Contract price	6,12,000
Work certified	5,50,800
Work uncertified	34,000
Cash received	4,40,640

Solution:

Computation of notional profit		Rs.
Value of work certified		5,50,800
Less: Cost of work certified (Rs. 4,50,000 - Rs. 34,000)		4,16,000
Notional profit		1,34,800

Computation of estimated profit		Rs.
Contract price		6,12,000
Less: Cost of work to date	4,50,000	
Estimated further expenditure to complete the contract	25,000	
Estimated total cost		4,75,000
Estimated profit		1,37,000

Under various methods

Work certified

(i) $\text{Notional profit} \times \frac{\text{Work certified}}{\text{Contract price}}$

$= \text{Rs.}1,34,800 \times \frac{\text{Rs.}5,50,800}{\text{Rs.}6,12,000} = \text{Rs.}1,21,320$

(ii) $\text{Estimated profit} \times \frac{\text{Work certified}}{\text{Contract price}}$

$= \text{Rs.}1,37,000 \times \frac{\text{Rs.}5,50,800}{\text{Rs.}6,12,000} = \text{Rs.}1,23,300$

(iii) $\text{Estimated profit} \times \frac{\text{Work certified}}{\text{Contract price}} \times \frac{\text{Cash received}}{\text{Work certified}}$

$= \text{Rs.}1,37,000 \times \frac{\text{Rs.}5,50,800}{\text{Rs.}6,12,000} \times \frac{\text{Rs.}4,40,640}{\text{Rs.}5,50,800} = \text{Rs.}98,640$

(iv) $\text{Estimated profit} \times \frac{\text{Cost of work date}}{\text{Estimated total cost}}$

$= \text{Rs.}1,37,000 \times \frac{\text{Rs.}4,50,000}{\text{Rs.}4,75,000} = \text{Rs.}1,29,790$

(v) $\text{Estimated profit} \times \frac{\text{Cost of work date}}{\text{Estimated total cost}} \times \frac{\text{Cash received}}{\text{Work certified}}$

$= \text{Rs.}1,37,000 \times \frac{\text{Rs.}4,50,000}{\text{Rs.}4,75,000} \times \frac{\text{Rs.}4,40,640}{\text{Rs.}5,50,800} = \text{Rs.}1,03,832$

Recommendation : It is recommended that a sum of Rs. 98,640 may be transferred to the profit and loss account. This amount is the least and has been arrived by using the formula (iii) above. According to this formula, profit transferred to the profit and loss account is generally kept the minimum and allows withholding in reserve a larger portion of notional profit to meet future unforeseen expenses and contingencies.

Illustration - 6:

A contractor has entered into a long term contract at an agreed price of Rs. 1,75,000 subject to an escalation clause for materials and wages as spelt out in the contract and corresponding actuals are as follows :

	Standard		**Actual**	
Materials	Qty (tones)	Rate (Rs.)	Qty (tones)	Rate (Rs.)
A	5,000	5	5,050	4.80
B	3,500	8	3,450	7.90
C	2,500	6	2,600	6.60
Labour	Hours Rate (Rs.)	Hourly Rate (Rs.)	Hours	Hourly
X	2,000	7.00	2,100	7.20
Y	2,500	7.50	2,450	7.50
Z	3,000	6.50	3,100	6.60

Reckoning the full actual consumption of material and wages the company has claimed a final price of Rs. 1,77,360. Give your analysis of admissible escalation claim and indicate the final price payable.

Solution:

Statement showing final claim

Materials	Standard Qty/Hrs. (a)	Standard Rate(Rs.) (b)	Actual Rate (Rs.) (c)	Variation in Rate(Rs.) (d) = (c)-(b)	Escalation Claim (Rs.) (e) =(a) x (d)
A	5,000	5.00	4.80	(-) 0.20	(-) 1,000
B	3,500	8.00	7.90	(-)0.10	(-) 350
C	2,500	6.00	6.60	(+) 0.60	1,500
Materials escalation claim : (P)					150
Labour					
X	2,000	7.00	7.20	(+) 0.20	400
Y	2,500	7.50	7.50	-	-
Z	3,000	6.50	6.60	(+) 0.10	300
Wages escalation claim: (Q)					700

Statement showing final price payable

Agreed price		Rs. 1,75,000
Agreed escalation:		
Material cost	Rs. 150	
Labour cost	Rs. 700	Rs. 850
Final price payable		Rs. 1,75,800

The claim of Rs. 1,77,360 is based on the total increase in cost. This can be verified as shown below:

Statement showing total increase in cost

		Standard Cost			Actual Cost		Increase/
	Qty/hrs (a)	Rate (Rs.) (b)	Amount (Rs.) (c) = (a)*(b)	Qty/hrs (d)	Rate (Rs.) (e)	Amount (Decrease) (Rs.) (f)=(d)*(e)<	(g)=(f)-(c)
I. Materials							
A	5,000	5.00	25,000	5,050	4.80	24,240	(760)
B	3,500	8.00	28,000	3,450	7.90	27,255	(745)
C	2,500	6.00	15,000	2,600	6.60	17.160	2.160
			68.000			68.655	655
II. Labour							
X	2,000	7.00	14,000	2,100	7.20	15,120	1,120
Y	2,500	7.50	18,750	2,450	7.50	18,375	(375)
Z	3,000	6.50	19.500	3,100	6.60	20,460	960
			52.250			53,955	1,705
		Total (1 + II)					2,360

The final price claimed by the company is contract price	Rs. 1,75,000
Add: Increase in cost	Rs. 2,360
	Rs. 1,77,360

Note : It is fundamental principle that the contractee would compensate the contractor for the increase in costs which are caused by factors beyond the control of contractor and not for increase in costs which are caused due to inefficiency or wrong estimation. Hence final price is payable Rs. 175850

Illustration - 7:

AKP Builders Ltd. commenced a contract on April 1, 2009. The total contract was for Rs. 5,00,000. Actual expenditure for the period April 1, 2009 to March 31, 2010 and estimated expenditure for April 1, 2010 to December 31, 2010 are given below :

Particulars	2009-10 (actual)	2010-11 (9months)(estimated)
Materials issued	90,000	85,750
Labour: Paid	75,000	87,325
Outstanding at the end	6,250	8,300
Plant	25,000	-
Sundry expenses: Paid	7,250	6,875
Prepaid at the end	625	-
Establishment charges	14,625	-

A part of the material was unsuitable and was sold for Rs.18,125 (cost being Rs. 15,000) and a part of plant was scrapped and disposed of for Rs.2,875. The value of plant at site on 31 March, 2010 was Rs. 7,750 and the value of material at site was Rs. 4,250. Cash received on account to date was Rs. 1,75,000, representing 80% of the work certified. The cost of work uncertified was valued at Rs.27,375.

The contractor estimated further expenditure that would be incurred in completion of the contract:

- The contract would be completed by 31st December, 2010.
- A further sum of Rs.31,250 would have to be spent on the plant and the residual value of the plant on the completion of the contract would be Rs.3,750.
- Establishment charges would cost the same amount per month as in the previous year.
- Rs. 10,800 would be sufficient to provide for contingencies.

Required :

Prepare Contract Account and calculate estimated total profit on this contract. Profit transferrable to Profit and Loss Account is to be calculated by reducing estimated profit in proportion of work certified and contract price.

Solution :

AKP Builders Ltd.

Contract Account (2009-10)

Particulars	Rs.	Particulars	Rs.
To Materials issued	90,000	By Material sold	18,125
To Labour 75,000		By Plant sold	2,875
Add : Outstanding 6,250	81,250	By Plant at site	7,750
To Plant	25,000	By Material at site	4,250
To Sundry Expenses 7,250		ByWork-in-progress	
Less : Prepaid 625	6,625	Work certified 2,18,750	
To Establishment charges	14,625	Work uncertified 27,375	2,46,125
To Profit & Loss A/c	3,125		
(profit on sale of material)			
To Notice profit c/d	58,500		
	2,79,125		2,79,125
To Profit & Loss A/c (transfer)	29,960	By Notional profit b/d	58,500
ToWork-in-progress (reserve)	28,540		
	58,500		58,500

Profit to be transferred to Profit and Loss Account

$$= \text{Estimated profit} \times \frac{\text{Work Certified}}{\text{Contract price}}$$

$$= \text{Rs. } 68{,}481 \times \frac{2{,}18{,}750}{5{,}00{,}000} = \text{Rs. } 29{,}960$$

Calculation of Estimated Profit		**(Rs.)**		
(1)	Material consumed	(90,000 + 3,125-18,125)	75,000	
	Add: Further consumption		85.750	1,60,750
(2)	Plant used	(25,000-2,875)	22,125	
	Add: Further plant introduced		31,250	
	Less: Closing balance of plant		3,750	49,625
(3)	Establishment charges		14,625	
	Add: Further charges for nine month	(14,625 x 9/12)	10,969	25,594
(4)	Sundry expenses		6,625	
	Add: Further expenses		6,875	
	Add: Prepaid expenses		625	14125
(5)	Labour cost		81,250	
	Add: Further cost	(87,325-6,250)	81,075	
	Add: Outstanding		8.300	1,70,625
(6)	Reserve for contingencies			10,800
	Estimated profit	(balancing figure)		68.481
	Contract price			5.00.000

Illustration - 8:

RST Construction Ltd. commenced a contract on April 1, 2010. The total contract was for Rs. 49,21,875. It was decided to estimate the total profit on the contract and to take to the credit of Profit and Loss A/c that proportion of estimated profit on cash basis, which work completed to total contract. Actual expenditure for the period April 1, 2010 to March 31, 2011 and estimated expenditure for April 1, 2011 to September 30, 2011 are given below:

(Rs.)

		April 1, 2010 to March 31, 2011 (Actual)	**April 1, 2011 to Sept. 30, 2011 (Estimated)**
Materials issued		7,76,250	12,99,375
Labour :	Paid	5,17,500	6,18,750
	Prepaid	37,500	-
	Outstanding	12,500	5,750

Plant purchased		4,00,000	-
Expenses :	Paid	2,25,000	3,75,000
	Outstanding	25,000	10,000
	Prepaid	15,000	-
Plant returns to store (historical cost)		1,00,000	3,00,000
		(on Sept. 30, 2010	(on Sept. 30, 2011
	Work Certified	22,50,000	Full
	Work uncertified	25,000	-
	Cash received	18,75,000	-
	Materials at site	82,500	42,500

The plant is subject to annual depreciation @ 25% on written down value method. The contract is likely to be completed on September 30, 2011.

Required : Prepare the Contract A/c. Determine the profit on the contract for the year 2010-11 on prudent basis, which has to be credited to Profit and Loss A/c.

Solution:

Calculation of written down value of plant as on 30-9-2011.	(Rs.)
Plant purchased on 1-4-2010	4,00,000
Less: Plant returned to store on 30-9-2010	1,00,000
(Depreciation on it Rs. 1,00,000 x 25/100 x 6/12 = Rs. 12,500)	3,00,000
Less: Depreciation on Balance plant (3,00,000 x 25/100)	75,000
WDV of Plant on 1-4-2011	2,25,000
Less : Depreciation (2,25,000 x 25/100 x 6/12)	28,125
WDV of plant returned to store on 30-9-2011	1,96,875

Contract Account (1-4-2010 to 31-3-2011)

Particulars		Rs.	Particulars		Rs.
To Materials issued		7,76,250	Plant returned to Store on 30-9-2010	1,00,000	
To Labour	5,17,500		Less : Depreciation	12,500	87,500
Add : Prepaid	37,500				
	4,80,000		Plant at site on 31.03.11	3,00,000	
Add : Outstanding	12,500	4,92500	Less : Depreciation	75,000	2,25,000
To Plant purchased		4,00,000			82,500
To Expenses	2,25,000				
Less : Prepaid	15,000		By Work-in-progress		
	2,10,000		Work certified		22,50,000
Add : outstanding	25,000	2,35,000	Work uncertified		25,000
To Notional profit c/d		7,66,250			-
		26,70,000			26,70,000
To Profit & Loss A/c (Tr.)		3,89,000	By Notional profit b/d		7,66,250
To Work-in-Progress (Res.)		3,77,250			
		7,66,250			7,66,250

Computation of Estimated Profit

Contract A/c (1-4-2010 to 30-9-2011)

Particulars		Rs.	Particulars		Rs.
To	Materials issued (7,76,250+12,99,375)	20,75,625	By	Materials at site	42,500
			By	Plant returned to stone on 30.9.2010 (1,00,000-12,500)	
To	Labour (5,17,500-37,500 + 12,500 + 6,18,750+37,500-12,500 + 5,750)	11,42,000			
To	Plant purchased	4,00,000	By	Plant returned to store on 30.9.11 (4,00,000-1,00,000-1,03,125)	1,96,875
To	Expenses (2,25,000+25,000-15,000+ 3,75,000 - 25,000 + 15,000 + 10,000)	6,10,000	By	Contractee A/c	49,21,875
To	Estimated profit	10,21,125			
		52,48,750			52,48.750

Since the contract is near to completion, the following formula is used for transfer of profit to Profit and Loss Account.

$$\text{Estimated Profit} \times \frac{\text{Cash received}}{\text{Contract price}} = 10,21,125 \times \frac{18,75,000}{49,21,875} = \text{Rs. } 3,89,000$$

Illustration - 9:

A contractor commenced a building contract on October 1, 2009. The contract price is Rs. 4,40,000. The following data pertaining to the contract for the year 2010-2011 has been compiled from his books and is as under:

		Rs.
April 1, 2010	Work-in-progress not certified	55,000
	Materials at site	2000
2010-11	Expenses incurred:	
	Materials issued	1,12,00
	Wages paid	1,08,000
	Hire of plant	20,000
	Other expenses	34,000
March 31, 2011	Materials at site	4,000
	Work-in-progress: Not certified	8,000
	Work-in-progress : Certified	4,05,000

The cash received represents 80% of work certified. It has been estimated that further costs to complete the contract will be Rs. 23,000 including the materials at site as on March 31, 2011.

Required: Determine the profit on the contract for the year 2010-11 on prudent basis, which has to be credited to P/L A/c.

Solution :

Contract Account for the year 2010-11

Dr. Cr.

Particulars		(Rs.)	Particulars	(Rs.)
1.4.2010				
To Work-in-progress	(not certified)	55,000	By Material at site	4,000
To Materials at site		2,000		
2010-11				
To Materials issued		1,12,000	By Cost of contract c/d (to date)	3,27,000
To Wages paid		1,08,000		
To Hire of plant		20,000		
To Other expenses		34,000		
		3,31,000		3,31,000
31.03.11				
To cost of contract b/d (to date)		3,27,000	By Work certified	4,05,000
To Profit & Loss A/c		66,273	By Work uncertified	8000
To Profit in reserve		19,727		
		4,13,000		4,13,000

90000x80% 92.05% = 66273

Estimated profit (on the completion of the contract)

	Rs.
Cost of the contract (to date)	3,27,000
Further cost of completing the contract Total cost: (A)	23,000
Total cost: (A)	3,50,000
Contract price: (B)	4,40,000
Estimated profit on the completion of contract: {(A) - (B)}	90,000

$$\text{Since} \left(\frac{\text{Work certified}}{\text{Contract p r ice}} \right) \times 100$$

$$= \frac{\text{Rs.4.05.000}}{\text{Rs.4,40,000}} \times 100 = 92.05\%$$

Illustration - 10:

A construction company under-taking a number of contracts, furnished the following data relating to its uncompleted contracts as on March, 2011 :

	(Rs. in Lacs)	Contract Numbers		
	723	726	729	731
Total Contract Price	23.20	14.40	10.08	28.80
Estimated Costs on completion of contract	20.50	11.52	12.60	21.60
Expenses for the year ended 31.3.2011 :				
Direct Materials	5.22	1.80	1.98	0.80
Direct Wages	2.32	4.32	3.90	2.16
Overheads (Excluding Depreciation)	1.06	2.60	2.62	1.05
Profit Reserve as on 1.4.2010	1.50	—	—	—
Plant issued at Cost	5.00	3.50	2.75	3.00
Materials at Site on 1.4.2010	0.75	—	—	—
Materials at Site on 31.3.2011	0.45	0.20	0.08	0.05
Work Certified till 31.3.2010	4.65	—	—	—
Work Certified during the year 2010-11	12.76	13.26	7.56	4.32
Work Uncertified as on 31.3.2011	0.84	0.24	0.14	0.18
Progress payments received during the year	9.57	9.0	5.75	3.60

Depreciation @ 20% per annum is to be charged on plant issued. While the Contract No. 723 was carried over from last year, the remaining contracts were started in the 1st week of April, 2010. Required :

(i) Determine the profit/loss in respect of each contract for the year ended 31st March, 2011.

(ii) State the profit/loss to be carried to Profit & Loss A/c for the year ended 31st March, 2011.

Solution:

(i) Statement of Profit/Loss in respect of following contract numbers for the year ended 31st March, 2011

(Rs.in lacs)

		Contract Numbers			
		723	726	729	731
A.	Contract completion percentage:				
	Work certified: (a)	17.41	13.26	7.56	4.32
	Contract price: (b)	23.20	14.40	10.08	28.80
	Percentage of completion : [(a) - (b)]	75.04	92.08	75.00	15.00
B.	Estimated profit on completion:				
	Contract price: (c)	23.20	14.40	10.08	28.80
	Estimated costs on completion : (d)	20.50	11.52	12.60	21.60
	Estimated profit (loss) on completion : [(c) - (d)]	2.70	2.88	(2.52)	7.20
C.	Profit of the year:				
	Op. stock of materials	0.75	—	—	—
	Materials issued	5.22	1.80	1.98	0.80
	Direct wages	2.32	4.32	3.90	2.16
	Overheads	1.06	2.60	2.62	1.05
	Depreciation	1.00	0.70	0.55	0.60
	Total: (P)	10.35	9.42	9.05	4.61

Profit in reserve	1.50	—	—	—
Material at site on 31/3/2011	0.45	0.20	0.08	0.05
Total: (Q)	1.95	0.20	0.08	0.05
Cost of contract: (R) = [(P) - (Q)]	8.40	9.22	8.97	4.56
Work certified	12.76	13.26	7.56	4.32
Work not certified	0.84	0.24	0.14	0.18
Total: (S)	13.60	13.50	7.70	4.50
Profit (loss) for the year [(R) - (S)]	5.20	4.28	(1.27)	(0.06)

(ii) Profit to be taken to Profit & Loss Account of the year in respect of respective contract

$$\left[\text{Contact 723} = \frac{2}{3} \times \text{Notional profit} \times \frac{\text{Cash received}}{\text{Work certified}}\right]$$

$$= \frac{2}{3} \times 5.20 \times \frac{9.57}{12.76} = \text{Rs. 2.60 lacs}$$

= Balance Rs. 2.60 lacs to reserve.

Contract 729 =Provide for current loss of Rs. 1.27 lacs

= Provide for expected loss of Rs. 1.25 lacs

Contract 731 = Provide for current loss of Rs. 0.06 lacs

11.15 Summary

Contract Costing

- Accounts maintained as per contract wise.
- Some computation of profit are main point so profit computation is as follow :

the case of incomplete contracts, the following four situations may arise:

(i) Completion of contract is less than 25 per cent: No profit should be taken to profit and loss account.

(ii) Completion of contract is up to 25 per cent or more than 25 per cent but less than 50 percent:

$$\frac{1}{3} \times \text{Notional Profit} \times \frac{\text{Cash received}}{\text{Work received}}$$

(iii) Completion of contract is up to 50 per cent or more than 50 per cent but less than 90 percent:

$$\frac{2}{3} \times \text{Notional Profit} \times \frac{\text{Cash received}}{\text{Work received}}$$

(iv) Completion of contract is up to 90 per cent or more than 90 per cent i.e. it is nearing completion:

(a) $$\text{Estimated Pr ofit} \times \frac{\text{Cash received}}{\text{Contract Price}}$$

(b) $$\text{Estimated Profit} \times \frac{\text{Work certified}}{\text{Contract price}} \times \frac{\text{Cash received}}{\text{Work certified}}$$

OR

$$\text{Estimated Profit} \times \frac{\text{Cash received}}{\text{Contract price}}$$

(c) $$\text{Estimated Profit} \times \frac{\text{Cost of work to date}}{\text{Estimated total cost}}$$

(d) $$\text{Estimated Profit} \times \frac{\text{Cost of work to date}}{\text{Estimated total cost}} \times \frac{\text{Cash received}}{\text{Work certified}}$$

(e) $$\text{Notional profit} \times \frac{\text{Work certified}}{\text{Contract price}}$$

11.16 Self Assessment Questions

1. What is Contract Account? How it is prepared? Give a specimen of such an account using imaginary figures.
2. Explain the nature and use of batch costing. Describe the concept of the economical batch with the help of any suitable example.
3. Why is a portion of profit on uncompleted contracts transferred to the profit and loss account? How would you determine the amount of profit to be transferred to the profit and loss account?
4. What is mean by Contract Costing Method? Where is it used? Discuss in brief the various items appearing in debit and credit side of Contract Account.

Numeric Questions

5. A Contractor, who prepared his accounts on 31st March each year, commenced a contract No. 119 on 1st July, 2009. The information at 31st March, 2010 are as under:

Materials charged out to site	2,51,000
Labour	5,65,600
Foreman	81,300

A machine costing Rs. 2,60,000 has been on the site for 146 days. Its working life is estimated at 7 years and its final scrap value at Rs. 15,000. A supervisor, who is paid Rs. 8,000 per month, has devoted approximately one half of his time to this contract. All other expenses and administration amount to Rs. 1,36,500. Material in hand at site on 31st March, 2010 cost Rs. 35,400. The contract price is Rs. 20,00,000. On 31st March, 2010 two-third of the con-tract was completed; architect's certificates had been issued cover-ing 50% of the contract price and Rs. 7,50,000 had so far been paid . on account and state how much profit or loss should be included in financial accounts to 31st March, 2010.

[Ans. Work uncertified Rs. 2,62,250, Total Profit Rs. 2,13,250, P. & L. a/c Rs. 1,06,625.]

6. Contractors Ltd. having an authorised capital of Rs. 2,00,000 f divided in 500 12% Preference Shares of Rs. 200 each and 5,000 Equity Shares of Rs. 20 each, commenced business on 1st January, 2010. During this year, they were engaged in one Cinema Building Contract, the contract price of which was Rs. 8,00!,000. The trial balance as on 31st December, 2010 was as follows:

Share Capital :	Rs.	Rs.
400 Preference Shares fully paid		80,000
5,000 Equity Shares, Rs. 16 paid up		80,000
Sundry Creditors		16,000
Land and Building at cost	68,000	
Cash at Bank	18,000	
Cinema Building Contract Account :		
Materials	1,60,000	
Plant	30,000	
Wages	2,10,000	
Expenses	10,000	
Cash received (80% of work certified)		3,20,000
	4,96,000	**4,96,000**

Of the plant and materials charged to the contract, plant costing Rs. 4,000 and materials costing Rs. 3,900 were destroyed in an accident. On 31st December, 2010 plant costing Rs. 8,000 was returned to stores. The value of materials on site was Rs. 8,000 and the cost of work done but not certified was Rs. 4,000. Charge 10% depreciation on plant, carry to the Profit and Loss account two-third of profit and prepare the contract account for the year, 2010 and also the Balance Sheet as on that date.

[Ans. Total Profit Rs. 33,300, Profit to P. & L. ale Rs. 17,760, W.I.P. Rs. 3,88,460, BIS Total Rs. 1,85,860, N.P. 17,760- 7,900 = 9,860.]

7. Mr. Rakesh undertook a contract to build a Bungalow for a con-tract price of Rs. 3,00,000. At the end of first year, contract account stands debited with the value of materials issued, wages and over-head incurred. It stands credited with materials at site Rs. 5,000 and the plant at site Rs. 80,000 after charging depreciation at 20%. The net cost of the contract is Rs. 1,65,000. The ratio of materials, labour and overheads is 7: 4:1. Two-third of the contract has been certified of which 80% was received by cheques. It is informed that 2/3rd of the Notional Profit on cash basis credited to Profit and Loss a/c is Rs. 32,000. Prepare the Contract account as it would appear at the end of first year giving full details and show the cost of work uncertified. Also prepare Work-in-Progress account.

[Ans. Cost of material, labour and overhead Rs. 1,50,000. National Profit Rs. 60,000.]

8. Modern Construction (Private) Limited undertook a contract for the construction of a Bridge on 1st January, 2010. The following balances were revealed from the costing records in respect of that contract:

Materials at site Rs. 75,000, Plant at site Rs. 1,80,000, work certified for Rs. 18,00,000 of which 80% was received by cheques. Cost of work uncertified was Rs. 3,00,000 and Profit reserved for future contingencies was Rs. 1,05,000. During this year the following fur-ther expenses were incurred:

Materials Rs. 2,40,000, Wages Rs. 3,20,000. Wages accrued on 1st January, 2010 were Rs. 15,000 and on 31st December, 2010 Rs. 21,000. Administration expenses paid Rs. 84,000, which includes Rs. 3,000 for the last year. At end of the year, materials in hand was worth Rs. 10,500. Depreciation on plant be provided at 10% per annum. Materials costing Rs. 8,300 was found unsuitable for the contract and was sold for Rs. 7,900. Work certified during the year for 18 lakhs. Cost of work uncertified was Rs. 11,000. Contract price of this con-tract is Rs. 40 lakhs. Prepare Bridge Contract Account for the year ended 31st December, 2010 and what profit be taken to Profit & Loss a/c? U.N.V.U., 2000]

[Ans. Profit Rs. 8,94,800, Profit to P.& L. ale. Rs. 4,77,227.]

9. Mr. Mehta undertook a contract for Rs. 1,35,000 which took 13 weeks in its completion. From the following details prepare Con-tract account and Contractee's account assuming the amount due from the contractee to be received:

	Rs.		**Rs.**
Direct materials	30,375	Tractor expenses:	
Direct wages	23,250	Fuel etc.	3,450
Stores issued	15,750	Driver's wages	4,500
Loose tools	3,600	Other expenses	3,975

The value of loose tools and stores returned at the end of the period were Rs. 300 and Rs. 4,500 respectively. The Plant was also returned at the value of Rs. 24,000 after charging depreciation at 20%. The value of Tractor was Rs. 30,000 on which depreciation @ 15% per annum was to be charged. The administration and office expenses are to be provided at 20% on works cost.

[Ans. Works Cost Rs. 87,225, T.C. Rs. 1,04,670, Profit Rs. 30,330.]

10. From the following data relating to a contract extracted from the books of a company prepare contract account as on 31st March, 2010. Also compute the profit and the value of work-in-progress for preparing the final accounts :

	Rs.		Rs.
Materials issued	90,000	Work certified	1,76,000
Wages paid	50,000	Work uncertified	9,000
Plant issued	75,000	Amount received	1,58,400
Supervisor's Salary	5,500	Contract price	3,00,000

You are further informed that : (i) Work commenced on 1st Oc-tober, 2009, (ii) Wages of workers for one week and salary of the supervise;} staff for one month were due at the end of the period, (iii) Depreciation to be charged @ 10% per annum on Plant; (iv) Materials at site on 31st March, 2010 was Rs. 4,200

[Ans. Total Profit Rs. 36,850, Profit to P. & L. ale Rs. 22,110, W.I.P. Rs. 1,70,260.]

11. The contract ledger of M/s. Lucky Engineers reveals the following details for four years:

Years :	**I**	**II**	**III**	**IV**
	Rs.	Rs.	Rs.	Rs.
Materials	47,000	80,000	2,50,000	50,000

Wages	50,000	1,00,000	2,00,000	80,000
Overhead	4,000	5,000	16,800	2,300
Work uncertified	10,000	30,000	40,000	-
Work certified during the year	1,00,000	2,00,000	5,00,000	2,00,000

Capital equipment at the commencement of the contract was Rs. 50,000 and at end it was valued at Rs. 40,000, contract price was Rs. 10 lakhs and 90% of the work certified was received in cash, balance was received on completion of the contract. Show contract account and Work-in-Progress account for four years.

[Ans; Profit to P. & L. ale : (i) Nil; (ii) Rs. 11,700; (Hi) Rs. 40,800; v) Rs. 52,400.]

12. Mr. Lucky a contractor completed the contract of constructing a Bungalow in two years. The expenses incurred by him in the first year were:

	Rs.
Material	80,000
Wages	40,000
Other expenses	12,000
Plant issued	1,00,000
Depreciation on plant 1	0% on original value
Work certified	60% of contract price
Work uncertified	Nil

In the second year, cost of materials and labour expenses were more than 10% of first year and other expenses remains the same as that of the first year. Mr. Lucky made a profit of 20% on con-tract price. Ascertain the contract price and prepare contract ac-count for two years separately showing profit to be credited to profit and loss account assuming that he received 90% of the work certified as an advance from the contractee.

[Ans. Profit to P. & L. ale (1) Rs. 48,000, (II) Rs. 26,000] (P-135) Calculation of Tender Price

11.17 Reference Books

- K.L. Narang and Jain, SP, 'Cost Accounting', Kalyani Publisher, New Delhi.
- Tulsian PC, 'Practical Costing', Vikas Publisher, New Delhi
- Maheswari S.N., 'Advance Problem and Solutions in Cost Accounting', Sultanchand and Sons, New Delhi
- Arora M.N., 'Cost Accounting Principle and Practice', Vikas Publisher, New Delhi
- Maheswari and Mittal, 'Cost Accounting' Mahaveer Prakashan, New Delhi
- Oswal and Maheswari, 'Cost Accounting' Ramesh Book Depot, Jaipur (Raj.)
- Agarwal M.L., 'Cost Accouating', Sahitya Bhawan Publisher, Agra (UP)
- Khan M.Y. and P.K., 'Management Accounting', Tata Mcgraw hill Publisher, New Delhi
- Horngren, Charles, Foster and Data, 'Cost Accounting - A Managerial Emphasis', Prentice Hall of India, New Delhi
- Jain, Khendelwal and Pareekh, 'Cost Accounting', Ajmer Book Company, Jaipur

Unit - 12 : Process Costing

Structure of Unit:

12.0 Objectives

After studying this chapter, you should be able to:

- Understand the meaning of Process and Operation costing.
- Understand and differentiate between Joint and By-products.
- Understand the accounting treatment required for normal and abnormal process losses.
- Understand the treatment for abnormal gain.
- Understand the accounting treatment required for joint products and by products.

12.1 Introduction

Process costing is used where the production moves from one process or department to next, until its final completion. There is a continuous production of identical units through a series of processing operations. Process in a check entity of an industrial unit in which specific work is done through the various well defined stages of production. This method of costing is used to know the cost of product in each process. A standard product passes through various stages of production called as processes.

12.2 Meaning of Process Costing

Process Costing is a method of costing used in industries where the material has, to pass through two or more processes for being converted into a final product. It is defined as "a method of Cost Accounting whereby costs are charged to processes or operations and averaged over units produced". A separate account for each process is opened and all expenditure pertaining to a process is charged to that process account. Such type of costing method is useful in the manufacturing of products like steel, paper, medicines soap, chemicals, rubber, vegetable oil, paints, varnish etc. where the production process is continuous and the output of one process becomes the input of the following process till completion.

12.3 Basic Features

Industries, where process costing can be applied, have normally one or more of the following features:

1. Each plant or factory is divided into a number of processes, cost centres or departments, and each such division is a stage of production or a process.
2. Manufacturing activity is carried on continuously by means of one or more process run sequentially, selectively or parallel.
3. The output of one process becomes the input of another process.
4. The end product usually is of like units not distinguishable from one another.
5. It is not possible to trace the identity of any particular lot of output to any lot of input materials. For example, in the sugar industry, it is impossible to trace any lot of sugar bags to a particular lot of sugarcane fed or vs. versa.
6. Production of a product may give rise to Joint and/or By-Products.

12.4 Costing Procedure

The Cost of each process comprises the cost of;

(i) Materials (ii) Labour
(iii) Direct expenses, and (iv) Overheads of production.

(i) Materials: Materials and supplies which are required for each process are drawn against material requisitions from stores. Each process for which the above drawn materials will be used should be debited with the cost of materials consumed on the basis of the information received from the Cost Accounting department. The finished product of first process generally become the raw materials of second process; under such a situation the account of second process, be debited with the cost of transfer from the first process and the cost of any additional material required under this second process.

(ii) Labour: Each process account should be debited with the labour cost or wages paid to labour for carrying out the processing activities. Sometimes the wages paid are apportioned over the different processes after selecting appropriate basis.

(iii) Direct Expenses: Each process account should be debited with direct expenses like depreciation, repairs, maintenance, insurance etc. associated with it.

(iv) Overheads Related to Production: Expenses like rent, power expenses, lighting bills, gas and water bills etc. are known as production overheads. These expenses cannot be allocated to a process. The suitable way-out to recover them is to apportion them over different processes by using suitable basis. Usually, these expenses are estimated in advance and the processes debited with these expenses on a pre-determined basis.

12.5 Operation Costing

It is defined as the refinement of process costing. It is concerned with the determination of the cost of each operation rather than the process. In those industries where a process consists of distinct operations, the method of costing applied or used is called operation costing. Operation costing offers better scope for control. It facilitates the computation of unit operation cost at the end of each operation by dividing the total operation cost by total output units.

Illustration - 1:

From the following data, prepare process accounts indicating the cost of each process and the total cost. The total units that pass through each process were 240 for the period.

	Process A Rs.	Process B Rs.	Process C Rs.
Materials	1,500	500	200
Labour	800	2,000	600
Other expenses	260	720	250

Indirect expenses amounting to Rs. 850 may be apportioned on the basis of wages. There was no opening or closing stock.

Solution:

Process 'A' Account

Dr.					**Cr.**
	Per unit	**Total**		**Per unit**	**Total**
	Rs.	Rs.		Rs.	Rs.
To Material	6.25	1,500	By Transfer to		
" Labour	3.34	800	Process 'B A/c	11.50	2,760
" Other expenses	1.08	260			
" Indirect expenses	0.83	200			
	11.50	2,760		11.50	2,760

Process 'B' Account

Dr.					**Cr.**
	Per unit	**Total**		**Per unit**	**Total**
	Rs.	Rs.		Rs.	Rs.
To be transferred			By Transfer to		
from Process 'A' A/c	11.50	2,760	Process 'C A/c	27.00	6,480
" Materials	2.08	500			
" Labour	8.34	2,000			
" Other expenses	3.00	720			
" Indirect expenses	2.08	500			
	27.00	6,480		27.00	6,480

Process 'C' Account

Dr.					**Cr.**
	Per unit	**Total**		**Per unit**	**Total**
	Rs.	Rs.		Rs.	Rs.
To be transferred			By Finished stock		
from Process 'B' A/c	27.00	6,480	A/c transfer	32.00	7,680
" Materials	0.83	200			
" Labour	2.54	600			
" Other expenses	1.04	250			
" Indirect expenses	0.59	150			
	32.00	7,680		32.00	7,680

12.6 Treatment of Normal Process Loss, Abnormal Process Loss and Abnormal Gain

Loss of material is inherent during processing operation. The loss of material under different processes arises due to reasons like evaporation or a change in the moisture content etc. Process loss is defined as the loss of material arising during the course of a processing operation and is equal to the difference between the input quantity of the material and its output.

There are two types of material losses viz. (i) Normal loss and (ii) Abnormal loss,

(i) Normal Process Loss: It is defined as the loss of material which is inherent in the nature of work. Such a loss can be reasonably anticipated from the nature of the material, nature of operation, the experience and technical data. It is unavoidable because of nature of the material or the process. It also includes units withdrawn from the process for test or sampling.

Treatment in Cost Accounts: The cost of normal process loss in practice is absorbed by good units produced under the process. The amount realised by the sale of normal process loss units should be credited to the process account.

(ii) Abnormal Process Loss: It is defined as the loss in excess of the pre-determined loss (Normal process loss). This type of loss may occur due to the carelessness of workers, a bad plant design or operation, Sabotage etc. Such a loss cannot obviously be estimated in advance. But it can be kept under control by taking suitable measures.

Treatment in Cost Accounts: The cost of an abnormal process loss unit is equal to the cost of a good unit. The total cost of abnormal process loss is credited to the process account from which it arise. Cost of abnormal process loss is not treated as a part of the cost of the product. In fact, the total cost of abnormal process loss is debited to costing profit and loss account.

(iii) Abnormal Gain: Sometimes, loss under a process is less than the anticipated normal figure. In other words, the actual production exceeds the expected figures. Under such a situation the difference between actual and expected loss and actual and expected production is known as abnormal gain. So abnormal gain may be defined as unexpected gain in production under normal conditions.

Treatment in Cost Accounts: The process account under which abnormal gain arises is debited with the abnormal gain and credited to abnormal gain account which will be closed by transferring to the Costing Profit and loss account. The cost of abnormal gain is computed on the basis of normal production.

To be clearer about the above concepts we consider the following illustration.

Illustration - 2:

A product passes through three processes. The output of each process is treated as the raw material of the next process to which it is transferred and output of the third process is transferred to finished stock.

	1st Process	2nd Process	3rd Process
	Rs.	Rs.	Rs.
Material issued	40,000	20,000	10,000
Labour	6,000	4,000	1,000
Manufacturing overhead	10,000	10,000	15,000

10,000 units have been issued to the 1st process and after processing, the output of each process is as under:

	Output	Normal Loss
Process No. 1	9,750 units	2%
Process No. 2	9,400 units	5%
Process No. 3	8,000 units	10%

No stock of materials or of work-in-progress was left at the end. Calculate the cost of the finished articles.

Solution :

Process No. 1 Account

	Units	Rs.		Units	Rs.
To Material	10,000	40,000	By Normal wastage	200	
" Labour		6,000	" Abnormal wastage	50	286
" Overhead		10,000	(cost per unit, Rs. 5.714)		
			" Process No. 2 (Transfer of completed units)	9,750	55,714
	10,000	56,000		10,000	56,000

Note : The cost of the abnormal wastage :

Normal Output	=	10,000 units-200 units	=	9,800 units
Cost per unit of normal output	=	Rs. 56,000 + 9,800 units	=	Rs. 5.714
Cost of 50 units	=	Rs. 5.714 x 50	=	Rs. 286

Process No. 2 Account

	Units	Rs.		Units	Rs.
To Process No. 1	9,750	55,714	By Normal wastage	488	-
" Materials		20,000	(5% of 9,750)		
" Labour		4,000	" Process No. 3	9,400	91,051
" Overhead		10,000	(cost per unit Rs. 9.686)		
" Abnormal gain @ Rs. 9.686	138	1,337			
	9,888	91,051		9,888	91,051

Note : The cost per unit is obtained by dividing Rs. 89,714 by 9,262 units, i.e., 9,750 units less 488 units.

Process No. 3 Account

	Units	Rs.		Units	Rs.
To Process No. 2	9,400	91,051	By Normal wastage	940	
" Materials		10,000	" Abnormal wastage	460	6,364
" Labour		1,000	(Cost per unit		
" Overhead		15,000	(Rs. 13.836)		
			" Finished stock	8.000	1.10.687
	9,400	1,17,051		9,400	1,17,051

Note : The cost of the abnormal wastage :

Normal Output	=	9,400 units-940 units	=	8,460 units
Cost per unit of normal output	=	Rs. 1,17,051 ÷ 8,460 units	=	Rs. 13,836
Cost of 460 units is	=	Rs. 6,364	=	Rs. 6,364

Illustration 3:

RST Limited processes Product Z through two distinct processes - Process I and Process II. On completion, it is transferred to finished stock. From the following information for the year 2010-11, prepare Process I, Process II and Finished Stock A/c :

Particulars	Process I	Process II
Raw materials used		7,500 units
Raw materials cost per unit		Rs.60
Transfer to next process/finished stock	7.050 units	6,525 units
Normal loss (on inputs)	5%	10%
Direct wages	Rs.1,35,750	Rs.1,29,250
Direct Expenses	60% of Direct wages	65% of Direct wages
Manufacturing overheads	20% of Direct wages	15% of Direct wages
Realisable value of scrap per unit	Rs.12.50	Rs.37.50

6,000 units of finished goods were sold at a profit of 15% on cost. Assume that there was no opening or closing stock of work-in-progress.

Solution:

Process IA/C

Particulars	Units	Rs.	Particulars	Units	Rs.
To Raw material used (@Rs.60)	7,500	4,50,000	By Normal loss (5% of 7,500)	375	4,688
To Direct wages		1,35,750	By Process II A/c	7,050	6,82,403
To Direct expenses		81,450	(transfer @ Rs.96.795)		
To Manufacturing overhead		27.150	By Abnormal loss (@ Rs.96.795)	75	7.259
	7,500	6,94,350		7,500	6,94.350

Transfer price in Process IA/C

$$= \frac{\text{Rs.694,350-Rs.4,688}}{\text{7,500units - 375 units}} = \frac{\text{Rs.6,89,662}}{\text{7125 units}} = \text{Rs. 96.795 p.u.}$$

Process II A/c

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process I A/c (transfer @ Rs.96.795)	7,050	6,82,403	By Normal loss (10% of 7,050 units)	705	26,438
To Direct wages		1,29,250	By Finished Stock A/c (transfer® Rs.140.05)	6,525	9,13,825
To Direct expenses		84,013			
To Manufacturing overhead		19,387			
To Abnormal gain (@ Rs.140.05)	180	25,210			
	7,230	9,40,263		7,230	9,40,263

Transfer price in Process IA/C

$$= \frac{\text{Rs.9,15,053-Rs.26,438}}{\text{7,050 units - 705 units}} = \frac{\text{Rs.8,88,615}}{\text{6345 units}} = \text{Rs. 140.05 p.u.}$$

Finished Goods Stock A/c

Particulars	Units	Rs.		Particulars	Units	Rs.
To Process II A/c (transfer @Rs.140.05)	6,525	9,13,825	By Cost of sales By Balance c/d		6,000 525	8,40,300 73,525
	6,525	9,13,825			6,525	9,13.825

Income Statement

Particulars	Rs.		Particulars	Rs.
To Cost of sales (6,000 units @ Rs.140.05)	8,40,300	By	Abnormal gain Process II A/c -180 units (Rs.140.05-Rs.37.50)	18,459
To Abnormal loss Process 1-75 units (Rs. 96.795-Rs.12.50)	6322			
To Net Profit	1,38,197	By	Sales (6,000 units @ Rs.1,61.06)	9,66,360
	9,84,819			9,84,819

12.7 Costing of Equivalent Production Units

In the case of process type of industries, it is possible to determine the average cost per unit by dividing the

total cost incurred during a given period of time by the total number of units produced during the same period. But this is hardly the case in most of the process type industries where manufacturing is a continuous activity. The reason is that the cost incurred in such industries represents the cost of work carried on opening work-in-progress, closing work-in-progress and completed units. Thus to ascertain the cost of each completed unit it is necessary to ascertain the cost of work-in-progress in the beginning and at the end of the process.

The valuation of work-in-progress presents a good deal of difficulty because it has units under different stages of completion from those in which work has just begun to those which are only a step short of completion. Work-in-progress can be valued on actual basis, i.e., materials used on the unfinished units and the actual amount of labour expenses involved. However, the degree of accuracy in such a case cannot be satisfactory. An alternative method is based on converting partly finished units into equivalent finished units.

Equivalent production means converting the incomplete production units into their equivalent completed units. Under each process, an estimate is made of the percentage completion of work-in-progress with regard to different elements of costs, viz., material, labour and overheads. It is important that the estimate of percentage of completion should be as accurate as possible. The formula for computing equivalent completed units is:

Equivalent completed units

= {Actual number of units in the process of manufacture} * {Percentage of work completed}

For instance, if 25% of work has been done on the average of units still under process, then 200 such units will be equal to 50 completed units and the cost of work-in-progress will be equal to the cost of 50 finished units.

12.8 Valuation of Work-in-Progress

(1) First-in-First Out (FIFO) method.

(2) Last-in-First Out (LIFO) method.

(3) Average Cost Method (or weighted average cost method).

(1) First-in-First-Out Method

Under this method the units completed and transferred include completed units of opening work-in-progress and subsequently introduced units. Proportionate cost to complete the opening work-in-progress and that to process the completely processed units during the period are derived separately. The cost of opening work-in-progress is added to the proportionate cost incurred on completing the same to get the complete cost of such units. Complete cost of such units plus cost of units completely processed constitute the total cost of units transferred. In this method the closing stock of Work in progress is valued at current cost.

Illustration - 4:

Opening work-in-progress 1,000 units (60% complete); Cost Rs. 1,100. Units introduced during the period 10,000 units; Cost Rs. 19,300. Transferred to next process - 9,000 units.

Closing work-in-progress - 800 units (75% complete). Normal loss is estimated at 10% of total input including units in process at the beginning. Scrap realise Re. 1 per unit. Scrapped are 100% complete.

Compute equivalent production and cost per equivalent unit. Also evaluate the output.

Solution:

FIFO Method

Statement of equivalent production and cost per unit

Input		Output		Equivalent Production	
Particulars	**units**	**Particulars**	**units**	**% of work done during current period**	**Equivalent units**
Op. work-in-process	1,000	Op. WIP:			
		Completed	1,000	40	400
Units introduced	10,000	Completed	8,000	100	8,000
		Normal loss	1,100	-	-
		Closing work-in-process	800	75	600
		Abnormal loss	100	100	100
			11,000		9,100

Cost of the Process (for the period)	Rs.	19,300
Less: Scrap value of normal loss	Rs.	1.100
Cost per equivalent unit	Rs.	18,200 ÷ 9,100 units = Rs. 2

Statement of Evaluation

Particulars	**Equivalent units**	**Cost per equivalent unit**	**Amount**
	Rs.	Rs.	
1. Opening WIP completed	400	2.00	800
Add : Cost of opening WIP	-	-	1,100
Complete Cost of 1,000 units of Op. WIP	1,000	1.90	1,900
2. Completely processed units	8,000	2.00	16,000
3. Abnormal loss	100	2.00	200
4. Closing WIP	600	2.00	1,200

(2) Last-in First-Out Method

According to this method units lastly entering in the process are the first to be completed. This assumption has a different impact on the costs of the completed units and the closing inventory of work-in-progress. The completed units will be shown at their current cost and the closing inventory of work-in-progress will continue to appear at the cost of the opening inventory of work-in-progress.

Illustration - 5:

From the following information relating to the month of April 06, calculate the equivalent production units and the value of finished production and work-in-progress, using the LIFO method.

Opening work-in-progress 1st April, 5,000 units, 50% complete, the cost is as under:

	Rs.
Materials	6,000
Labour	8,000
Overheads	8,000
	22,000

10000 Units introduced into the process and the cost introduced into the process are under:

	Rs.
Materials	30,000
Labour	52,500
Overheads	70,000
	1,52,500

During the period 7,500 units were completed and transferred to the next process. Closing work-in-progress on 30th April: 7,500 units, 50% complete.

Solution:

(i) Computation of Equivalent Production Units

(LIFO method)

Units	Particulars	Equivalent production		
		Units out	% of completion	Equivalent units
5,000	Opening Work-in-Process			
10,000	Units introduced into the process			
	Units completed and transferred, of the units introduced during the period	7,500	100	7,500
	Of the units introduced during the period	2,500	50	1,250
	Of the opening work in process	5,000	-	-

* Since the units in the opening work in process were already 50% complete; no work has been done on these units during the period.

(ii) Cost per unit of equivalent production

$$= \frac{\text{Rs.}1,52,500}{8,750} = \text{Rs.}17.43$$

Valuation of finished production and WIP

1. Finished production: 7,500 x Rs. 17.43 = Rs. 1,30,725
2. Closing WIP: Rs. 22,000 + (1,250 x Rs. 17.43) = Rs. 43,787.50

(3) Average Cost Method:

Under this method, the cost of opening work-in-progress and cost of the current period are aggregated and the aggregate cost is divided by output in terms of completed units. The equivalent production in this case consists of work-load already contained in opening work-in-process and work-load of current period.

The main difference between FIFO method and average method is that units of opening work in progress and their cost are taken in full under average method while under FIFO method only the remaining work done now is considered. Refer to illustration solved by FIFO method - Under Average Cost Method, the solution will be as follows:

Solution:

Statement of Equivalent Production and Cost per unit

Output	Units	Equivalent Percentage	Production units
Transferred to Next Process	9,000	100	9,000
Normal Loss	1,100	-	-
Abnormal Loss	100	100	100
Closing work-in-process	800	75	600
			9,700

Costs:	
	Rs.
Opening Work-in-Process	1,100
Cost of units introduced	19,300
	20,400
Less: Scrap value realised on normal loss	1,100
	19,300
Cost per equivalent unit - Rs. 19,300 + 9,700 units	= Rs. 1.99 (approx.)

Statement of Evaluation

	Particulars	Equivalent units	Cost per equivalent unit (Rs.)	Amount (Rs.)
1.	Transferred to next process	9,000	1.99	17,910
2.	Abnormal loss	100	1.99	199
3.	Closing Work-in-process	600	1.99	1,194
				19,303

Illustration - 6:

Following information is available regarding process A for the month of February, 2011:

Production Record	Units
Units in process as on 1.2.2011 (All materials used, 25% complete for labour and overhead)	4,000
New units introduced	16,000
Units completed	14,000
Units in process as on 28.2.2011 (All materials used, 33-1/3% complete for labour and overhead)	6,000

Cost Records	
Work-in-process as on 1.2.2011	Rs.
Materials	6,000
Labour	1,000
Overhead	1,000
	8,000
Cost during the month	
Materials	25,600
Labour	15,000
Overhead	15,000
	55,600

Presuming that average method of inventory is used, prepare:

(i) Statement of equivalent production.
(ii) Statement showing cost for each element.
(iii) Statement of apportionment of cost.
(iv) Process cost account for process A.

Solution:

(i) Statement of equivalent production:

(Average cost method)

Particulars Input (units)	Output	Units	Materials		Labour		Overhead	
			% Completion	Equivalent units	% Completion	Equivalent units	% Completion	Equivalent units
20,000	Completed	14,000	100	14,000	100	14,000	100	6,000
	WIP	6,000	100	6,000	33-1/3	2,000	33-1/3	2,000
20,000		20,000		20,000		16,000		16,000

(ii) Statement showing cost for each element:

Particulars	Materials	Labour	Overhead	Total
Cost of opening work-in-progress (Rs.)	6,000	1,000	1,000	8,000
Cost incurred during the month (Rs.)	25,600	15,000	15,000	55,600
Total cost (Rs.) : (A)	31,600	16,000	16,000	63,600
Equivalent units : (B)	20,000	16,000	16,000	
Cost per equivalent unit (Rs.):	1.58	1	1	3.58

(iii) Statement of apportionment of cost:

		Rs.	Rs.
Value of output transferred : (a)	14,000 units @ Rs. 3.58		50,120
Value of closing work-in-progress : (b)			
Materials	6,000 units® 1.58	9,480	
Labour	2,000 units @ Re. 1	2,000	
Overhead	2,000 units @ Re. 1	2.000	13,480
Total cost: (a + b)			63,600

(iv) Process cost account for process A:

Process A Cost Account

Dr.				Cr.	
	Units	Rs.		Units	Rs.
To Opening WIP	4,000	8,000	By Completed units	14,000	50,120
To Materials	16,000	25,600	By Closing WIP	6,000	13,480
To Labour		15.000			
To Overhead		15,000			
	20,000	63,600		20,000	63,600

Illustration - 7:

Following details are related to the work done in Process 'A' XYZ Company during the month of March, 2011 :

		(Rs.)
Opening work-in progress (2,000 units)		
Materials		80,000
Labour		15,000
Overheads -	'	45,000
Materials introduced in Process 'A' (38,000 units)		14,80,000
Direct Labour		3,59,000
Overheads		10,77,000
Units scrapped:	3,000 units	
Degree of completion: Materials	100%	
Labour and overheads	80%	
Closing work-in progress:	2,000 units	
Degree of completion :		
Materials	100%	
Labour and overheads	80%	

Units finished and transferred to Process 'B': 35,000 units

Normal Loss:

5% of total input including opening work-in-progress.

Scrapped units fetch Rs.20 per piece.

You are required to prepare:

(i) Statement of equivalent production
(ii) Statement of cost
(iii) Statement of distribution cost, and
(iv) Process 'A' Account, Normal and Abnormal Loss Accounts.

Solution:

(a) Statement of Equivalent Production

Input Details	Units	Output Details	Units	Equivalent Production			
				Material		Labour & O.H	
				Units	%	Units	%
Opening WIP	2,000	Completed and transferred to process B	35,000	35,000	100	35,000	100
Units introduced	38,000	Normal Loss (5% of 40,000)	2,000	-	-	-	-
		Abnormal loss	1,000	1,000	100	800	80
		Closing WIP	2,000	2,000	100	1,600	80
	40,000		40,000	38,000		37,400	

(b) Statement of Cost

Details	Cost at the beginning of the process (Rs.)	Cost added (Rs.)	Total Cost (Rs.)	Equivalent Production (Units)	Cost per unit (Rs.)
Material	80,000	14,80,000	15,60,000		
Less: Value of Normal Scrap			40,000		
			15,20,000	38,000	40
Labour	15,000	3,59,000	3,74,000	37,400	10
Overheads				37,400	30
					80

(c) Statement of Distribution of Cost **(Rs.)**

i) Completed and transferred to Process B	(35,000 units @ Rs.80)		28,00,000
ii) Abnormal Loss -1,000 units			
Materials	(1,000 units @Rs.40)	40,000	
Labour and overheads	(800 units @ Rs.40)	32,000	72,000
iii) Closing W.I.P.-2,000 units			
Materials	(2,000 units @ Rs.40)	80,000	
Labour and overheads	(1,600 units® Rs.40)	64,000	1,44,000

(d) Process A A/c

Particulars	Units	Rs.	Particulars	Units	Rs.
To Balance					
Opening W.I.P.	2,000	1,40,000	By Normal Loss	2,000	40,000
Materials - Rs.80,000			(@Rs.2O per paise)		
Labour - Rs.15,000			By Abnormal loss	1,000	72,000
Overheads - Rs.45,000			By Process B A/c	35,000	28,00,000
To Materials introduced	38,000	14,80,000	(transferred to the next		
To Direct Labour		3,59,000	Process)		
To Overheads	—	10,77,000	By Balance c/d	2,000	1.44,000
			(Closing WIP)		
	40,000	30,56,000		40,000	30,56,000

Normal Loss A/c

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process A A/c	2,000	40,000	By Cost Ledger Control A/c	2,000	40,000

Abnormal Loss A/c

Particulars	Units	Rs.	Particulars	Units	Rs.
To Process A A/c	1,000	72,000	By Cost Ledger Control A/c	1,000	20,000
			By Costing Profit / Loss A/c		52.000
		72,000			72,000

Inter-Process Profits

In some process industries the output of one process is transferred to the next process not at cost but at market value or cost plus a percentage of profit. The difference between cost and the transfer price is known as inter-process profits.

The advantages and disadvantages of using inter-process profit, in the case of process type industries are as follows:

Advantages:

1. Comparison between the cost of output and its market price at the stage of completion is facilitated.
2. Each process is made to stand by itself as to the profitability.

Disadvantages:

1. The use of inter-process profits involves complication.
2. The system shows profits which are not realised because of stock not sold out.

Illustration - 8:

A Ltd. produces product 'AXE' which passes through two processes before it is completed and transferred to finished stock. The following data relate to October 2011:

Particulars	Process		Finished Goods
	I	II	
	Rs.	Rs.	Rs.
Opening stock	7,500	9,000	22,500
Direct materials	15,000	15,750	
Direct wages	11,200	11,250	
Factory overheads	10,500	4,500	
Closing stock	3,700	5,500	11,250
Inter-process profit included in opening stock		1,500	8,250

Output of Process I is transferred to Process II at 25% profit on the transfer price. Output of Process II is transferred to finished stock at 20% profit on the transfer price. Stock in process is valued at prime cost. Finished stock is valued at the price at which it is received from process II. Sales during the period are Rs. 1, 40,000.

Prepare Process cost accounts and finished goods account showing the profit element at each stage.

Solution:

Process I Account

	Total Rs.	Cost Rs	Profit Rs		Total Rs.	Cost Rs	Profit Rs
Opening stock	7,500	7,500	-	Transfer to			
Direct materials	15,000	15,000	-	Process II A/c	54,000	40,500	13,500
Direct wages	11,200	11,200	-				
	33,700	33,700	-				
Less Closing stock	3,700	3,700					
Prime cost	30,000	30,000	-				
Overheads	10,500	10,500	-				
Process cost	40,500	40,500	-				
Profit $33^1/_3$ of Total cost (see working note 1)	13,500	-	13,500				
	54,000	40,500	13,500		54,000	40,500	13,500

Process II Account

	Total Rs.	Cost Rs	Profit Rs		Total Rs.	Cost Rs	Profit Rs
Opening stock	9,000	7,500	1,500	Transfer to finished stock A/c	1,12,500	75,750	36,750
Transferred from Process I	54,000	40,500	13,500				
Direct materials	15,750	15,750	—				
Direct wages	11,250	11,250					
	90,000	75,000	15,000				
Less: Closing Stock	5,500	3,750	750				
Prime Cost	84,500	71,250	14,250				
Overheads	4,500	4,500	—				
Process Cost	90,000	75,750	14,250				
Profit 25% on total cost (See working note 2)	22,500	-	22,500				
	1,12,500	75,750	36,750		1,12,500	75,750	36,750

(Finished Stock Account)

	Total Rs.	Cost Rs	Profit Rs		Total Rs.	Cost Rs	Profit Rs
Opening stock	22,500	14,250	8,250	Sales	1,40,000	82,500	57,500
Transferred from Process II	1,12,500	75,750	36,750				
	1,35,000	90,000	45,000				
Less: Closing stock	11,250	7,500	3,750				
Finished stock : Cost	1,23,750	82,500	41,250				
Profit	16,250	—	16,250				
	1,40,000	82,500	57,500		1.40,000	82,500	57,500

Working Notes:

Let the transfer price be 100 then profit is 25; i.e. cost price is Rs.75.

1. If cost is Rs. 75 then profit is Rs. 25

   If cost is Rs. 40,500 then profit is $\frac{25}{75} \times 40{,}500 = \text{Rs. } 13{,}500$

2. If cost is Rs. 80 then profit is Rs. 20

   If cost is Rs. 90,000 then profit is $\frac{20}{80} \times 90{,}000 = \text{Rs. } 22{,}500$

12.9 Joint Products and By-Products

Meaning of Joint Products and By-Products

Agricultural product industries, chemical process industries, sugar industries, and extractive industries are some of the industries where two or more products of equal or unequal importance are produced either simultaneously or in the course of processing operation of a main product.

In all such industries, the management is faced with the problems such as, valuation of inventory, pricing of product and income determination, problem of taking decision in matters of further processing of by-products and/or joint products after a certain stage etc. In fact the various problems relate to

(i) Apportionment of common costs incurred for various products and
(ii) Aspects other than mere apportionment of costs incurred up to the point of separation. Before taking up the above problems, we first define the various necessary concepts.

Joint Products - Joint products represent "two or more products separated in the course of the same processing operation usually requiring further processing, each product being in such proportion that no single product can be designated as a major product".

In other words, two or more products of equal importance, produced, simultaneously from the same process, with each having a significant relative sale value are known as joint products. For example, in the oil industry, gasoline, fuel oil, lubricants, paraffin, coal tar, asphalt and kerosene are all produced from crude petroleum. These are known as joint products.

Co-Products - Joint products and co-products are used synonymously in common parlance, but strictly speaking a distinction can be made between two. Co-products may be defined as two or more products which are contemporary but do not emerge necessarily from the same material in the same process. For instance, wheat and gram produced in two separate farms with separate processing of cultivation are the co-products. Similarly timber boards made from different trees are co-products.

By-Products - These are defined as "products recovered from material discarded in a main process, or from the production of some major products, where the material value is to be considered at the time of severance from the main product." Thus by-products emerge as a result of processing operation of another product or they are produced from the scrap or waste of materials of a process. In short a by-product is a secondary or subsidiary product which emanates as a result of manufacture of the main product.

The point at which they are separated from the main product or products is known as split-off point. The expenses of processing are joint till the split-off point.

Examples of by-products are molasses in the manufacture of sugar, tar, ammonia and benzene obtained on carbonisation of coal and glycerine obtained in the manufacture of soap.

Distinction between Joint-Product and By-Product - The main points of distinction as apparent from the definitions of Joint Products and By-Products are :

a) Joint products are of equal importance whereas by-products are of small economic value.
b) Joint products are produced simultaneously but the by-products are produced incidentally in addition to the main products.

12.10 Apportionment of Joint Costs

Joint product costs occur in many industries such as : petroleum, oil refinery, meat-making, textiles, dairy, flour mill, saw mill and many other process industries and top management of business concerns require the Accountants to give their opinion for many managerial decisions such as to process further or to sell at split-off stage. To answer this question they require apportionment of joint costs over different products produced.

The main problem faced in the case of joint products/by-products is the apportionment of the total cost incurred up to the point of separation of joint products/or by products. For costs incurred after the split off point there is no problem, as these costs can be directly allocated to individual joint products or by-products. Thus the apportionmesnt of joint costs over different products produced involves the following two cases.

1. When two or more products are simultaneously produced and there is by-product.
2. When there are both joint products and by-products.

Method of apportioning joint cost over joint products

Proper apportionment of joint cost over the Joint Products is of considerable importance, as this affects (a) Valuation of closing inventory; (b) Pricing of products; and (c) Profit or loss on the sale of different products.

The commonly used methods for apportioning total process costs up to the point of separation over the joint products are as follows :

(i) Physical Unit Method
(ii) Average Unit Cost Method
(iii) Survey Method
(iv) Contribution Margin Method
(v) Market Value Method:
  (a) At the Point of Separation
  (b) After Further Processing
  (c) Net Realisable Value,

(i) Physical Unit Method

This method is based on the assumption that the joint products are capable of being measured in the same units. Accordingly joint costs here are apportioned on the basis of some physical base, such as weight or measure expressed in gallons, tonnes etc. In other words, the basis used for apportioning joint cost over the joint products is the physical volume of material present in the joint products at the point of separation. Any loss arising during the stage of processing is also apportioned over the products on the same basis. This method cannot be applied if the physical units of the two joint products are different. The main defect of this method is that it gives equal importance and value to all the joint products.

Illustration - 9 :

A coke manufacturing company produces the following products by using 5,000 tonnes of coal @ Rs. 15 per tonne into a common process.

Coke	3,500	tonnes
Tar	1,200	tonnes
Sulphate of ammonia	52	tonnes
Benzol	48	tonnes

Apportion the joint cost amongst the products on the basis of the physical unit method.

Solution:

	Products					
	Coke	Tar	Sulphate of Ammonia	Benzol	Wastage	Total
Output (in tonnes)	3,500	1,200	52	48	200	5,000
Wastage (in tonnes) (apportioned on the basis of weights)	146	50	2	2	200	
Total weight (in tonnes)	3,646	1,250	54	50		5,000
Joint Cost (in Rs.) @ Rs. 15 per tonne	54,690	18,750	810	750		75,000

Note : 1. Apportionment of wastage of 200 tonnes over the four products is as follows:

Coke : $\frac{200}{4800} \times 3{,}500$ tonnes = 146 tonnes

Tar : $\frac{200}{4800} \times 1{,}200$ tonnes = 50 tonnes

Sulphate of ammonia = 2 tonnes

Benzol = 2 tonnes

(ii) Average Unit Cost Method

Under this method, total process cost (upto the point of separation) is divided by total units of joint products produced. On division average cost per unit of production is obtained.

Average unit cost=

Total process cost (upto the point of separation)/Total units of joint product produced.

This is a simple method. The effect of application of this method is that all joint products will have uniform cost per unit. If this method is used as the basis for price fixation, then all the products may have more or less the same price. Under this method customers of high quality items are benefitted as they have to pay less price on their purchase.

Illustration 10:

Find out the cost of joint products A, B and C using average unit cost method from the following data:

(a) Pre-separation Joint Cost Rs. 60,000.

(b) Production data:

Products	Units produced
A	500
B	200
C	300
	1,000

The joint costs apportioned @ Rs. 60 are as follows :

Solution:

Products	Units	Costs per unit	Value
A	500	Rs. 60	Rs. 30,000
B	200	Rs.60	Rs. 12,000
C	300	Rs.60	Rs. 18,000
			Rs. 60,000

(iii) Survey Method

This method is also known as point value method. It is based on technical survey of all the factors involved in the production and distribution of products. Under this method joint cost are apportioned over the joint products, on the basis of percentage/point values, assigned to the products according to their relative, importance. The percentage or points used for the purpose are usually computed by management with the help of technical advisers. This method is considered to be more equitable than other methods.

(iv) Contribution Margin Method

According to this method, joint costs are segregated into two parts - variable and fixed.

The variable costs are apportioned over the joint products on the basis of units produced (average method) or physical quantities. In case the products are further processed after the point of separation, then all variable cost incurred be added to the variable costs determined earlier. In this way total variable cost is arrived which is deducted from their respective sales values to ascertain their contribution.

The fixed costs are then apportioned over the joint products on the basis of the contribution ratios.

Illustration - 11:

Find out the cost of joint products A and B using contribution margin method from the following data:

Sales

A: 100 kg @ Rs.60 per kg

B: 120 kg @ Rs. 30 per kg
Joint costs
Marginal cost Rs. 4,400
Fixed cost Rs. 3,900

Solution:

The marginal cost (variable cost) of Rs. 4,400 is apportioned over the joint products A and B in the ratio of their physical quantity i.e 100 :120

Marginal cost for Product A: $\text{Rs.}440 \times \frac{100}{220} = \text{Rs. } 2{,}000$

Marginal cost for Product B : $\text{Rs. } 4{,}400 \times \frac{120}{220} = \text{Rs. } 2{,}400$

The fixed cost of Rs. 3,900 is apportioned over the joint products A and B in the ratio of their contribution margin i.e. 40:12
(Refer to working note)

Product A : Rs. 3,900 x 40/52 = Rs. 3,000
Product B : Rs. 3,900 x 12/52 = Rs. 900

Working Note:

Computation of contribution margin ratio

Products	Sales revenue (Rs.)	Marginal cost (Rs.)	Contribution (Rs.)
A	6,000	2,000	4,000
B	3,600	2,400 (Refer to above)	1200

Contribution ratio is 40 :12

(v) Market Value Method

This is the most popular and convenient method because it makes use of a realistic basis for apportioning joint costs. Under this method joint costs are apportioned after ascertaining "what the traffic can bear". In other words, the products are made to bear a proportion of the joint cost on the basis of their ability to absorb the same. Market value means weighted market value i.e. units produced $\times$ price of a unit of joint product.

(a) Market Value at the Point of Separation: This method is used for the apportionment of joint costs to joint products upto the split off point. It is difficult to apply this method if the market value of the products at the point of separation are not available. It is a useful method where further processing costs are incurred disproportionately.

To determine the apportionment of joint costs over joint products, a factor known as multiplying factor is determined. This multiplying factor on multiplication with the sales values of each joint product gives rise to the proportion of joint cost. For example, a concern incurs a joint cost of Rs. 64,500 in producing two products A (200 units), B (200 units) and earns a sales revenue of Rs. 86,000 by selling @ Rs. 170 per unit of product A and B @ Rs. 260 per unit of product B. The multiplying factor in this case is obtained by dividing the total joint cost by total sales revenue and finally multiplying the figure so obtained by 100. The multiplying factor based on the data can be computed as follows:

Multiplying factor: $\frac{\text{Rs. } 64,000}{\text{Rs. } 86,000} \times 100 = 75\%$

Joint cost apportioned over product A = Sales revenue of product A x 75%
= Rs. 34,000 × 75%
= Rs. 25,500

Joint cost apportioned over product B = Sales revenue of product B x 75%
= Rs. 52,000 x 75%
= Rs. 39,000

Alternatively - This joint cost may be apportioned in the ratio of sales values of different joint products.

(b) Market Value after Processing: Here the basis of apportionment of joint cost is the total sales value of finished products and involves the same principle as discussed in (a) above. Suppose that in the example given in Part (a) above, if sales prices of products A and B after further processing is Rs. 200 and Rs. 300 respectively the joint cost apportioned over Products A and B is as follows :

The pre-separation costs of Rs. 64,500 will be apportioned in the ratio of (2 : 3) as follows: Market sales value after further processing

		Rs.
A : 200 units * Rs. 200	=	40,000
B : 200 units * Rs. 300	=	60,000
		1,00,000

Joint Cost apportioned :

$$A = \text{Rs. } 64,500 \times \frac{\text{Rs. } 40,000}{\text{Rs. } 1,00,000} = \text{Rs. } 25,800$$

$$B = \text{Rs. } 64,500 \times \frac{\text{Rs. } 60,000}{\text{Rs. } 1,00,000} = \text{Rs. } 38,700$$

The use of this method is unfair where further processing costs after the point of separation are disproportionate or when all the joint products are not subjected to further processing. The net realisable value method which is discussed as below overcomes the shortcoming of this method.

(c) Net Realisable Value Method: From the sales value of the joint products (at finished stage) are deducted :

(i) estimated profit margins,

(ii) selling and distribution expenses, if any, and

(iii) post-split off costs.

The resultant figure so obtained is known as net realisable value of joint products. Joint costs are apportioned in the ratio of net realisable value. Suppose that in the example given in part (a) above if further processing costs for products A and B are Rs. 4,000 and Rs. 32,000 respectively the Joint cost may be apportioned to products A and B as follows:

Products	Sales revenue (Rs.)	Further processing cost (Rs.)	Net realisable value (Rs.)	Joint cost apportioned ratio
	(a)	(b)	(c)=(a)-(b)	
A	34,000	4,000	30,000	3/5
B	52,000	32,000	20,000	2/5

Joint cost apportioned over product A = Rs. 64,500 x 3/5 = Rs. 38,700

Joint cost apportioned over product B = Rs. 64,500 x 2/5 = Rs. 25,800

This method is extensively used in many industries.

Illustration - 12:

Inorganic Chemicals purchases salt and processes it into more refined products such as Caustic Soda, Chlorine and PVC. In the month of July, Inorganic Chemicals purchased Salt for Rs. 40,000. Conversion of Rs. 60,000 was incurred up to the split off point, at which time two sealable products were produced. Chlorine can be further processed into PVC.

The July production and sales information is as follows:

	Production(tonnes)	**Sales quantity(tonnes)**	**Selling price(per tonnes)**
Caustic Soda	1,200	1,200	Rs. 50
Chlorine	800	—	—
PVC	500	500	Rs. 200

All 800 tonnes of Chlorine were further processed, at an incremental cost of Rs. 20,000 to yield 500 tonnes of PVC. There was no beginning or ending inventories of Caustic Soda, Chlorine or PVC in July.

There is active market for Chlorine. Inorganic Chemicals could have sold all its July production of Chlorine at Rs. 75 per tonne.

Required:

(1) To calculate how joint cost of Rs. 1,00,000 would be apportioned between Caustic Soda and Chlorine under each of following methods :
   (a) Sales value at split off,
   (b) Physical measure (method), and
   (c) Estimated net realisable value.

(2) Lifetime Swimming Pool Products offers to purchase 800 tonnes of Chlorine in August at Rs. 75 per tonne. This sale of Chlorine would mean that no PVC would be produced in August. How the acceptance of this offer for the month of August would affect operating income?

Solution :

(a) Sales value at split off method

Products	Sales in tonnes (a)	Selling price per tonne (Rs.) (b)	Sales Joint revenue (Rs.) (c)=(a) x (b)	Cost Apportioned* (Rs.)
Caustic Soda	1,200	50	60,000	50,000
Chlorine	800	75	60,000	50,000
			1,20,000	1,00,000

$$\text{Apportioned joint cost} = \frac{\text{Total joint cost}}{\text{Total sale value}} \times \text{sale revenue of each product}$$

$$\text{Joint cost apportioned to Caustic Soda} = \frac{\text{Rs.}1,00,000}{\text{Rs.}1,20,000} \times \text{Rs. } 60,000 = \text{Rs. } 50,000$$

$$\text{Joint cost apportioned to Chlorine} = \frac{\text{Rs.}1,00,000}{\text{Rs.}1,20,000} \times \text{Rs. } 60,000 = \text{Rs. } 50,000$$

(b) Physical measure method

Products	**Sale in (tonnes)**	**Joint cost apportioned ****
Caustic Soda Chlorine	1,200	60,000
	800	40,000
	2,000	1,00,000

**Apportioned joint cost =

$$\frac{\text{Total joint cost}}{\text{Tota physical value}} \times \text{Physical units of each product}$$

$$\text{Joint cost apportioned to Caustic Soda} = \frac{\text{Rs.}1,00,000}{2,000} \times 1,200 \text{ tones} = \text{Rs.}60,000$$

$$\text{Joint cost apportioned to Chlorine} = \frac{\text{Rs.}1,00,000}{2,000} \times 800 \text{ tones} = \text{Rs.}40,000$$

(c) Estimated net realisable value method

Products	Sales in Tonnes (a)	Selling price Tonne (Rs.) (b)	Sales Joint revenue (Rs.) (c)=(a) - (b)	Cost Apportioned* (Rs.)
Caustic Soda (1,200 tonnes x Rs. 50)	60,000	—	60,000	42,857
Chlorine	1,00,000 (500 tonnes of PVC x Rs. 200)	20,000	80,000	57,143
			1,40,000	1,00,000

**Apportioned joint cost $= \frac{\text{Total joint cost}}{\text{Total net realisable value}} \times \text{Net realisable value of each product}$

Apportioned joint cost for Caustic $= \frac{\text{Rs.}1,00,000}{\text{Rs.}1,40,000} \times \text{Rs.}60,000 = \text{Rs.}42,857$

Apportioned joint cost for Chlorine $= \frac{\text{Rs.}1,00,000}{\text{Rs.}1,40,000} \times \text{Rs.}80,000 = \text{Rs.}57,143$

2. Incremental revenue from further

processing of Chlorine into PVC	Rs. 40,000
(500 tonnes x Rs. 200 - 800 tonnes x Rs. 75)	
Less: Incremental cost of further processing of Chlorine into PVC	Rs. 20,000
Incremental operating income from further processing	Rs. 20,000

The operating income of Inorganic Chemicals will be reduced by Rs. 20,000 in August if it sells 800 tonnes of Chlorine to Lifetime Swimming Pool Products, instead of further processing of Chlorine into PVC for sale.

Illustration - 13:

Sunmoon Ltd. produces 2,00,000 : 30,000; 25,000; 20,000 and 75,000 units of its five products A, B, C, D and E respectively in a manufacturing process and sells them at Rs. 17, Rs. 13, Rs. 8, Rs. 10 and Rs. 14 per unit. Except product D remaining products can be further processed and then can be sold at Rs. 25, Rs. 17, Rs. 12 and Rs. 20 per unit in case of A, B, C and E respectively.

Raw material costs Rs. 35,90,000 and other manufacturing expenses cost Rs. 5,47,000 in the manufacturing process which are absorbed on the products on the basis of their 'Net realisable value'. The further processing costs of A, B, C and E are Rs. 12, 50,000; Rs. 1,50,000; Rs. 50,000 and Rs. 1,50,000 respectively. Fixed costs are Rs. 4,73,000.

You are required to prepare the following in respect of the coming year:

(a) Statement showing income forecast of the company assuming that none of its products are to be further processed.

(b) Statement showing income forecast of the company assuming that products A, B, C and E are to be processed further.

Can you suggest any other production plan whereby the company can maximise its profits? If yes, then submit a statement showing income forecast arising out of adoption of that plan.

Solution:

Working Note:

Statement showing apportionment of joint costs on net realisable value basis

Products	Sales value	Post separation	Net realisable value	Apportioned joint costs
	(1)Rs.	(2)Rs.	(1)-(2)=(3)Rs.	(4)Rs.
A	50,00,000 (2,00,000 units * Rs. 25)	12,50,000	37,50,000	26,25,000
B	5,10,000 (30,000 units xRs. 17)	1,50,000	3,60,000	2,52,000
C	3,00,000 (25,000 units xRs. 12)	50,000	2,50,000	1,75,000
D	2,00,000 (20,000 units * Rs. 10)	—	2,00,000	1,40,000
E	15,00,000 (75,000 units * Rs. 20)	1,50,000	13,50,000	9,45,000
			59,10,000	41,37,000

Total joint cost = Raw material costs + Manufacturing expenses

= Rs. 35,90,000 + Rs. 5,47,000 = Rs. 41,37,000

$$\text{Apportioned joint cost} = \frac{\text{Total joint cost}}{\text{Total net realisable value}} \times \text{Net realisable value of each product}$$

$$\text{Apportioned joint cost for Product A} = \frac{\text{Rs.}41,37,000}{\text{Rs.}59,10,000} \times \text{Rs.}37,50,000 = 26,25,000$$

Similarly, the apportioned joint cost for products B, C, D and E are Rs. 2,52,000; Rs. 1,75,000; Rs. 1,40,000 and Rs. 9,45,000 respectively.

(a) Statement showing income forecast of the company assuming that none of its products are further processed

	Products					
	A Rs.	B Rs.	C Rs.	D Rs.	E Rs.	Total Rs.
Sales revenue	34,00,000 (2,00,000 Units x Rs. 17)	3,90,000 (30,000 Units x Rs. 13)	2,00,000 (25,000 Units x Rs. 8)	2,00,000 (20,000 units * Rs. 10)	10,50,000 (75,000units Units x Rs. 14)	52,40,000
Less: Apportioned joint cost	26.25.000	2.52.000	1.75.000 (Refer to working note)	1.40.000	9.45.000	41.37.000
Excess of revenue over joint cost of manufacturing	7,75,000	1,38,000	25,000	60,000	1,05,000	11,03,000
Less: Fixed cost						4,73,000
Profit						6,30,000

(b) Statement showing income forecast of the company: assuming that products A, B, C and E are further processed (Refer to working note)

	Products					
	A	B	C	D	E	Total
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Sales revenue (X)	50,00,000	5,10,000	3,00,000	2,00,000	15,00,000	75,10,000
Apportioned joint cost: (Y)	26,25,000	2,52,000	1,75,000	1,40,000	9,45,000	41,37,000
Further processing cost: (Z)	12,50,000	1,50,000	50,000	—	1,50,000	16,00,000
Total manufacturing cost: (K)=(Y)+(Z)	38,75,000	4,02,000	2,25,000	1,40,000	10,95,000	57,37,000
Excess of sales revenue over total manufacturing cost: [(X)-(K)]	11,25,000	1,08,000	75,000	60,000	4,05,000	17,73,000
Less: Fixed cost						4,73,000
Profit						13,00,000

12.11 Suggested Production Plan for Maximising Profits

On comparing the figures of excess of revenue over cost of manufacturing in the above statements one observes that the concern is earning more after further processing of A, C and E products but is losing a sum of Rs. 30,000 in the case of product B (if it is processed further). Hence the best production plan will be to sell A, C and E after further processing and B and D at the point of split off. The profit statement based on this suggested production plan is as below:

Profit statement based on suggested production plan

	Products					
	A	B	C	D	E	Total
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	2	3	4	5	6	7
Sales revenue: (X)	50,00,000	3,90,000	3,00,000	2,00,000	15,00,000	73,90,000
Apportioned joint cost: (Y)	26,25,000	2,52,000	1,75,000	1,40,000	9,45,000	41,37,000
Further processing cost: (Z)	12,50,000	-	50,000	-	1,50,000	14,50,000
Total manufacturing cost: (K)=(Y)+(Z)	38,75,000	2,52,000	2,25,000	1,40,000	10,95,000	55,87,000
Excess of sales revenue over manufacturing cost [(X) - (K)]	11,25,000	1,38,000	75,000	60,000	4,05,000	18,03,000
Less: Fixed cost						4,73,.000
Profit						13,30,000

Methods of apportioning joint cost over by-products

The following methods may be adopted for the accounting of by-products and arriving at the cost of production of the main product:

(a) Market Value or Value on Realisation: The realisation on the disposal of the by-product may be deducted from the total cost of production so as to arrive at the cost of the main product. For example, the amount realised by the sale of molasses in a sugar factory goes to reduce the cost of sugar produced in the factory.

When the by-product requires some additional processing and expenses are incurred in making it saleable to the best advantage of the concern, the expenses so incurred should be deducted from the total value realised from the sale of the by-product and only the net realisations should be deducted from the total cost of production to arrive at the cost of production of the main product. Separate accounts should be maintained for collecting additional expenses incurred on:

(i) further processing of the by-product, and
(ii) selling, distribution and administration expenses attributable to the by-product.

(b) Standard Cost in Technical Estimates: By-products may be valued at standard costs. The standard may be determined by averaging costs recorded in the past and making technical estimates of the number of units of original raw material going into the main product and the number forming the by-product or by adopting some other consistent basis.

This method may be adopted where the by-product is not saleable in the condition in which it emerges or comparative prices of similar products are not available.

(c) Comparative Price: Under this method, the value of the by-product is ascertained with reference to the price of a similar or an alternative material.

Suppose in a large automobile plant a blast furnace not only produces the steel required for the car bodies but also produces gas which is utilised in the factory. This gas can be valued at the price which would have been paid to a gas company if the factory were to buy it from outside sources.

(d) Re-use Basis: In some cases the by-product may be of such a nature that it can be reprocessed in the same process as part of the input of the process. In that case the value put on the by-product should be same as that of the materials introduced into the process. If, however, the by-product can be put into an earlier process only, the value should be the same as for the materials introduced into the process.

Treatment of By-Product Cost in Cost-Accounting

By-product cost can be dealt in cost accounting in the following ways:

(a) When They are of Small Total Value: When the by-products are of small total value, the amount realised from their sale may be dealt in any one the following two ways :

1. The sales value of the by-products may be credited to the Profit and Loss Account and no credit be given in the Cost Accounts. The credit to the Profit and Loss Account here is treated either as miscellaneous income or as additional sales revenue.
2. The sale proceeds of the by-product may be treated as deductions from the total costs. The sale proceeds in fact should be deducted either from the production cost or from the cost of sales.

(b) When the By-Products are of Considerable Total Value: Where by-products are of considerable total value, they may be regarded as joint products rather than as by-products. To determine exact cost of by-products the costs incurred upto the point of separation, should be apportioned over by-products and joint products by using a logical basis. In this case, the joint costs may be divided over joint products and by-products by using relative market values; physical output method (at the point of split off) or ultimate selling prices (if sold).

(c) Where They Require Further Processing: In this case, the net realisable value of the by-product at the split-off point may be arrived at by subtracting the further processing cost from the realisable value of by-products.

If total sales value of by-products at split-off point is small, it may be treated as per the provisions discussed above under (a).

In the contrary case, the amount realised from the sale of by-products will be considerable and thus it may be treated as discussed under (b).

(Students must solve a large number of questions from process costing so as to acquire the required proficiency in the area).

12.12 Summary

Process Costing:- Used in industries where the material has to pass through two or more processes for being converted into a final product

Operation Costing:- It is the refinement of process costing. It is concerned with the determination of the cost of each operation rather than the process.

Treatment of Losses in process costing:-

(i) **Normal process loss -** The cost of normal process loss is absorbed by good units produced under the process. The amount realised by the sale of normal process loss units should be credited to the process account.

(ii) **Abnormal process loss -** The total cost of abnormal process loss is credited to the process account from which it arise, the total cost of abnormal process loss is debited to costing profit and loss account.

Abnormal gain- The process account under which abnormal gain arises is debited with the abnormal gain and credited to Abnormal gain account which will be closed by transferring to the Costing Profit and loss account.

Equivalent production units: This concept use in the industries where manufacturing is a continuous activity. Converting partly finished units into equivalent finished units.

Equivalent production means converting the incomplete production units into their equivalent completed units.

Equivalent completed units = {Actual number of units in the process of manufacture} x {Percentage of work completed}

Valuation of work-in-progress : three methods:

(1) First-in-First Out (FIFO) method.

(2) Last-in-First Out (LIFO) method.

(3) Average Cost method (or weighted average cost method).

Inter-process Profits: The output of one process is transferred to the next process not at cost but at market value or cost plus a percentage of profit. The difference between cost and the transfer price is known as inter-process profits.

Joint Products - Two or more products of equal importance, produced, simultaneously from the same process, with each having a significant relative sale value are known as joint products.

Co-Products - Two or more products which are contemporary but do not emerge necessarily from the same material in the same process.

By-Products - "products recovered from material discarded in a main process, or from the production of some major products

12.12 Self Assessment Question

Short Answer Type Questions

1. Define and explain the terms "Joint Products" and "By-products". Enumerate the methods which may be employed in costing joint products.

2. Explain briefly the methods of accounting for by-products.

3. Distinguish between:

   (i) Joint product and By-product
   (ii) Abnormal loss and abnormal gain.

4. How would you deal with by-products in costing :

   (i) Where they are of small total value?
   (ii) Where they are of considerable total value? (iii) Where they require further processing?

5. Describe briefly the various ways of valuing work-in-progress in process costing.

Long Answer Type Questions

1. Describe the general features of process costing. How is unit cost determined in process costing?

2. What is meant by operation costing? Is it different from process costing?

3. What do you understand by the terms, "normal process loss" and "abnormal process loss"? How is the value of abnormal process loss determined?

4. What is meant by abnormal gain in process costing? How is it dealt with in Cost Accounting?

5. What do you understand by the term "inter-process profits"? What is the utility of transferring the output of one process to another process at more than cost?

Numerical Questions :

1. A product passes through three processes, A, B, and C. The normal wastage of each process is as follows : Process A-3%m Process B-5% and Process C-8%.

The wastage of process A was sold at 0.25 p. per unit, that of process B at 0.50 p. per unit, and that of process C, at Re. 1 per unit. 10,000 units were issued to the Process A in the beginning of October 1998 at a cost of Re. 1 per unit. The other expenses were:

	Process A	Process B	Process C
Sundry materials	Rs. 1,000	Rs. 1,500	Rs. 500
Labour	5,000	8,000	6,500
Direct expenses	1,050	1,188	2,000
Actual output (units)	9,500	9,100	8,100

Prepare the Process accounts, assuming that there were no opening or closing stocks. Also give the Abnormal Wastage and the Abnormal Gain Accounts.

Ans: Process A Ab. wastage Rs. 350, Process B Ab. Gain Rs. 225, Process C Ab. wastage Rs. 272.

2. In a manufacturing unit, raw materials passes through four processes I, II, III & IV and the output of each process is the input of the subsequent process. The loss in the four processes I, II, III & IV are respectively 25%, 20% and 16-2/3% of the input. If the end product at the end of Process IV is 40,000 Kg. what is the quantity of raw material required to be fed at the beginning of Process I and the cost of the same at Rs. 5 per Kg.?

   Find out also the effect of increase or decrease in the material cost of the end product for variation of every rupee in the cost of raw material.

   Ans: For every increase or decrease in the material cost, the cost of the end product would increase/ decrease by 2.5 times.

3. In a certain period 300 units of main product are produced and 200 units are sold at Rs. 30 per unit. The by-product emerging from the main product is sold at Rs. 600. The total cost of production of 300 units is Rs. 4,500. Calculate the amount of gross profit after crediting by-product value (a) to the cost of production and (b) to cost of sales.

   Ans: Rs. 3,400, Rs. 3,600.

4. The following information is given about two products produced jointly upto a stage.

Joint cost	(Rs)	40,000
Number of units of Product	A	2,000
	B	600
Selling price (Rs.)	A	30
	B	25
Special (separate) expenses (Rs.)	A	8,000
	B	3,000

   Ascertain the profit earned in total and by each product.

   Ans: Total profit Rs. 24,000 : A Rs. 20,000 or Rs. 19,500; B, Rs. 4,000, Rs. 4,500.

5. A factory producing article P also produces a by-product Q which is further processed into a finished product. The cost of manufacture is given below:

Subsequent Cost

	Joint Costs (Rs.)	P(Rs.)	Q (Rs.)
Material	5,000	3,000	1,500
Labour	3,000	1,400	1,000
Overheads	2.000	600	500
10.000	5.000	3.000	

Selling Price Are P : Rs. 16,000, and Q : Rs. 8,000

Estimated profit on selling prices are 25% for P and 20% for Q. Assume that selling and distribution expenses are in proportion of the sale prices. Show how you would apportion joint costs of manufacture and prepare a statement showing cost of production of P and Q.

Ans: P. Rs. 11,733 ;Q. Rs. 6,267

6. X Ltd. manufactures product A, which yields two by-products B and C. In a period, the amount spent upto the point of separation was Rs. 20,000. Subsequent expenses were :

A	8	C		
Rs.	Rs.	Rs.		
Materials	250	180	60	
Direct wages	500	300	120	
Overheads	840	300	180	
Total	1,100	7	80	360
Gross sale value	15,200	10,000	5,100	

It was estimated that profit as a percentage of sales of B and C would be 25% and 15% respectively. Ascertain the profit earned on A.

Ans: Rs. 4,795.

12.14 Reference Books

- K.L. Narang and Jain, SP, 'Cost Accounting', Kalyani Publisher, New Delhi.
- Tulsian PC, 'Practical Costing', Vikas Publisher, New Delhi
- Maheswari S.N., 'Advance Problem and Solutions in Cost Accounting', Sultanchand and Sons, New Delhi
- Arora M.N., 'Cost Accounting Principle and Practice', Vikas Publisher, New Delhi
- Maheswari and Mittal, 'Cost Accounting' Mahaveer Prakashan, New Delhi
- Oswal and Maheswari, 'Cost Accounting' Ramesh Book Depot, Jaipur (Raj.)
- Agarwal M.L., 'Cost Accouating', Sahitya Bhawan Publisher, Agra (UP)
- Khan M.Y. and P.K., 'Management Accounting', Tata Mcgraw hill Publisher, New Delhi
- Horngren, Charles, Foster and Data, 'Cost Accounting - A Managerial Emphasis', Prentice Hall of India, New Delhi
- Jain, Khendelwal and Pareekh, 'Cost Accounting', Ajmer Book Company, Jaipur

Unit - 13 : Nature and Scope of Management Accounting

Structure of Unit:

13.0 Objectives

After completing this unit, you will be able to understand that:

- Management Accounting is the accounting service to the management.
- It helps the management to assist in the execution of determination of policies, planning, decision-making and co-ordinating functions.

13.1 Introduction

Word "Management Accounting" is formed by joining two words Management + Accounting. Management has been defined differently by various scholars but planning, organizing, directing and controlling are included in it whereas accounting means recording of facts. This way we can say that management accounting is a process which increases the managerial efficiency. It is one of the tools used for increasing the managerial efficiency. Though the instruments used in management accounting are taken from the financial accounting or the financial books but its objective is not to clarify the past position instead its job is to forecast the future activities by using the information which can help in taking bold and scientific management decisions. The main aim of management accounting is to help in formulation of corporate planning for affecting the attention of management towards future plans and continuously comparing the expected aid actual results for increasing the managerial efficiency.

Management Accounting keeps a regular check on internal control and establishes balance, constant diagnose of the mistakes and motivates the management to improve over them. Whereas financial accounting is historical in nature i.e., it accounts only the past facts and information on the other hand management accounting tries to look into the future. The calibre of financial accounting is shown in the presentation of financial statements in the purest form, whereas the capability of management accounting is depicted in close examination of future activities.

Definitions of Management Accounting-It had been defined differently by various scholars of the field. Some of the famous and broadly accepted defections of Management Accounting are as under:

"Management Accounting is the adaptation and analysis of accounting information, and its diagnosis and explanation in such a way as to assist management" – **T. G. Rose**

"Management Accounting is concerned with accounting information, that is useful to management" **- Robert N. Anthony**

"Management Accountancy is the presentation of accounting information in such a way as to assist management in the action of policy and in day-to-day operation of undertakings **-Anglo-American Council of Productivity**

"Any form of accounting which enables a business to be conducted mode efficiently can be regarded as management accountancy". **- Institute of Chartered Accountants, England**

"Management Accounting is the term used to describe the accounting methods, systems and techniques, which coupled with special knowledge and ability, assist management in its task of maximising profits or minimizing losses"**- J. Batty**

"Management Accounting is the application of appropriate techniques and concepts in processing the historical and projected economic data of any entity to assist management in establishing a plan for reasonable economic objectives and in the making of rational decisions with a view toward achieving these objectives." **-Report of tie. Committee- on Management Accounting**, Accounting Review, April 1959 (American Management Association)

''Management accounting can be defined as the art of presenting to management such figures, whether in terms of money or other units, as will assist management to do its job." **-Bostock**

From the above definition it is clear that the corporate organizations used to take help of management accounting for running in a smooth way. Some part of such information is derived from financial statements and rest comes from other statements. The main purpose of financial statements is to provide information to external parties like shareholders, creditors and government. The rules, techniques and basis on which the financial data of the organization should be collected and presented, are decided mostly keeping in view the requirements of these parties.

But most of the information important for the outer world is not of any use for management. Therefore, management accounting creates such information, which can be used by the management and increases the management efficiency. In short, we can say that in management accounting financial and other information is presented in intelligent and informative way through the use of some specific ways, techniques and procedures such that the available information shall be able to understand and solve the problems of management to a great extent.

13.2 Nature of Management Accounting

Management accounting comprises of various financial and non-financial data, subjects, procedures, formats and other related facts.

Information in business is gathered for various purposes and used with a little difference in various statements. The most important of these statements are financial statements, cost statements and statistical analysis. But the work of management accounting is not only to collect the historical facts because these facts tell only what happened? They docs not throw light on what should be? Thus for getting expected results some

standards have to be set. Check can be kept on efficiency by composing the expected and actual results. Standard costing and budgetary control are based on the standards set. .

In management accounting system there is a necessity of Amendment in the traditional approach of not giving emphasis on the improvement in managerial efficiency and just looking into the balancing of financial books. But in management accounting, the management accountant generates such information, based on his knowledge and experiences, which helps the managers in the decision-making process. The nature of management accounting can be studied on the basis of following characteristics:

(1) **Management Accounting is related with Future-** In management accounting, the forecasts about the future are prepared. The actual results are compared with these forecasts. This helps the management in effective controlling. It include budgetary control, standard costing etc in management accountancy. In all these methods facts relating to future are studied, thus we say management accounting is related with future.

(2) **Management Accounting is of a Selective Nature-** In management accounting the most profitable and best alternative is chosen after analysis and comparative study of various alternatives. In the same way, only selected information is presented to the management. Thus at every stage it requires selection and presentation of necessary information to the management, therefore management accounting is selective in nature

(3) **Established Financial Accounting Rules are not followed in Management Accounting-**The work of management accountant is, to increase the efficiency. For this purpose, he can frame his own rules different from that of set rules on the basis of his logic, knowledge, experience and imagination and creates an information system which can serve the cause. Therefore it is more appropriate to say that there are no set of rules for management accounting.

(4) **Management Accounting Furnishes Facts and Not the Decisions-**The management accountant only collects and analyses the data and presents it to the management. He does not take any decision over it. Decision-making is in the preview of management and he helps in decision making.

(5) **In Management Accounting Special Emphasis is Laid on Cause and its Effect-** In management accounting not only the results are seen but also attempt is made to understand that the result is affected with what factors and how it can be improved. For Example, in financial accounting only profit is calculated but in management accounting it is studied that why the profit remains at certain level and what will be its effect on the health of the enterprise and how it can be increased.

(6) **Emphasis is Placed on the Study and Analysis of the Nature of Elements of Cost-**The study of cost elements is of great importance in management accounting.

Total cost can be distributed in various parts such as variable cost, fixed cost and semi-variable cost. In management accounting this classification has an important place.

For taking managerial decisions, marginal costing, cost volume-profit analysis, variance analysis etc. are used, which are based on this classification

(7) **Service Function** -Management accounting is a service function through which, the information necessary for deciding policies of the organisation and taking decisions is provided on time These information can be related to cost, price, income and profits etc..

(8) **Integrated System** - Management accounting is an integrated system of various systems, methods and techniques. In this we include cost accounts, budgetary control, financial accounts along with economics, psychology, statistics and other related subjects.

(9) **Developing Subject** - Management accounting had developed in less than 50 years and till today it has not developed fully. Its tools, methods, and systems are constantly progressing because of which it is getting more refined.

(10) **Potentiality of Development as a Profession** - It has not evolved as a profession in India, as yet. But some institutions are trying to establish it in that way. Among them the main are Institute of Chartered Accountants of India and Institute of Cost & Work Accounts of India.

13.3 Objectives of Management Accounting

The main objective of management accounting is to provide information for successfully carrying out the managerial duties. According to Henry Fayol, "To manage is to forecast and plan, to organise, to command, to co-ordinate and to control. To forecast and plan is to provide means for examining the future and drawing up the plan of action. To organise means building up the dual structure, material and human of the undertaking. To command means maintaining activity among the personal. To co-ordinate means seeing that everything occurs in conformity with established rule and express command." Management accounting helps in all the above mentioned works of management. The objectives of management Accounting is as under:

(1) **Helpful in Planning**-For the set on future goals that should be done, is called planning. For achieving the desired goals of business it is necessary for management to prepare plan of action. Management accounting gives an ample help in this cause of management. The forecast of production, sale, purchase, capital, investment and cash etc. helps the management in framing a profitable plan for future. The best alternative is chosen by the managers with the help of management accounting.

(2) **Helpful in Organising**-Every management tries to unite its organization and departments in the best possible way. The distribution of authorities and responsibilities of carrying out the plans comes under the organizing. Management accounting helps into this by emphasizing more on the budget and cost centres.

The responsibilities can be divided easily on the basis of budget and cost centres and by calculating the rate of return on investment made in each cost centre, the profitability and effectiveness of each can be checked. On the basis of investigation the weak areas can be strengthen. The employees remain conscious and work properly due to the constant investigation through the system and methods of management accounting. .

(3) **Helpful in Co-ordination** - Every manager tries to establish co-ordination between the activities carried out under him so that organization can prove to be more profitable and efficient. Management accounting helps the management in this work. For example, there should be a co-ordination between production and sale, according to estimated production the raw material, finance and labour should be available. This co-ordination is facilitated by budgetary control system.

(4) **Helpful in Communication**- By communication, we mean the transfer of information between the employees of the organization (Managers and Labourers) and among the organization and external Institutions like customers, creditors, suppliers, government etc. For correct and immediate communication the management should have up to date information. Through management accounting the daily reports can be presented in form of reports. The yearly performance can be presented in the form of final accounts and yearly reports. Through the cost accountancy, the cost of production,

operations and processes can be known and it can be presented to management in the form of details. For keeping the employees informed memos, circulars and notices can be prepared. For taking any solid decision, information remains the base. For this proper explanation and interpretation of information is required and management accounting helps in the smooth flow of this.

(5) **Helpful in Controlling-** Controlling means the comparison of actual and expected results and taking the corrective action wherever the intolerable deviations are found. In managerial tasks, controlling comes on front seat. Various techniques are employed by management accountant to have a better control mechanism. Through standard and overhead costs and budgetary control, control is kept on various activities and departments.

(6) **Helpful in Motivating Employees-**Every manager tries to make his subordinates: a loyal employee. For this a good leadership is required, and good leadership is possible only if correct information are available. This is taken care of by the management accounting and the management accountant keeps on increasing the knowledge of management by providing adequate and timely information. This keeps the self-confidence of the managers at high levels and they lead better.

(7) **Helpful in Analysis and Interpreting the Financial Information-**This is again one of the main objectives of management accounting. Accounting is a technical subject. Management is not expected to understand the minute details of it. Thus it is the responsibility of management accountant to interpret this information and present it in most new technical form so that it could be understood by each and every one. For this, graphs and diagrams etc. are used.

(8) Helpful in Decision-Making-The most important part of management is decision-making. Decision means choosing the best out of the rest. Management has to take various decisions in business. For taking decision on complex matters, It is the responsibility of management accountant to present the data and information various possible alternatives. Various tools and techniques are available for this purpose.

(9) **Helpful in Reporting**-The most important work of management accountant is to provide data and contents to the management for tacking important decisions. This work is done through reports. Various departmental heads pass on the operation reports of their departments to the top management. In this job, management accounting plays a major role.

(10) **Helpful in Fixing Responsibility**-With the help of management accounting techniques the responsibility centres are formed in the undertaking, which fixes responsibility of particular person for a particular work.

13.4 Scope of Management Accounting

In management accounting the accounting information is collected and presented in such a way that it can be used to carry out day to day operations in a better way. Management accounting reports should be presented in such a way and intervals that it is most useful for the management. The subject matter of management accounting is the past, present and future activities of any organization. The past records are used to know the difference between the standards and the actual results? What were the reasons for such differences and were they important? Analysis of present situations is done to know that whether the present activities are being carried out in accordance with the standards? Is there a need of improvement in them and if required the undesirable activities should be rectified immediately to save the organization from losses? The future

forecast is made just to make fool proof future plans and activities shall be carried out accordingly? To decide what is to be done in future is called planning. For planning the analysis of present and past only, is not sufficient. It is necessary to peep in future. In short, in the management accounting the past, present and future related financial and other facts are collected, classified, arranged and analysed with such systems, methods and techniques so that to help the management in understanding, solving and taking decisions about management problems.

This way the preview of management accounting is too vast and includes various aspects of business operations. Following subjects are included in management accounting:-

(1) Financial Accounting- It is the general accounting which includes the primary record of transactions, ledger posting and finding out the balances. After this, final accounts are prepared, which show the profit & loss of the business and the balance sheet shows the position as on that date. The financial accounting forms the basis of details and reports to be presented under the management accounting; without them, management accounting cannot establish control and co-ordination over the activities.

(2) Cost Accounting-It is one of the branches of accounting. It is the process and technique of knowing the cost. The effective planning, decisions and control are the basic work of management accounting and its tools are standard costing, budgetary control, marginal costing etc.

(3) Budgeting and Forecasting-Budgeting means planning, policies and goals for a specified future time. All this work is done on the basis of business forecasting. The responsibilities for various departments of organisation and their goals are pre-decided and the actual performance is known by comparing actual with standard.

(4) Statistical Methods -statistical tools like graphs, charts, tables, index numbers etc. make the presentation of information more attractive. Various methods of statistics are helpful for forecasting purposes.

(5) Inventory Control – The material from the time of procurement till the time of its consumption, remains under control and that is called as inventory control. It is important because a huge amount is spent on the materials. Management needs to decide maximum stock level, minimum stock level, re-order level and other things. The study of inventory control is very useful for the management.

(6) Interpretation of Data-The analysis and interpretation of financial statements is very necessary. The comparison of financial statements can be made with that of previous years or with the other related firms.

(7) Tax Planning and Management- In present times, tax planning and management is very essential. Central and State Governments put so many taxes and require the filing of returns, assessment of tax and payment of tax. Every work is to be done in stipulated time period.

(8) Internal Audit- For assessing the work of various departments of the organization it is necessary to internally audit them. It helps in holding the officials responsible for the work done under their departments.

(9) Reporting-The reports prepared at various levels of organization should be synchronised and presented to the top management so that they can take proper steps. Sending them after delay makes them stale. Reporting can be done on quarterly, half-yearly or yearly basis. It can be related to cash, profit and loss funds etc.

(10) Methods and Procedures - Generally the secretarial or official service administration should also fall under the work of management accountant. The processing and use of data, filing, copying and postage are the official works. The optimum utilization of machines and other electronic equipments is to be insured.

Various types of surveys and forecasts are also made. Due to the information given above it is clear that the scope of management accounting is increasing day by day.

13.5 Techniques of Management Accounting

The development of this subject was done for the facilitation of managerial work. Therefore following tools and techniques have been adopted:

Some scholars divide the techniques of management accounting as under-

(A) Techniques Based on Information Contained in Financial Accounting-

(i) Comparative Financial Statements,
(ii) Common-size Financial Statements,
(iii) Tread Analysis,
(iv) Ratio Analysis,
(v) Funds Flow Statement,
(vi) Cash Flow Statement, and
(vii) Graphs, Diagrams and Charts.

(B) Techniques Based on Information Contained in Cost Accounts-

(i) Standard Costing,
(ii) Direct or Incremental Costing,
(iii) Marginal Costing, and
(iv) Cost-Volume-Profit Analysis.

(C) Techniques Based on Quantitative Methods -

(i) Operations Research,
(ii) Game Theory and Queuing Theory,
(iii) Network Analysis,
(iv) Simulation Theory,
(v) Linear Programming,
(vi) Co-relation and Regression Analysis,
(vii) Analysis of Time Series,
(viii) Standard Deviation, and
(ix) Quality Control Techniques.

(D) Techniques Based on Estimated Information-

(i) Business Forecasting,
(ii) Budgeting,
(iii) Project Appraisal, and
(iv) Projected Financial Statement. .

(E) Other Techniques –

(i) Managerial Reporting,
(ii) Internal Control Techniques and Auditing.

13.6 Functions of Management Accounting

Management accounting's main purpose is to help in managerial works. It helps in the management in two ways:

I. Providing Necessary Accounting Information to Management.

II. Helping in Managerial Works and Activities.

I. Providing Necessary Accounting Information to Management:

For this work in management accounting the job of creating information and making it available, is done in four phases:

(1) Measuring (2) Recording (3) Analysis (4) Reporting

The description about them is as follows:

(1) Measuring- In management accounting, the accountant helps in measuring the work efficiency in different areas. For helping the management it is done on the past and present incidents with context to future. In standard costing and budgetary control, standard and actual performance is compared to find out efficiency. .

As the forecasting is involved in management accounting, therefore it is natural that there can be some faults, thus management accountant presents these data at certain level of confidence. It is to be made clear that forecasted information cannot be fully correct, then also there should be reasonable fairness in them. That is why, in management accounting, at the place of emphasizing on 100% correctness, reasonable correctness is needed. .

(2) Recording-Recording is the primary job of accounting. Production, labour, sale and purchase etc. have transactions on every day. Firstly they are recorded in accounting and cost books. But in case of management accounting this recording is done on the basis of assumption and even those items which cannot be expressed financially are included in management accounting. Thus in management accounting both, the quantitative and qualitative types of data are included.

(3) Analysis -The work of management accounting is to collect and analyse the facts related to the managerial problems and then present them in clear and simple way. Till the facts are properly analysed and no differentiation is made between useful and wasteful facts, the management cannot use it. For this purpose there should be a working knowledge of accounting. Managers generally lack this awareness so there arises the need of management accountant. He analyses the various projects, alternatives and procedures and presents them to the management with proper details.

(4) Reporting- One of the major works of management accounting is to prepare useful reports. Under this subject mainly two types of reports are prepared-

(a) Regular Reports -Such reports are prepared at regular time intervals, for the use of some important officials. These reports are used to keep a check on operational activities and work area. The format of such reports can be different in various organizations but reports regarding the sales, purchases, production and operational cost are helpful in assessing the results of the organisation. The reports prepared for whole organisation are very short, for some department it is detailed but for various works of departments it is very detailed. In such statements, for controlling the cost and efficiency the information is presented in comparative form.

(b) Special Reports - These reports are prepared on the request of any manager or department. Top management confronts such problems generally, where the regular reports are not enough.

There is some information in the accounts which is never used in the preparation of reports but at the time of need these information can be collected in the form of reports, with special efforts. Generally, the special reports are not only prepared on the information present in the accounts but on the basis of common sense and forecast, a special report is prepared. For example, if managers have to decide to produce a particular product in a factory or purchase from others; the old machines should be replaced or not; all the processes of production should run or to be closed; it is difficult to take the decision. Here the comparative study is required therefore, management accountant is required to collect information from various sources and prepare a special report.

II. Helping in Managerial Works and Activities:

Some great changes in science and industry has made it non-profitable to carry out the work of management on the basis of traditional methods. Presently, management tries to take the decision on the basis of statistical facts and quantitative techniques and not on situations. They do not need only the facts of present activities and the past ones but also likes to forecast on the basis of it. The complexities have increased in the managerial tasks, therefore, it has become necessary for managers to delegate their responsibility. But passing on responsibility down the chain requires proper control. The main functions of management are planning, organizing, staffing, directing provides information to the various levels responsibilities properly and effectively. It is helpful in various managerial functions as under: -

(1) Planning- Planning includes the decision taken regarding "What to do" in future and then formulating plans and policies to activate it. It is considered as the basic function and always have some goals behind it. Till today, the aim or goal of business was considered to be profit earning, but with changed situations, industrial democracy socialism and interference of government, every business needs to give equitable weighing to profit making and social welfare. Through management accounting forecasts regarding the sales, purchases, production etc. can be obtained, which helps in making justifiable plans. On the basis of cost, price, income and production level the alternative plans can be compared and best is chosen. The tools of management accounting like standard costing, managerial costing cost-volume-profit, analysis etc. are of great help in planning.

(2) Organising - Organising is a system where in the responsibilities of employees and the posts they are holding in organization, are decided. The present industrial era has even birth to various levels of management namely, top management, middle level management and down level management. The effect of this is that, not only top management wants to assess its workings but also the middle and lower level management tries to find out their efficiency. On .the other hand, the heads of various departments want to know the performance of their subordinates. In such cases, the financial accounting is of no use and this need can be fulfilled only through the management accounting. The budgetary control and establishing cost centre techniques of management accounting helps in controlling costs and fixing responsibility, which result in efficient management. In management accounting whole organisation is divided into various departments, on the basis of work or production, and then detailed information are prepared to simplify the thing. Internal audit increases the efficiency. By inspecting the various procedures and systems; the labour, the supervisors and managers get motivation to constantly improve their work.

(3) Staffing-The meaning of staffing is to fill the various positions in organisation with the capable people and to maintain a balance between the requirement of the position and the qualification of the employees. Management accounting helps the managers in this work. Merit rating and job evaluation are two important functions to be performed for staffing. Generally, only those employees are useful for the organization, whose value of work done by them is more than the

value paid to them. Training is required for maintaining balance between the position and the personnel. But before starting training programmes it should be evaluated whether the cost of it is less than the benefit delivered or not, otherwise such training programmes can prove to be a costly and burdened affair for the organisation. Thus by doing Cost- benefit analysis management accounting is useful in staffing function.

(4) Directing-The purpose and meaning of directing is to order the employees for doing tasks and to guide them. It motivates the employees to work in group. For proper directing, the essentials are co-ordination, leadership, communication and motivation. In all these tasks, management accounting is of great help. Through standard costing and budgeting help is provided in supervision and leadership.

(5) Controlling- To see that all the activities in the organization are heading according to plans or not and if any deviation found then correcting it is called controlling. In this way, for controlling anything first the standards are to be set, then actual performance is compared with standards and on finding any deviation, the reasons for it are enquired and corrective action is taken. Thus, we can say that there are three main steps in controlling:

(i) Setting up performance standards.
(ii) Comparing actual performance with the standards set.
(iii) If deviation is found then taking corrective action.

Here it is important to maintain that controlling is most important function of management because without it all other functions like planning, directing, organizing etc. are of no use. And this process of controlling is month governed by the tools provided in the management accounting.

From all above discussion, it is clear that management accounting is an important tool and technique of management. Though managerial decision depend upon the type of manager but the grass-root information required for it is provided by management accounting.

13.7 Role of Management Accounting in Decision Making

Management of every organisation has to face many problems which are to be properly analysed. These problems require decision making and policy formation. Management needs require data and information to resolve such problems. Management accounting plays important role in providing the required information. We provide few managerial problems relating to purchase, production, marketing and finance, which requires managerial decision making and the role of management accounting in providing the required data to help management in decision making-

(1) Purchase Decision -Management has to take decision relating to purchase f different items for production function. Following may be the useful information analysed and provided by management accounting for purchase decision-

(a) Data related to quantity, rate and the amount involved of different material in a particular period.
(b) Analysis of items in capital nature and revenue nature
(c) Purchase by different departments
(d) Time and quantity of material required by the organisation.
(e) Order placed and the schedule of receiving such orders
(f) Safety stock required to be maintained.
(g) Material available for the expected production
(h) Re-order level and Economic order quantity

(2) Production Decision -Management has to take decision related to production to meet the needs of customers. Management accounting collects and provides following information to solve various problems related to production function-

(a) Order received and schedule of despatch

(b) Information related to raw material, labour and other infrastructure to meet the pending orders

(c) Estimation of demand and production sequencing

(d) Nature of expenses at different levels of production, i.e., fixed variable and semi variable.

(e) Past failures and reasons thereof.

(3) Marketing Decision - Management Accounting provides following information related to different problems of marketing management, i.e., division of selling areas, decision for Sales budget, policy for Sales promotion, credit policy etc.-

(a) Quantity and price of items sold in a particular period

(b) Cash and credit Sales and their analysis with respect to financial effectiveness

(c) Branch wise and department wise sales

(d) Item wise, Area wise, Dealer wise, Agent wise sales

(e) Marketing expenditures and justification budget

(f) Analysis of goods returned by the customers

(g) Customer's feedback and new products in the market

(4) Finance Decision - Management has the problem of collection and utilization of short term and long term finance. Management also faces the emblem of proper allocation of funds. Management accounting helps in collecting and analysing following information. for the purpose of appropriate decisions for these problems-

(a) Requirement of finance for purchase

(b) Fixed payments and variable payments at different levels of production

(c) Estimation of Cash and credit purchase as well as Sales

(d) Estimation of time schedule in collecting funds from different sources

(e) Dividend and Taxation information

(f) Cost of collecting and continuing loans.

(g) Alternative sources of finance.

Now, it can be verified from the above details that management accounting plays an important role in various decisions of the management although at the, same time, it is true that it is not an alternative to the management.

13.8 Difference between Cost Accounting and Management Accounting

Due to the limitations and incompleteness of financial accounting, separate system of accounting was evolved to do accounting of cost related matters. Basically, the accounting knowledge has improved along with the time. In spite of the new accounting procedures and technical innovations there was not much improvement in the historical nature of financial accounting, thus leaving a very limited scope for it in the field of management. It has proved to be unsuccessful in providing facts for management control, decision making, cost control and forecasting. Cost accounting development removed these drawbacks of financial accounting and helped management in establishing proper control.

Cost accounting includes the presentation of information derived there from for the purpose of managerial decision-making." Thus cost accountancy helps in controlling costs by bringing efficiency in the operational activities. Actually this accounting procedure is more forward looking and dynamic as compared to the historical accounting procedures. Presently techniques like budgetary control, cost-volume-profit analysis, marginal costing etc. are most commonly used in cost accountancy. Due to these techniques used for cost accountancy, being common to that used for management accounting, people generally get confused that both are similar. Though management accounting and cost accountancy both are forward looking and dynamic but they have some remarkable differences, if probed closely. The differences are as under:-

(1) Object-Main object of cost accountancy is to ascertain the cost of goods or services produced whereas the main purpose behind management accounting is to increase the managerial efficiency of the organisation.

(2) Nature- Cost accountancy is related mainly to historical or present facts whereas management accounting is much related to futuristic facts.

(3) Scope -The scope of management accounting is much more wider than that of cost accountancy. Actually cost accountancy is just a part of management accounting.

(4) Description-In cost accountancy only monetary facts find the place but management accounting includes both the monetary and non-monetary facts.

(5) Accounting Principles and Formats - Cost accountancy have some established and set accounting principles and formats but it is not so in the case of the management accounting.

(6) Parties - In cost accountancy the facts are used for both the internal and external parties but management accounting facts are restricted only for the use of internal management.

(7) Evolution - Cost accountancy is the gift of industrial revolution whereas the concept of management accounting has evolved just in last few decades. Basically management accounting has not developed fully as yet and the evolution of new concepts and techniques is on constantly.

13.9 Limitations of Management Accounting

In the present corporate world, management accounting is of great importance but it has some limitations like any other science:-

(1) Based on Financial and Cost Accounting- Most of the information presented by management accounting are based on the financial and cost accounting. Thus the conclusions drawn by the management accountant are affected, by the limitations of the financial and cost accounting to a great extent. The information in their statements are generally based on historical figures, which make the information of management accounting less useful.

(2) Wide Scope- Management accountant tries to provide forecasts, analysis and reports for all the areas of management, which has a very wide scope thus making it very hard for him to generate such information.

(3) Lack of Continuity in Efforts –The conclusions derived by management accountant are of no use till they are constantly and cautiously used by the management. For this it is essential that information provided by him should be used at each level of management and treated as the part of management process.

(4) Effect of Human Factor- The information whatsoever is collected in the management accounting is affected by the "personal biases" and human factor. From the collection to the analysis of the

information there comes some part of effect because of the character, intentions, and behavior of the person doing it. These decisions are affected by personal influence and the self knowledge to a great extent. That's why the conclusions drawn from them are also affected.

(5) Lack of Thorough Knowledge-The right conclusions, from the information collected in management accounting, can be drawn only if the person is having in-depth knowledge of accountancy, statistics, economics, auditing, principles of management and engineering etc. Management accountant and managers both don't have this much knowledge, which ultimately affects the quality of decisions.

(6) Not an Alternative of Administration -Management accounting is just a tool in the hands of management and it cannot replace the administration and management. Management accountant just supplies some information to the management, taking decision and activating them are not in his peripheral. Thus, management accounting provides basis for decision-making and not the decision.

(7) Effect of Time Factor-Most of the information gathered by management accountant is of historical nature. When any forecast is made regarding a project at that time if this information is used, then it can pose some problems, which puts management in awkward situations. Sometimes quick decisions are needed regarding the project and at such time management accountant cannot reproduce effective information, which is a failure.

(8) Top Heavy Structure- For the establishment of management accounting system there is a requirement of a broad organization and employees, which makes it a costly affair, therefore it can be adopted only by large organisations.

(9) Evolutionary Stage-The tools of management accounting has not developed fully as yet, there is a constant change in it from time to time, which makes them instable for use.

(10) Use of Alternative Techniques -In management accounting various techniques can be used for solving a problem. Different conclusions will be drawn for the same problem on using different tools.

(11) Psychological Resistance- Managers generally resist the information of management accounting because it can change the basis of the whole established management system and it can be used as a tool against manager. Therefore, managers oppose it from the beginning itself.

13.10 Organisation of Management Accounting

Wherever two or more people work together, there is a need of organization. And when responsibilities are assigned to persons with certain authorities it is called organization. The goals of a business cannot be achieved, without organization. For the efficient working of management accounting in any business there should be a separate organization. The shape and size of such organization depends upon the nature and size of the business itself. In a small-business, a clerk can be kept for doing book-keeping and the service of public auditor or management auditor can be taken on periodic basis. In a middle sized business a chief accountant can be appointed and under him there can be separate accountants for accounting, costing, plant etc.

The management accounting organization structure usually found in small and middle sized business is as under:

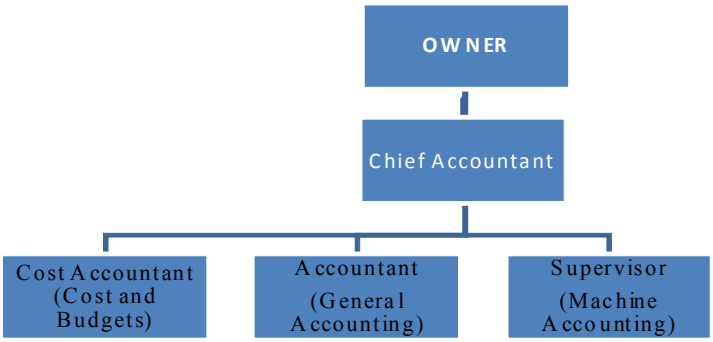


Figure 13.1 : Organisation Structure in Small and Middle Sized Business Ventures.

According to the chart, chief accountant is the chief officer of the management accounting organization. Under him, the cost accountant takes care of cost and budgets. General accountant works for preparing basic accounts, creditors and debtors list, salary lists etc. A separate accountant can be appointed for taking care of machine work. In a big sized firm, the organisation of management accounting can be done in two ways:

(1) Functional Accounting Organization - Under this kind of organisation structure, management accounting work is divided into five departments- Cost department, Budget department, General Accounting department, Works department, Audit department and a separate person is appointed for each department. To keep control over them and to maintain co-ordination, a controller or Management Accountant is appointed. If the firm is having only one unit then each of the above officers performs his work as a line officer but in case of more than one unit the official in head office is the main head and other officers looking after the work in other units, reports to him. Figure 13.2 shows the functional accounting organization.

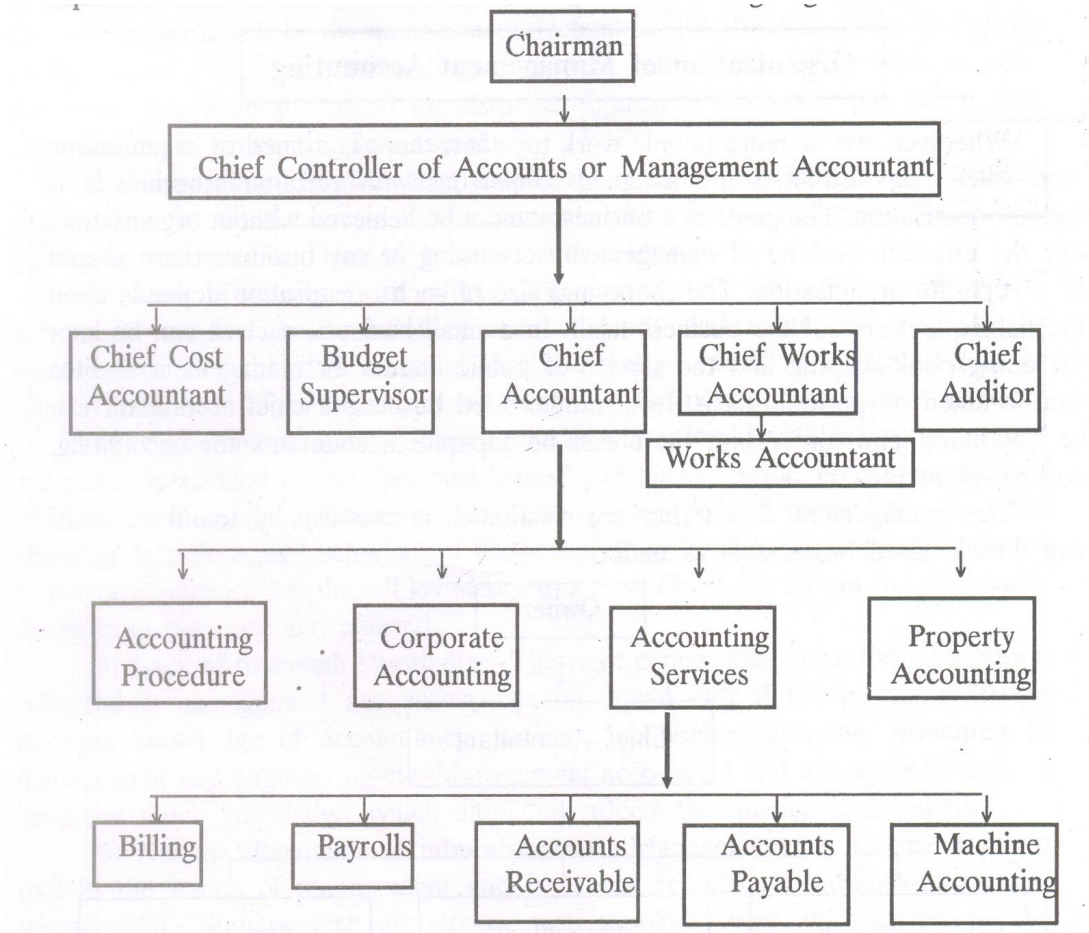


Figure 13.2 : Organisation of Big firm on the Basis of Functional Accounting.

Various benefits are derived by organizing the accounting work on functional basis. The biggest benefit is that for various accounting works different people are appointed who become expert in their work. In case, of more than one units, the improvement measures taken by one officer can be introduced in the other units.

(2) Accounting Organization According to Divisions of the Company-Some firms do their amounting on the basis of divisions. For this purpose they create divisions first. For example dividing in 'Division A', 'Division B' and 'Division C'.

After this accounting of each division is arranged to a particular controller and he is responsible for the performance of his division. In a venture, some works are not divisible in divisions, therefore, they are carried out under the supervision of control officers. The work of Chief Accountant and Chief Auditor is like that.

Figure 13.3 shows the accounting organisation according to the divisions of the Company:

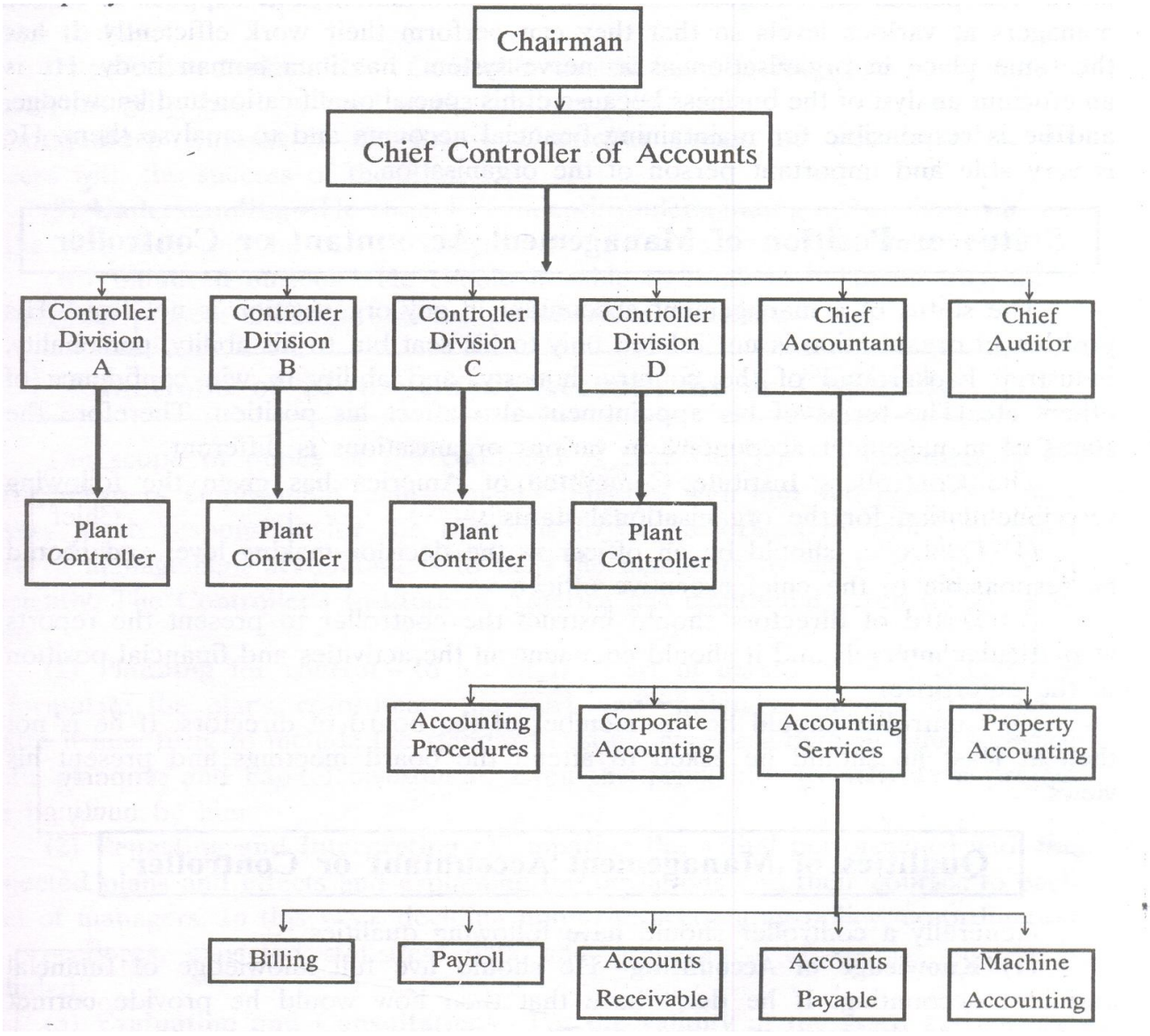


Figure 13.3 : The Organisation of Big Firm on the Basis of Divisions.

The biggest advantage of this organization is that every controller can keep the proper care of each problem of his division. He can adopt proper procedures and systems according to his requirements. It proves to be more useful where the working of each division is different. It also helps in developing the employee's knowledge. They got acquainted to handle higher positions in future.

13.11 Management Accountant

The person who carries out the management accounting work in organisation is called management accountant. It is also addressed as chief accountant, controller, accounting manager, financial director, financial controller etc. Actually he is the person who provides a practical shape to management accounting in the organisation.

He is the person who collects the data and information and supplies it to the managers at various levels so that they can perform their work efficiently. It has the same place in organization as a ''nerve system" has in a human body. He is an efficient analyst of the business because of his special qualification and knowledge, and he is responsible for maintaining financial accounts and to analyse them. He is very able and important person of the organization.

The status of a management accountant in any organisation is not fixed. His position in organisation is not related only to his seat but to his ability, personality, industrial background of the country, honesty, and ability to win confidence of others etc. The terms of his appointment also affect his position. Therefore the status of management accountant in various organisations is different.

The Controllers Institute Committee of America has given the following recommendation for the organisational status :-

(1) Controller should be an officer at the decision-making level and should be responsible to the chief executive officer.
(2) Board of directors should instruct the controller to present the reports at particular intervals and it should comment on the activities and financial position of the enterprise.
(3) Controller should be the member of the board of directors. If he is not then at least he should be asked to attend the board meetings and present his views.

13.12 Qualities of Management Accountant

Generally a controller should have following qualities:

(1) Knowledge of Accounting-He should have full knowledge of financial and cost accounting. If he does not have that then how would he provide correct information to the managers.

(2) Knowledge of Statistics -The proper knowledge of statistics is necessary to present the information in the form of graphs, charts, tables etc. to make them more understandable. .

(3) Knowledge of Economics -Most of the economic decisions of the organisation are based on the principles of economics. Thus, he should have its knowledge, price fixation, production decisions, capital expenditure etc. are based on this

(4) Knowledge of Law-The law complexities are increasing day by day, thus controller should know all the laws which can affect the business. New capital issue, distribution of dividend, depreciation and reserve accounts, publishing and auditing etc. are bounded by legal obligations which have to be fulfilled.

(5) Knowledge of Psychology-He needs to take work from his colleagues and subordinates. If he has good knowledge of psychology then he can maintain good relations with them.

(6) **Knowledge of Mercantile and Industrial Laws** - Companies Act., Partnership Act, Sale of Goods Act, Factories Act etc. are some legislations which must be known to him.

(7) **Effective Personality**- Controller should have qualities like good nature, dignity, integrity, honesty, hard work, fun-loving etc.

(8) **Deep Interest in the Firm**- Controller should be able to relate his success with the success of the firm.

(9) **Understanding**-He should of in depth understanding about the problems of the firm then only he can be effective or otherwise he will be unsuccessful.

(10) **Balanced Outlook**- He should be able to think in balanced way about the original present situation and the potentialities of future.

13.13 Summary

Management accounting is the presentation of accounting information in such a way as to assist management in the creation of policy and the day-to-day operation of an undertaking. This work is performed by such techniques and systems coupled with special knowledge and ability so that the available information may prove helpful in understanding and solving the problems of management.

13.14 Self Assessment Questions

1 Explain the term 'Management Accounting' and state its objectives and functions.

2 Explain the nature and scope of Management Accounting.

3 Discuss the techniques of Management Accounting.

4 Explain the objectives, functions and limitations of 'Management Accounting'.

5 "Management Accounting is concerned with accounting information that is useful to management". Comment and define management accounting. How does it differ from Cost Accounting.

13.15 Reference Books

- Agrawal, Shah, Mendiratta, Agarwal, Sharma, Tailor, 'Cost and Management Accounting', Malik and Co.
- Agrawal & Agrawal, 'Management Accounting', RBD, Jaipur
- Khan, Jain, 'Management Accounting'
- I. M. Pandey, 'Management Accounting'

Unit - 14 : Marginal Costing

Structure of Unit:

14.0 Objectives

After completing this unit, you would be able to:

- Understand the concept of Marginal Cost and Marginal Costing.
- Know the merits and demerits of Marginal Costing.
- Learn to compute the various components of CVP analysis.
- Understand the margin of safety with respect Break even sales.
- Able to draw the Break Even Chart and show the different components of Marginal Costing on Chart.

14.1 Introduction

Marginal costing is not a method of cost ascertainment like job costing or contract costing. Marginal costing is a technique of costing which may be used with other methods of costing, viz., job or process. For decision making, it is more helpful to the management. The other names for marginal costing are direct costing, differential costing, incremental costing and comparative costing.

In marginal costing, only variable items of costs are taken into account. These variable costs will change in direct relation to the change in the volume of production or change in the production by one unit. As such, variable costs are called product costs and are charged to production. Fixed costs are not allocated to cost unit; and these are charged directly to profit and loss account during the period and are called as period costs or capacity costs.

14.2 Definitions of Marginal Cost and Marginal Costing

Marginal cost means the same thing as variable cost. The term is not new one. The accountants' concept of marginal cost differs from economists' concept of marginal cost. Economists define marginal cost as additional cost of producing one additional unit. This shall include an element of fixed cost also. Moreover, the economists' marginal cost per unit cannot be uniform with the additional production since the law of diminishing or increasing returns is applicable; whereas the accountants' marginal cost shall be constant per unit of output with the additional production.

The Institute of Cost and Works Accountants of India (ICWAI) defined marginal cost as, "the amount at any given volume of output by which aggregate costs are changed, if the volume of output is increased or decreased by one unit". In this case the unit may be a single article, a batch of articles, an order, and a stage of production capacity, a process or a department. To ascertain the marginal cost, we need the following elements of cost.

- Direct Materials
- Direct Labour
- Other direct expenses, and
- Total variable overheads.

That is, Marginal cost = Prime cost + Total Variable Overheads

Or

Marginal Cost = Total cost - Fixed Cost

Marginal costing is defined by the ICWAI as, "the ascertainment by differentiating between fixed costs, and variable costs, of marginal costs and of the effect on profit of changes in volume of type of output".

According to Dr. Joseph, "Marginal costing is a technique of determining the amount of change in the aggregate costs due to an increase of one unit over the existing level of production. As such, it arises from the production of additional increments of output".

Batty defines Marginal Costing as "a technique of cost accounting which pays special attention to the behavior of costs with changes in the volume of output".

It may be remembered that marginal cost takes into account only variable cost and excludes the fixed cost.

Fixed cost is one which tends to be unaffected by variation in volume of output. Fixed cost does not change with the increase or decrease in production with a certain range. Period cost is another name for fixed cost, as it is related to periods.

Variable cost is one which tends to vary directly with the volume of output. Variable cost changes with the increase or decrease in production. In direct costing variable cost is known as direct.

Activity A:

1. According to you, what are the elements of Marginal Costing? Which type of overheads are included in it? Identify and make a list.

14.3 Features of Marginal Costing

The main features of Marginal costing can be enumerated as below:

1. Marginal costing is a technique or working of costing, which is used in conjunction with other methods of costing (process or job).
2. Fixed and variable costs are kept separate at every stage. Semi-variable costs are also separated into fixed and variable.
3. As fixed costs are period costs, they are excluded from product cost or cost of production or cost of sales. Only variable costs are considered as the cost of the product.
4. When evaluation of finished goods and work-in-progress are taken into account, they will be only variable costs.

5. As fixed costs are period costs, they are charged to profit and loss account during the period in which they are incurred. They are not carried forward to the next year's income.
6. Marginal income or marginal contribution is known as the income or the profit.
7. The difference between the contribution and fixed costs is the net profit or loss.
8. Fixed costs remain constant irrespective of the level of output/activity.
9. Sales price and variable cost per unit remain the same.
10. Cost-Volume-Profit relationship is fully employed to reveal the state of profitability at various levels of activity.

14.4 Advantages

The advantages of Marginal Costing can be enumerated as below:

1. **Constant in Nature:** Variable costs fluctuate from time to time, but in the long run, marginal costs are stable. Marginal costs remain the same, irrespective of the volume of production.
2. **Effective Cost Control:** It divides cost into fixed and variable. Fixed cost is excluded from product. As such, Management can control marginal cost effectively.
3. **Treatment of Overheads Simplified:** It reduces the degree of over or under-recovery of overheads due to the separation of fixed overheads from production cost.
4. **Uniform and Realistic Valuation:** As the fixed overhead costs are excluded from product cost, the valuation of work-in-progress and finished goods becomes more realistic.
5. **Helpful to Management:** It enables the management to start a new line of production which is advantageous. It is helpful in determining which is profitable- whether to buy or manufacture a product. The management can take decision regarding pricing and tendering.
6. **Helps in Production Planning:** It shows the amount of profit at every level of output with the help of cost volume profit relationship. The break even chart may be used for this.
7. **Better Results:** When used with standard costing. It gives better results.
8. **Fixation of Selling Price:** The differentiation between fixed costs and variable costs is very helpful in determining the selling price of the products or services. Sometimes, different prices are charged for the same article in different markets to meet varying degrees of competition.
9. **Helpful in Budgetary Control:** The classification of expenses is very helpful in budgeting and flexible budget for various levels of activities.
10. **Preparing Tenders:** Many business enterprises have to compete in the market in quoting the lowest price. Total variable cost, when separately calculated, becomes the 'floor price'. Any price above this floor price may be quoted to increase the total contribution.
11. **'Make or Buy' Decision:** Sometimes a decision has to be made whether to manufacture a component or a product or to buy it readymade from the market. The decision to purchase it would be having taken if the price paid recovers some of the fixed expenses.
12. **Better Presentation:** The statements and graphs prepared under marginal costing are better understood by management executives. The bread even analysis presents the behavior of cost, sales, contribution etc. in terms of charts and graphs. And, thus the results can easily be grasped.

14.5 Disadvantages

The disadvantage can be enumerated as below:

1. **Difficulty to Analyse Overhead:** Separation of costs into fixed and variable is a difficult problem. In marginal costing, semi-variable or semi-fixed costs are not considered.
2. **Time Element Ignored:** Fixed costs and variable costs are different in the short run; but in the long run, all costs are variable. In the long run all costs change at varying levels of operation. When new plants and equipments are introduced, fixed costs and variable costs will vary.
3. **Unrealistic Assumption:** Assumption of sale price will remain the same at different levels of operation. In real life, they may change and give unrealistic results.
4. **Difficulty in the Fixation of Price:** Under marginal costing, selling price is fixed on the basis of contribution. In case of cost plus contract it is very difficult to fix price.
5. **Complete Information not Given:** it does not explain the reason for increase in production or sales.
6. **Significance Lost:** In capital intensive industries, fixed cost occupies major portions in the total cost. But marginal costs cover only variable costs. As such, it loses its significance in capital industries.
7. **Problem of Variable Overheads:** Marginal costing overcomes the problem of over and under absorption of fixed overheads. Yet there is the problem in the case of variable overheads.
8. **Sales Oriented:** Successful business has to go in a balanced way in respect of selling production functions. But marginal costing is criticized on account of its attaching over importance to selling function. Thus, it is said to be sales oriented. Production function is given less importance.
9. **Unreliable Stock Valuation:** Under marginal costing stock of work-in-progress and finished stock is valued at variable cost only. No portion of fixed cost is added to the value of stocks. Profit determined, under this method, is depressed.
10. **Claim for Loss of Stock:** Insurance claim for loss or damage of stock on the basis of such a valuation will be un-favourable to business.
11. **Automation:** Now a days increasing automation is leading to increase in fixed costs. If increasing fixed costs are ignored, the costing system cannot be effective and dependable.

    Marginal costing, if applied alone, will not be much in use, unless it is combined with other techniques like standard costing and budgetary control.

Activity B:

1. Discuss the merits and demerits of the Marginal Costing with the help of a company's financial statement.

14.6 Cost-Volume-Profit Analysis

As the term itself suggests, the cost-volume-profit (CVP) analysis is the analysis of three variables, viz, cost, volume and profit. In CVP analysis, an attempt is made to measure variations of costs and profit with volume. Profit as a variable is the reflection of a number of internal and external conditions which exert influence on sales revenue and costs.

The cost-volume-profit analysis helps or assists the management in profit planning. In order to increase the profit, a concern must increase the output. When the output is at maximum, within the installed capacity, it adds to the contribution. In the words of Heiser, "The most significant single factor in profit planning of the

average business is the relationship between the volume of business, costs and profit." Thereby, cost volume profit analysis is the relationship among cost, volume and profit. When volume of output increases, unit cost of production decreases, and vice versa; because the fixed cost remains unaffected, when the output increases, the fixed cost per unit decreases. Therefore, profit will be more, when sales price remains constant. Generally, costs may not change in direct proportion to the volume. Thus, a small change in the volume will affect the profit.

The management is always interested in knowing that which product or product mix is most profitable, what effect a change in the volume of output will have on the cost of production and profit etc. All these problems are solved with the help of the cost-volume-profit analysis.

Marginal cost equations

Sales = Variable cost + Fixed Cost + Profit or minus loss

Sales - Variable cost = Fixed Cost + Profit or minus loss

Sales - Variable cost = Contribution

Contribution = Fixed cost + Profit

From the above equation, we can understand that in order to earn profit, the contribution must be more than the fixed cost. To avoid any loss, the contribution must be equal to fixed cost.

14.6.1 Contribution

Contribution is the difference between sales and marginal cost of sales. Contribution enables to meet fixed costs and adds to the profit. Contribution is also known as gross margin. Fixed costs are covered by the contribution; and the balance amount is an addition to the net profit.

Marginal Cost = Prime Cost + Variable Overhead

Contribution= Sales - Marginal Cost or Contribution = Sales - Variable Cost

Contribution = Fixed Cost + Profit or minus Loss

Profit = Contribution - Fixed Cost

Sale - Variable Cost = Fixed Cost + Profit

Or C= S - VC = FC + P

Illustration: From the following information, find out the amount of profit earned during the year using marginal costing technique:

Fixed cost - Rs.500000; Variable Cost- Rs. 10 per unit; Selling Price- Rs. 15 per unit; Output level - 150000 units.

Solution:

Contribution = Selling Price - Marginal Cost

= Rs. 22,500,00 - Rs. 15,000,00 = Rs. 7,500,00

Contribution = Fixed Cost + Profit

Rs. 7,50,000 = Rs. 5,00,000 + Profit

Profit = Rs. 2,50,000

Activity C:

1. If Marginal cost is Rs 15, sales Rs. 10, fixed Cost Rs. 10000 and Unit sold 2500. What profit you would suggest for decision making in case of marginal costing.

14.6.2 Break -Even Analysis

The break-even point and bread-even chart are two by-products of break even analysis. In a narrow sense, it is concerned with the break even point and in a broad sense; it is concerned with the break even chart. Break-even analysis is also known as cost volume profit analysis. The analysis is a tool of financial analysis whereby the impact on profit of the changes in volume, price, costs and mix can be estimated with reasonable accuracy. Break-even-point is equilibrium point or balancing point of no-profit no loss. This is a point at which loss ceases and profit begins. This is a point where income is exactly equal to expenditure.

Break-even-point: Break-even-point is a point where the total sales are equal to total cost. In this point there is no profit or loss in the volume of sales. The formula to calculate bread-even point is:

$$\text{B.E.P. (in units)} = \frac{\text{Total Fixed Cost}}{\text{Contribution per unit}}$$

Or

$$= \frac{\text{Fixed Cost}}{\text{Selling price per unit} - \text{Variable cost per Unit}}$$

Illustration:

From the following information, you are required to compute break-even point

Variable cost per unit - Rs. 12; Fixed cost- Rs. 60000; Selling price per unit- Rs. 18.

Solution:

Contribution = Selling Price - Variable Cost

= Rs. 18 - Rs. 12 = Rs. 6

B.E.P. in Units = Fixed Cost/ Contribution per Unit

= Rs. 60000/Rs. 6 = 10000 Units

Break Even Point Sales = Rs. 18 X 10000 Units = Rs. 180000

Illustration: A company estimates that next year it will earn a profit of Rs. 50000. The budgeted fixed costs and sales are Rs. 250000 and 993000 respectively. Find out the break-even point for the company.

Solution:

Contribution = Fixed Cost + Profit = Rs. 250000 + Rs. 50000 = Rs. 300000

B.E.P. (in Units) = (Fixed Cost X Sales)/ Contribution

= (Rs. 250000 X Rs. 993000)/Rs. 300000 = Rs. 827500

14.6.3 Profit Volume Ratio (P/V Ratio)

Profit volume ratio, which is popularly known as P/V ratio, expresses the relationship of contribution to sales. Another name for this ratio is contribution sales ratio or marginal income ratio or variable profit ratio. The ratio, expressed as a percentage, indicated the relative profitability of different products.

The formula for computing the P/V ratio is given below:

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} = \frac{C}{S}$$

$$\text{Or} = \frac{\text{Fixed Cost + Profit}}{\text{Sales}} = \frac{FC + P}{S}$$

$$\text{Or} = \frac{\text{Sales} - \text{Variable Cost}}{\text{Sales}} = \frac{S - VC}{S}$$

When two periods Sales and Profit is given then P/V ratio can be computed as below

$$\text{P/V ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100$$

It can also be expressed in percentage. Normally, this ratio is expressed in percentage. When we know the P/V ratio, B.E.P. can be calculated, by using the formula:

$$\text{B.E.P. (Sales volume)} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}} \text{ or } = \frac{FC}{\text{P/V Ratio}}$$

The profit of a business can be increased by improving P/V ratio. As such management will make efforts to improve the ratio. A higher ratio means a greater profitability and vice versa. So management will increase the P/V ratio:

a. By increasing sales price per unit
b. By decreasing variable costs
c. By increasing the production of products which is having a high P/V ratio and vice-versa.

P/V ratio is very important in decision making. It can be used for the calculation of B.E.P. and in problems regarding profit sales relationship.

1. $\text{B.E.P.} = \frac{\text{Fixed Cost}}{\text{P/V ratio}} = \frac{FC}{\text{P/V ratio}}$

2. Fixed Cost = B.E.P. x P/V ratio

3. Sales required in units to maintain a desired profit

$$\frac{\text{F.C. + Desired Profit}}{\text{P/V Ratio}} = \frac{FC + P}{\text{P/V ratio}} = \frac{\text{Required Contribution}}{\text{new contribution per unit}}$$

4. Contribution = Sales x P/V ratio

5. Variable costs = Sales (1 - P/V ratio)

6. S X P/V ratio = F+P

Illustration:

From the given data, compute Profit Volume Ratio.

Marginal Cost- Rs. 2400; Selling Price- Rs. 3000

Solution:

Contribution = Selling Price - Marginal Cost = Rs. 3000 - Rs. 2400 = Rs. 600

P/V Ratio = (Contribution/ Sales) X 100 = (Rs. 600/ Rs. 3000) X 100 = 20%

Illustration:

The sales turnover and profits during two periods are as under:
Period I: Sales Rs. 20 lakhs; Profit- Rs. 2 lakhs
Period II: Sales Rs. 30 lakhs; Profit Rs. 4 lakhs
Calculate P/V Ratio

Solution:

P/V Ratio = (Change in Profit/Change in Sales) X 100

= (Rs. 4 lakhs - Rs. 2 lakhs/ Rs. 30 lakhs - Rs. 20 lakhs) X 100

= (200000/1000000) X 100 = 20%

Activity D:

1. If your trading concerns result for first and second quarter sales and profits are Rs. 25000; Rs. 5000; Rs. 37,500 and Rs. 10000 respectively. What is the Profit Volume Ratio of your trading concern? If you want to earn a profit of Rs. 7500 then what would be your sales and if sales is Rs. 20,000 then how much profit you will be able to earn?

14.6.4 Margin of Safety

Margin of Safety is an important concept in Marginal Costing approach. Total sales minus the sales at break-even point are known as the margin of safety (MOS). That is, Margin of safety is the excess of normal or actual sales over sales at break-even point. In other words, sales over and above break-even sales are known as Margin of Safety. The Margin of Safety refers to the amount by which sales revenue can fall before a loss is incurred. That is, it is the difference between the actual sales and sales at the break-even point. Break-even-point can be compared to a Red signal point. If margin of safety is large, it is sign of soundness of the business and vice versa. The margin of safety serves as a guide is a reliable indicator of the business strength and soundness. Margin of safety can be expressed in absolute sales amount or in percentage.

High margin of safety indicates the soundness of a business because even with substantial fall in sale or fall in production, some profit shall be made. Small margin of safety on the other hand is an indicator of the weak position of the business and even a small reduction in sale or production will adversely affect the profit position of the business.

Margin of safety can be increased by:

a. Decreasing the fixed cost;

b. Decreasing the variable cost;

c. Increasing the selling price;

d. Increasing output and sales;

e. Changing to product mix that improves P/V ratio

Margin of safety: Actual Sales - Sales at B.E.P.

$$\text{(or)} = \frac{\text{Profit}}{\text{P/V ratio}} \quad \text{or} \quad = \frac{\text{Profit}}{\text{Contribution}}$$

$$\text{As a percentage} = \frac{\text{Margin of Safety}}{\text{Total Sales}} \times 100$$

Illustration: From the following details find out i) Profit Volume Ratio ii) B.E.P. and iii) Margin of safety.

Sales- Rs. 1,00,000; Total Cost- Rs. 80,000; Fixed Cost- Rs. 20,000 and Net Profit- Rs. 20,000

Solution:

i) P/V ratio = Contribution/Sales X 100

= (100000 - 60000)/100000 X 100 = 40%

ii) B.E.P. = Fixed Cost/ Profit volume ratio

= Rs. 20000/40% = Rs. 50000

iii) Margin of safety = Profit/ Profit Volume ratio

= Rs. 20000/ 40% = Rs. 50000

Or Margin of Safety = Actual Sales - Sales at BEP

= Rs. 100000 - Rs. 50000 = Rs. 50000

Illustration: From the following data, calculate: i) P/V Ratio ii) Profit when sales are Rs. 20000 iii) New Break Even Point if selling price is reduced by 20%; Fixed Expenses- Rs. 4000; Break-Even Point- Rs. 10000

Solution:

i) Break Even Sales = Fixed Expenses/ Profit Volume Ratio

Profit Volume Ratio = Fixed Expenses/Break Even Sales

= (Rs. 4000/Rs. 10000) X 100 = 40%

ii) When sales are Rs.20000, the profit is

= Sales X Profit Volume Ratio - Fixed Expenses

= Rs. 20000 X 40% - Rs. 4000 = Rs. 4000

iii) If selling price is reduced by 20%, the new break even point would be Rs. 80 (say Rs.100 - Rs. 20).

Variable Cost per Unit = 100 - 40% = Rs. 60

New P/V Ratio = (80 - 60)/80 X 100 = 25%

New Break Even Point = (4000 X 100)/25 = Rs. 16000

Activity E:

1. If your Company's given data are margin of safety ratio 20%; P/V ratio 60% and fixed cost Rs. 30000 and you are eager to know Break Even Sales, actual sales, variable cost and profit for the year for the meeting. How would you know all this? Explain

14.7 Break-Even-Chart

The technique of break-even analysis can be made easy with the help of graph or mathematical formula. Graphical representation of break-even point (or cost-volume-profit) is known as the break-even chart. Dr. Vance is of the opinion that "it is a graph showing the amounts of fixed variable costs and the sales revenue at different volumes of operation. It shows at what volume the firm first covers all costs with revenue of break-even." B.E.C. shows the profitability or otherwise of an undertaking at various levels of activity, and indicates the point at which neither profit nor loss is made. Break-even point is known as "no profit, no loss point". So the chart is also known as bread-even chart. At this point, the total costs are recovered and profit begins.

14.7.1 Significance of B.E.C.at various levels of activity

1. It will show the variable costs, fixed costs and total costs.
2. Sales value or unit can be known.
3. Profit or loss can be known.
4. Margin of safety can be known.
5. Angle of incidence or the intersection of sales line with costs line can also be known.

Thus, it is very useful for managerial decision.

14.7.2 Assumptions of Break-even chart

1. Fixed costs remain the same and do not change with level of activity.
2. Costs are divided into fixed and variable costs. Variable costs change according to the volume of production.
3. Variable cost varies with the volume of output but price of variable costs such as wage rate, price of materials, suppliers will be unchanged.
4. Selling price remains the same at different levels of activity.
5. There is no change in the product mix.
6. There is no change in the level of efficiency.
7. Policies of management do not change.
8. No change in the manufacturing process is due to non-static operating efficiency.
9. As the number of units produced and sold is the same, there is no closing or opening stock.

14.7.3 Construction of Break-even Chart

1. On the graph the 'X' axis (horizontal axis) shows the volume of production and the 'Y' axis (vertical axis) shows the cost and production. A graph has two sides which are known as 'axes'. The horizontal side at the bottom of the graph is the X axis. The left hand vertical side is the 'Y' axis. On the 'Y' axis, costs and revenues are exhibited. On the 'X' axis one or more of production quantity, capacity on percentage form, sale volumes etc. are shown.
2. Draw both the axes on the suitable graph paper on the basis of appropriate scale.
3. Insert production quantity on X axis and cost and sales revenues on Y-axis.
4. Draw the fixed cost line on the graph. Even if zero production, the fixed costs will be the loss.
5. The total cost line is drawn above the fixed cost line. For this purpose, the variable cost is added to the fixed cost to arrive at the total cost and drawn at each and every scale of production.
6. Sales revenue line is drawn commencing at zero and finishing at the last point.
7. Then the sales line cuts the total cost line i.e., sales equals the total costs line i.e. sales equals the total cost. This is known as Break-even point. If dotted line is drawn from BEP to X axis, it indicates BEP (Units) and if it is drawn towards Y-axis, it indicates BEP (value).

8. The difference between the sales line and total cost line is marked as profit and it is to the right of BEP. The angle at which sales line cuts the total cost line is the angle of incidence.
9. The position to the left of the BEP on the graph indicates the loss which goes up to the total amount of fixed costs which is the maximum loss at the zero production.
10. Then the graph will indicate the BEP, profit and loss at different level of output, margin of safety, contribution and the relationship between the marginal cost, fixed cost and total cost.

14.7.4 Advantages of Break-even Analysis and Chart

1. Total cost, variable cost and fixed cost can be determined.
2. Break-even output or sales value can be determined.
3. Cost, volume and profit relationship can be studied and they are very useful to the managerial decision making.
4. Inner-firm comparison is possible.
5. It is useful for forecasting plans and profits.
6. The best product mix can be selected.
7. Total profits can be calculated.
8. Profitability of different levels of activity, various products or profit, i.e. plans can be known.
9. It is helpful for cost control.

14.7.5 Limitations of Break-even chart

B.E.C. is constructed under some unrealistic assumptions:

1. Exact and accurate classification of cost into fixed and variable is not possible. Fixed costs vary beyond a certain level or output. Variable costs per unit are constant and it varies in proportion to the volume.
2. Constant selling price is not true.
3. Detailed information cannot be known from the chart. To know all the information about fixed cost, variable cost and selling price, a number of charts must be drawn.
4. No importance is given to opening and closing stocks.
5. Various product mixes on profits cannot be studied as the study is concern.

Activity F:

1. Your supervisor is interested to know the pictorial figure to understand the BEP and other aspects. You have the data of fixed cost Rs. 2000; Variable Cost Re. 0.50; Sales Re. 1 per unit and Unit produced and sold 2000, 4000, 6000, 8000 and 10000. With the help of this draw a chart to show your command on the concept.

14.8 Summary

Marginal Costing is an extremely valuable technique with the management. The cost-volume-profit relationship has served as a key to locked storehouse of solutions to many situations. It enables the management to tackle many problems which are faced in the practical business. The introduction of marginal cost principles does is to give the management a fresh and perhaps a refreshing, insight into the progress of their business.

14.9 Self Assessment Questions

1. What do you mean by Marginal Costing and Marginal Cost? How Marginal Costing is differs from total cost?
2. How Break - even analysis contributes in Profit Planning?
3. What are the uses of Break-Even-Chart?
4. How absorption costing is different from marginal Costing?
5. What do you understand by 'C-V-P analysis? Explain its importance.

14.10 Reference Books

- Management Accounting by I. M. Pandey
- Management Accounting by S.N. Maheswari
- Management Accounting I by M. R. Agarwal

Unit - 15 : Standard Costing and Variance Analysis

Structure of Unit:

15.0 Objectives

After completing this unit, you would be able to:

- Understand the concept of Standard, Standard Cost and Standard Costing.
- Know the advantages and limitation of Standard Costing.
- Learn to set the various type of Standards
- Able to identify the favourable and unfavourable variances.
- Identify the controllable and Uncontrollable Variances.
- Understand the utility of Variance Analysis for management decision making.
- Point out the Favourable and Adverse Variances in order to take the remedial action.
- Able to compute Material, Labour and Overhead Variances.

15.1 Introduction

Historical costing or actual costing is a system where costs are ascertained after they are incurred. It is a post-mortem of the costs. Historical costing does not help in finding mistakes and inefficiencies, which all lead to variation in profit. Due to these disadvantages and limitations of historical costing, the standard costing technique was introduced in the U.S.A. and in the U.K. in India also standard costing is used widely and recognized greatly.

Standard cost seeks to establish the cost of a product, operations or process under standard operating conditions. The aim of standard cost is to eliminate the influence of abnormal changes in prices. It is used as a guide for future decision and action over a period of time. Standard costing is an effective management tool for planning, decision making, coordination and control of business. The object of standard cost is to ascertain the quotation and determination of price policy. It is a technique of cost control.

15.2 Definitions of Standard, Standard Cost and Standard Costing

15.2.1 Standard: According to Prof. Eric L. Kohler, "Standard is a desired attainable objective, a performance, a goal, a model". Standard may be used to a predetermined rate or a predetermined amount or a predetermined rate or a predetermined amount or a predetermined cost.

15.2.2 Standard Cost: Standard costs are predetermined cost or forecast estimate of cost. I.C.M.A. Terminology defines standard cost as, "a predetermined cost which is calculated from management standards of efficient operations and the relevant necessary expenditure. It may be used as a basis for price fixing and for cost control through variance analysis". The other names for standard costs are predetermined costs, budgeted costs, projected costs, model costs, measured costs, specification costs etc. Standard cost is predetermined estimate of cost to manufacture a single unit or a number of units of a product during a future period. Actual costs are compared with these standard costs.

15.2.3 Standard Costing: It is defined by I.C.M.A. Terminology as "The preparation and use of standard costs, their comparison with actual costs and the analysis of variances to their causes and points of incidence".

According to Wheldon "Standard costing is a method of ascertaining the costs whereby statistics are prepared to show (a) the standard cost (b) the actual cost (c) the difference between these costs, which is termed the variance".

Thus the technique of standard cost study comprises of

1. Ascertainment and use of standard costs.
2. Comparison of actual costs with standard costs and measuring the variances.
3. Controlling costs by the variance analysis.
4. Reporting to management for taking proper action to maximize the efficiency.

Activity A:

1. Analyse the Standard, Standard Cost and Standard Costing. Do you feel that these are different from Historical and Estimate Cost for a business? If yes then justify your analysis.

15.3 Advantages of Standard Costing

The advantages of standard costing can be enumerated as below:

1. It helps the management in formulating price and production policy.
2. It is a yardstick of performance. Standard costs are compared with actual costs, and the differences are analysed and effective cost control is taken. Thus reduction of cost is possible by increasing the profits.
3. It reduces avoidable wastages and losses.
4. It facilitates to reduce clerical and accounting cost and managerial time.
5. It creates cost consciousness among the personnel because the variance analysis fixes responsibility for favourable or unfavourable performances.
6. Executive become more responsible, as it shows clearly who is responsible for the cost centers.
7. By the variance analysis and reporting, "the principle of management by exception" is facilitated. Management must concentrate their attention on variations only.
8. It aids in budgetary control and in decision making.

9. Opening stock and closing stock are valued at the standard price. This helps in the preparation of Profit and Loss account for a short period say a week, a month.

10. It facilitates timely cost reports to management and a forward looking mentality is encouraged at all levels of the management. It is a basis for the implementation of an incentive system for the employees.

Standard cost forms a basis for future planning, preparation of tenders, fixation of price etc. Otherwise, or in the absence of standard cost, decision will be based on actual cost. The prices of material, labour etc. may change from time to time. There must be a fixed cost structure based on normal standard efficiency. Thus it helps the management in formulating price and production policy.

When standards have been fixed, the section heads safely delegate the responsibility to the workers. The standard of activity can be measured through the costing reports.

Introduction of standard cost facilitates timely reporting. The management gives attention to the variances and takes corrective steps. The costing reports, based on standard cost, reveal the overall result of the manufacturing side.

15.4 Limitations of Standard Costing

Standard Costing suffers from following limitations

1. It is costly, as the setting of standards needs high technical skill.
2. Keeping of up-to-date standard is a problem. Periodic revision of standard is a costly thing.
3. Inefficient staff is incapable of operating this system.
4. Since it is difficult to set correct standards, it is difficult to ascertain correct variances.
5. Industries, which are subject to frequent changes in technological process or the quality of material or the character of labour, need a constant revision of standard. But revision of standard is more expensive.
6. For small concerns, standard costing is expensive.
7. It is difficult to apply this method where production takes more than one accounting period. Standard costing may not be effective in industries which deal in non-standardised products or jobs as per the customer's requirements.

Activity B:

1. If you have to suggest to your supervisor for adopting the standard costing system in the business. How would you convince your supervisor indicating pros and cons of the standard costing system?

15.5 Setting the Standards

While setting standard cost for operations, process of products, the following preliminaries must be gone through:

1. There must be Standard Committee, similar to Budget Committee in which purchase manager, personnel manager and Production manager are represented. The cost accountant coordinates the functions of the Standard Committee.
2. Study the existing costing system, cost records and forms in use. If necessary, review the existing system.

3. A technical survey of the existing methods of production should be undertaken so that accurate and reliable standards can be established.
4. Determine the type of standard to be used.
5. Fix standard for each element of cost.
6. Determine standard costs for each product.
7. Fix the responsibility for setting standards.
8. Classify the accounts properly so that variances may be accounted for in the manner desired.
9. Comparison of actual costs with pre-determined standards to ascertain the deviations.
10. Action to be taken by management to ensure that adverse variance is not repeated.

Activity C:

1. Assume yourself as a cost accountant and taking the example of a hypothetical company, set the standard and its outline.

15.6 Variance Analysis

The most significant contribution of standard costing to the science and art of management is the presentation of'variances'. As a matter of fact, without determination and analysis of variances, standard costing is meaningless. The term 'Variances' has been derived from the verb 'To vary' meaning to differ. In cost accounting, variance means deviation of the actual cost from the standard cost. In standard costing, standard costs are predetermined and refer to the amounts which ought to be incurred. These become the yardsticks against which actual costs can be compared.

Variance analysis is the process of analyzing variance by sub-dividing the total variance in such a way that management can assign responsibility for off-standard performance. It, thus, involves the measurement of the deviation of actual performance from the intended performance. That is, variance analysis is a tool to measure performances and based on the principle of management by exception. In variance analysis, the attention of management is drawn not only to the monetary value of unfavourable and favourable managerial performance but also to the responsibility and causes for the same.

After the standard costs have been fixed, the next stage in the operation of standard costing is to ascertain the actual cost of each element and compare them with the standard already set. Computation and analysis of variances is the main objective of standard costing. The deviation of actual from the standard is called 'variance'. The difference between the actual cost and the standard cost is known as the 'cost variance'.

Activity D:

1. How you would interpret that the different variances can contribute in business decision making? Explain with the help of suitable example.

15.7 Favourable and Unfavourable Variances

Variances may be favourable (positive or credit) or unfavourable (negative or adverse or debit) depending upon whether the actual resulting cost is less or more than the standard cost.

15.7.1 Favourable Variance: When the actual cost incurred is less than the standard cost, the deviation is known as favourable variance. The effect of favourable variance increases the profit. Again favourable variance would result when the actual cost is lower than the standard cost. It is also known as positive or credit variance and viewed only as savings.

15.7.2 Unfavourable Variance: When the actual cost incurred is more than the standard cost, there is a variance, known as unfavourable or adverse variance. Unfavourable variance refers to deviation to the loss of the business. It is also known as negative or debit variance and viewed as additional costs or losses.

When the profit is greater than the standard profit, it is known as favourable variance. When the profit is less than the standard profit, it is known as unfavourable variance. This favourable variance is a sign or efficiency of the organization and the unfavourable variance is a sign of inefficiency of the organisation.

15.8 Controllable and Uncontrollable Variances

Variances may be controllable or uncontrollable, depending upon the controllability of the factors causing variances.

15.8.1 Controllable Variance: A variance is said to be controllable if it can be identified as the primary responsibility of a specified person or department. That is, it refers to a deviation caused by such factors which could be influenced by the executive action. For example excess usage of materials, excess time taken by a worker etc. is example for controllable variance. When compared to the standard cost it becomes controllable because the responsibility can be fixed on the in-charge or foreman of the department.

15.8.2 Uncontrollable Variance: When variance is due to the factors beyond the control of the concerned person (or department), it is said to be uncontrollable. Cost variance is due to outside factors, for example, the wage rate increased on account of strike, Government restrictions, change in market price etc. No person or department can be held responsible for uncontrollable variances. Here revision of standards is required to remove such variances in future.

Activity E:

1. What can be the probable reasons for the Variance? Can it be Controlled? If yes, then list out those variances and the strategies to be adopted for controlling them.

15.9 Computation of Variances

The computation and analysis of variance are the objectives of standard costing. The causes of variance are necessary to find remedial measures. Variances can be found out with respect to all the elements of cost, i.e. direct material, direct labour and overheads. In other words, the total cost variance is split into its component parts on the basis of elements, and each element is further subdivided to locate the responsibility of variance. The variances can be studied in the following manner.

A) Material Variances
B) Labour or wage Variances
C) Overhead Variances (i) Variable and (ii) Fixed
D) Sales Variances
E) Profit Variances

This Unit will describe only above three variances

15.10 Material Variances

Material variance involves the below mentioned Variances

15.10.1 Material Cost Variance: It is the difference between the standard cost of direct materials specified for the output achieved and the actual cost of direct materials used. The standard cost of materials is

computed by multiplying the standard price with the standard quantity for actual output; and the actual cost is computed by multiplying the actual price with the actual quantity.

Material Cost Variance (MCV) = Standard Cost of Materials - Actual Cost of Material Used

Or

MCV = Standard Cost of Actual Output - Actual Cost

Or

MCV= (Standard Quantity for Actual Output X Standard Price) - (Actual Quantity X Actual Price) = (SQ X SP) - (AQ X AP)

Illustration: The standard cost of material for manufacturing a unit of a particular product is estimated as follows: 16 kg. of raw materials @ Rs. 2 per kg. On completion of the unit, it was found that 20 kg. of raw material costing Rs. 1.50 per kg. has been consumed. Compute material variances.

Solution: MCV = (SQ X SP) - (AQ X AP)
= (16 X Rs. 2) - (20 X Rs. 1.50)
= Rs. 32 - Rs. 30 = Rs. 2 (Favourable)

15.10.2 Material Price Variance: Material price variance is that portion of the direct material cost variance which is the difference between the standard price specified and the actual price paid for the direct materials used. The formula is:

Material Price Variance (MPV) = (Actual quantity consumed X Standard Price) - (Actual quantity consumed X Actual Price)

Or

MPV = Actual quantity consumed (Standard Rate - Actual Rate) = AQ (SR - AR)

Illustration:

The standard cost of material for manufacturing a unit of a particular product is estimated as follows: 20 kg of raw materials @ Rs. 2 per kg. On completion of the unit, it was found that 25 kg. of raw material costing Rs. 3 per kg. has been consumed.

Solution:

MPV = AQ (SR - AR)

= 25 (Rs. 2 - Rs. 3) = Rs. 25 (Adverse)

15.10.3 Material Usage (Quantity) Variance: It is the deviation caused by the standards due to the difference in quantity used. It is calculated by multiplying the difference between the standard quantity specified and the actual quantity used by the standard price.

Material Usage or Quantity Variance (MU or QV) = Standard Rate (Standard Quantity - Actual Quantity) = SR(SQ - AQ)

Illustration:

From the following data, you are required to material usage variance.
Standard - 20 kg. at Rs. 5.50 per kg.
Actual - 25 kg. at Rs. 6 per kg.

Solution:

MUV = SR (SQ - AQ)

= Rs. 5.50 (20 -25) = Rs. 27.50 (Adverse)

Material Usage Variance may further be classified into Material Mix Variance (MMV) and either Material Yield Variance (MYV) or Material Revised Usage Variance.

15.10.4 Material Mix Variance: I.C.M.A. defines it as 'that portion of direct material usage variance which is the difference between the actual quantities of ingredients used in a mixture at standard price and the total quantity of ingredients used at the weighted average price per unit of ingredient as shown by the standard cost sheet'. When two or more materials are used in the manufacture of a product, the difference between the standard composition and the actual composition of material mix is the Material Mix Variance (MMV).

MMV = Standard Rate (Standard Mix - Actual Mix)

I) When actual weight of mix and standard weight of mix are the same.

MMV = Standard Rate (Standard Quantity - Actual Quantity) = SR(SQ -AQ)

Standard is revised due to the shortage of a particular type of material. The formula is: MMV = Standard Rate (Revised Standard Quantity - Actual Quantity) = SR (RSQ - AQ)

$$RSQ = \frac{\text{Total weight of actual mix}}{\text{Total weight of standard mix}} \times \text{Standard Quantity}$$

II) When the actual weight of mix and standard weight of mix differ from each other, the formula to find new standard mix is:

$$\frac{\text{Total weigh of actual mix}}{\text{Total weigh of standard mix}}$$

After finding out this revised standard mix it is multiplied by the revised standard cost of standard mix and then the standard cost of actual mix is subtracted from the result.

Revised usage variance or sub-usage variance = Standard Rate (Standard Quantity - Revised Standard Quantity)

Material mix variance arises when standard mix of the materials is different from the actual mix ratio. If the ratio of standard mix and actual mix is the same, the quantities may differ, there will be no mix variance.

15.10.5 Material Yield Variance: It is that portion of the direct material usage variance which is due to the difference between the standard yield specified and the actual yield obtained. The variance arise due to abnormal contingencies like spoilage, chemical reaction etc. Since the variance is a measure of the waste or loss in the production, it can also be known as material loss or waste variance. In case actual yield is more than the standard yield, the materials yield variance is favourable and if the actual yield is less than the standard yield, the variance is unfavourable or adverse.

I) When actual mix and standard mix are the same the formula is:

MYV = Standard Yield Rate (Standard Yield - Actual Yield) or

= Standard Revised Rate (Actual Loss - Standard Loss)

$$\text{Standard Yield Rate} = \frac{\text{Standard cost of standard mix}}{\text{Net Standard Output}}$$

Net Standard Output = Gross Output - Standard Loss.

II) When the actual mix and the standard mix differ from each other, the formula is:

MYV = Standard Rate (Actual Standard Yield - Revised Standard Yield)

$$\text{Standard Rate} = \frac{\text{Standard Cost of Revised Standard Mix}}{\text{Net Standard Output}}$$

Relationship or Verification

- MCV = MPV + MUV
- MUV = MMV + MYV
- MCV = MPV + MMV + MSUV

Illustration: The standard material cost for 100 kg. of Chemical D is made up of: Chemical A -30 kg @ Rs. 4 per kg.; Chemical B - 40 kg. @ Rs. 5 per kg.; Chemical C - 80 kg. @ Rs. 6 per kg.

In a batch, 500 kg of chemical D were produced from a mix of: Chemical A - 140 kg. at a cost of Rs. 588; Chemical B - 220 kg. at a cost of Rs. 1056; Chemical C - 440 kg. at a cost of Rs. 2860.

How do the yield, mix and the price factor contribute to the variance in the actual per 100 kg. of chemical D over the standard cost?

Solution: We have to find out the variances only for 100 kg. of output. Therefore, the data required is calculated as follows:

$$\text{Chemical A : Rate} = \frac{588}{140} = \text{Rs. } 4.20 \text{ per kg.}$$

$$\text{Chemical B: Rate} = \frac{1056}{220} = \text{Rs. } 4.80 \text{ per kg.}$$

$$\text{Chemical C: Rate} = \frac{2860}{440} = \text{Rs. } 6.50 \text{ per kg.}$$

For 100 kg. of chemical D, the required Chemical is:

$$A = \frac{140 \times 100}{500} = 28 \text{ kg.} \qquad B = \frac{220 \times 100}{500} = 44 \text{ kg.} \qquad C = \frac{400 \times 100}{500} = 88 \text{ kg.}$$

Material Cost Variance (MCV) = (SQ XSP) - (AQ X AP)

Chemical A = (30 X Rs. 4) - (28 X Rs. 4.20) = Rs. 2.40 (F)

Chemical B = (40 X Rs. 5) - (44 X Rs. 4.80) = Rs. 11.20 (A)

Chemical C = (80 X Rs. 6) - (88 X Rs. 6.50) = Rs. 92.00 (A)

Total MCV = Rs. 100.80 (A)

Material Price Variance (MPV) = AQ (SP - AP)

Chemical A = 28 (4 - 4.20) = Rs. 5.60 (A)

Chemical B = 44 (5 - 4.80) = Rs. 8.80 (F)

Chemical C = 88 (6 - 6.50) = Rs. 44.00 (A)

Total MPV = Rs. 40.80 (A)

Material Usage variance (MUV) = SP (SQ -SP)

Chemical A = 4 (30 - 28) = Rs. 8 (F)

Chemical B = 5(40 - 44) = Rs. 20 (A)

Chemical C = 6 (80 - 88) = Rs. 48 (A)

Total MUV = Rs. 60 (A)

Material Mix Variance (MMV) = SP (RSQ - AQ)

The actual quantity of 160 kg. is to be apportioned in the standard proportion i.e. 30:40:80, so RSQ is required.

$$A = \frac{160 \times 30}{150} = 32 \text{ kg.} \quad B = \frac{160 \times 40}{150} = 42.67 \text{ kg.} \quad C = \frac{160 \times 80}{150} = 85.33 \text{ kg.}$$

Chemical A = 4 (32 - 28) = Rs. 16.00 (F)

Chemical B = 5 (42.67 - 44) = Rs. 6.67 (A)

Chemical C = 6 (85.33 - 88) = Rs. 16.00 (A)

Total MMV = Rs. 6.67 (A)

Material Yield Variance (MYV) = SP (AY - SY)

$$\text{Standard Price} = \frac{\text{Total Standard Price}}{\text{Standard Output}} = \frac{800}{100} = \text{Rs. } 8$$

150 kg. mix will produce 100 kg. so 160 kg. of mix will produce = 100 X 160/150 = 106.67 kg.

MYV = Rs. 8 (100kgs. - 106.67) = Rs. 53.33 (A)

Verification: MCV = MPV + MUV Rs. 100.80 (A) = Rs.40.80 (A) + Rs. 60 (A)

MUV = MMV + MYV Rs. 60 (A) = Rs. 6.67 (A) + Rs. 53.33 (A).

Activity F:

1. If your company is engaged in producing a standard mix using 60 kgs of chemical X and 40 kgs. Of chemical Y. The standard loss of production is 30%. The standard price of X is Rs. 5 per kg. and of Y is Rs. 10 per kg. The actual mixture for X- 80 kgs. @ Rs. 4.50 per kg. and for Y- 70 kgs. @ Rs. 8.00 per kg. and actual yield is 115 kgs. What are the relevant material variances which can be computed.

15.11 Labour Variances

Labour variances arise because of i) difference in actual rates and standard rates of labour and ii) the variation in actual time taken by workers and the standard time allotted to them for performing a job. These variances are computed on the same pattern as those of material variances. One can find out the various formulae for labour variances by simply putting the word 'time' or 'hour' at the place of 'quantity' and 'rate' at the place of 'price' in the formulae of material variances. The various labour variances can be analysed as follows:

15.11.1 Labour Cost Variance or Labour Wage Variance (LCV or LWV): This variance represents the difference between the standard labour cost and the actual labour costs. That is, it is the difference between standard direct wages specified for the activity achieved and the actual direct wages paid. Labour costs may be considered wages including pay, allowances and other expenses on labour. If the standard cost is higher, the variation is favourable and vice versa. This variance can be calculated with the help of the following formulae:

Labour Cost Variance (LCV) = Standard Cost of Labour - Actual Cost of Labour

LCV = (Standard Hour X Standard Rate) - (Actual Hour X Actual Rate)

LCV = (SH X SR) - (AH X AR)

15.11.2 Labour or Wage Rate Variance (L or WRV): This variance is the direct result of the wages paid at a rate different from the standard rate. That is, it is the difference between the standard rate of pay specified and the actual rate paid. If the standard rate is higher then the variance is favourable and vice versa.

Labour Rate Variance (LRV) = Actual Hour (Standard Rate - Actual Rate)

LRV = AH (SR - AR)

15.11.3 Labour Efficiency Variance (LEV): The terminology defines Labour Efficiency Variance as 'the difference between the standard hours for the actual production achieved and the hours actually worked, valued at the standard labour rate.' This variance represents standard wages for the difference between the hours allowed for a job and the hours actually taken. When the workers finish the specific job in less than the standard time, the variance is favourable. It is important to note that the actual time should be taken after deducting abnormal idle time if any.

Labour Efficiency Variance (LEV) = Standard Rate (Standard Hour - Actual Hour)

LEV = SR (SH - AH)

15.11.4 Labour Idle Time Variance (LITV): This type of variance arises because of the time during which the labour remains idle due to abnormal reasons, i.e., power failure, strikes, machine breakdown, shortage of materials etc. The idle time will affect the efficiency of employees when such time loss is beyond their control. This will always be an adverse variance.

Labour Idle Time Variance (LITV) = Abnormal Idle Time X Standard Hourly Rate

15.11.5 Labour Mix Variance or Gang Composition Variance (LMV): It results from employing different grades of labour from the standard fixed in advance. It is the difference between the standard composition of workers and the actual gang of workers. It is a part of labour efficiency variance. This variance enables the management to study the labour cost variance occurred because of the changes in the composition of labour force. The rates of pay of the different categories of workers- skilled, semi-skilled and unskilled, are different. Hence, any change made in composition of the workers will naturally cause variance. There are two situations of the changes in the composition of workers.

i) When the total hours i.e. time of the standard composition and actual composition of workers do not differ, the formulae is:
   Labour Mix Variance (LMV) = (Standard Cost of Standard Mix) - (Standard Cost of Actual Mix)
ii) When the total hours i.e. time of the standard composition and actual composition of workers differ, the formulae is:

LMV = (Total time of Actual Mix / Total time of Standard Mix X Standard Cost of Standard Mix) - (Standard Cost of Actual Mix)

15.11.6 Labour Yield Variance (LYV): It is the difference between the standard labour output and actual output or yield. It is calculated as below:

Labour Yield Variance (LYV) = Standard Cost per Unit (Standard Production of Actual Mix - Actual Production)

If the actual production is more than standard production, it would result in a favourable variance and vice versa.

Relationship or Verification

LCV = LRV + LEV
LEV = LMV + LITV
LEV = LYV + LITV
LEV = LMV + LYV + LITV

Illustration:

From the following information, you are required to compute the labour variance:

Direct Wages: Rs. 3000; Standard hours produced: 1600 and Standard rate per hour: Rs. 1.50.

Actual hours paid 1500 hours, out of which hours not worked (abnormal idle time) are 50.

Solution:

Labour Cost Variance (LCV) = (SH X SR) - (AH X AR)
= (1600 X Rs. 1.50) - (1500 X Rs. 2) = Rs. 600 (A)
Labour Rate Variance (LRV) = AH (SR - AR)
= 1500 (Rs. 1.50 - Rs. 2.00) = Rs. 750 (A)
Labour Efficiency Variance (LEV) = SR (SH - AH)
Actual Hour = Actual Hour Paid - Abnormal idle Hour

= 1500 - 50 = 1450

= Rs. 1.50 (1600 - 1450) = Rs. 225 (F)

Labour Idle Time Variance (LITV) = Idle Time X SR

= 50 X Rs. 1.50 = Rs. 75 (A)

Verification: LCV = LRV + LEV + LITV

Rs. 600 (A) = Rs. 750 (A) + Rs. 225 (F) + Rs. 75 (A)

Illustration:

Standard labour hours and rate of production of Article A are given below:

Skilled Worker- 5 hours @ Rs. 1.50 per hour Total Rs. 7.50

Unskilled Worker- 8 hours @ Rs. .50 per hour Total Rs. 4.00

Semi-skilled Worker- 4 hours @ Rs. .75 per hour Total Rs. 3.00

Grand Total Rs.14.50

Actual Data

Article produced- 1000 units

Skilled Worker- 4500 hours, Rate Rs. 2.00 per hour Total Rs. 9000

Unskilled Worker- 10000 hours, Rate Rs. 0.45 per hour Total Rs. 4500

Semi-skilled Worker- 4200 hours, Rate Rs. 0.75 per hour Total Rs. 3150

Grand Total Rs. 16650

Calculate a) Labour Cost Variance b) Labour Rate Variance c) Labour efficiency Variance and d) Labour Mix Variance.

Solution:

a) Labour Cost Variance (LCV) = (SH for Actual Production X SR) - (AH X AR)

Computation of Standard Hour for Actual Production

Skilled Worker- 1000 X 5 = 5000 Hours

Unskilled Worker- 1000 X 8 = 8000 Hours

Semi-skilled Worker- 1000 X 4 = 4000 Hours

Labour Cost Variance (LCV)

Skilled Worker = (5000 X Rs. 1.50) - (4500 X Rs. 2) = Rs. 1500 (A)

Unskilled Worker = (8000 X Rs. 0.50) - (10000 X Rs. 0.45) = Rs. 500 (A)

Semi-skilled Worker = (4000 X Rs. 0.75) - (4200 X Rs. 0.75) = Rs. 150 (A)

Total Labour Cost Variance = Rs. 2150 (A)

b) Labour Rate Variance (LRV) = AH (SR - AR)

Skilled Worker = 4500 (1.50 - 2) = Rs. 2250 (A)

Unskilled Worker = 4200 (0.75 - 0.75) = Nil

Semi-skilled Worker = 1000 (0.50 - 0.45) = Rs. 500 (F)

Total Labour Rate Variance = Rs. 1750 (A)

c) Labour Mix Variance (LMV) = SR (RSH - AH)

Revised Standard Hour (RSH) = Standard Mix/Total Standard Hours X Total Actual Hours

Skilled Worker = 5000/17000 X 18700 = 5500 hours

Unskilled Worker = 8000/17000 X 18700 = 8800 hours

Semi-skilled Worker = 4000/17000 X 18700 = 4400 hours

Labour Mix Variance

Skilled Worker = 1.50 (5500 - 4500) = Rs. 1500 (F)

Unskilled Worker = 0.50 (8800 - 10000) = Rs. 600 (A)

Semi-skilled Worker = 0.75 (4400 - 4200) = Rs. 150 (F)

Total Labour Mix Variance = Rs. 1050 (F)

d) Labour Efficiency Variance (LEV) = SR (SH for Actual Production - RSH)

Skilled Worker = 1.50 (5000 - 5500) = Rs. 750 (A)

Unskilled Worker = 0.50 (8000 - 8800) = Rs.400 (A)

Semi-skilled Worker = 0.75 (4000 - 4400) = Rs. 300 (A)

Total Labour Efficiency Variance = Rs. 1450 (A)

Verification = LCV = LRV + LMV +LEV

Rs. 2150 (A) = Rs. 1750 (A) + Rs. 1050 (F) + Rs. 1450 (A)

Activity G:

1. Your are instructed by your supervisor to report the labour variances from the following data: Standard labour rate- Rs. 2 per hour; Standard hours- 2 per unit; Actual labour rate- Rs. 2.25 per hour; Actual units produced- 1000 units and actual hours worked 1950 hours. What labour variances, you would report to your supervisor?

15.12 Overhead Variances

Overhead variance is the difference between the standard cost of overhead absorbed in the actual output achieved and the actual overhead cost. The term overhead includes indirect material, indirect labour and indirect expenses and the variances relate of factory, office and selling and distribution overheads. Overhead variances are divided into two broad categories i) Variable Overhead variances and ii) Fixed Overhead variances. Some overhead calculation is used as below:

Standard Overhead Rate per Unit = Budgeted Overheads/ Budgeted Output

Standard Overhead Rate per Hour = Budgeted Overheads/ Budgeted Hours

Standard Hours for actual Output = (Budgeted hours/Budgeted output) X Actual Output

Standard Output for actual Time = (Budgeted Output/Budgeted Hours) X Actual Hours

Recovered or absorbed overhead = Standard Rate per Unit X Actual Output

15.12.1 Variable Overhead Variance: Variable cost varies in proportion to the level of output, where the cost is fixed per unit. As such the standard cost per unit of these overheads remains the same irrespective of the level of output attained. As the volume does not affect the variable cost per unit or per hour, the only factor leading to difference is price.

15.12.1.1 Variable Overhead Cost Variance (VOCV): It is the difference between standard overheads for actual output i.e. Recovered Overhead and actual variable overheads.

VOCV = Variable Recovered Overhead - Actual Variable Overhead

Variable Recovered Overhead = Variable Actual Output/Variable Standard Output X Standard Variable Overhead

VOCV = (Variable Actual Output/Variable Standard Output X Standard Variable Overhead) - Actual Variable Overhead.

It is divided into two namely Variable Overhead Expenditure Variance and Variable Overhead Efficiency Variance.

15.12.1.2 Variable Overhead Expenditure Variance (VOExp.V): It is the difference between actual variable overhead expenditure incurred and the standard variable overheads set in for a particular period.

VOExp.V = Budgeted Variable Overhead - Actual Variable Overhead or BVO -AVO

15.12.1.3 Variable Overhead Efficiency Variance (VOEff.V): It shows the effect of change in labour efficiency on variable overheads recovery.

VOEff.V = Standard Rate per hour (Standard hours for actual production - Actual Variable Hours)

15.12.2 Fixed Overhead Variance: Fixed overhead variance depends on a) fixed expenses incurred and b) the volume of production obtained. The volume variance includes three variances namely i) Efficiency ii) Calendar and iii) Capacity.

15.12.2.1 Fixed Overhead Cost Variance (FOCV): It is the difference between standard overheads for actual output i.e. recovered overhead and actual fixed overheads.

FOCV = Fixed Recovered Overhead - Actual Fixed Overhead

Fixed Recovered Overhead = Fixed Actual Output/Fixed Standard Output X Standard Fixed Overhead

FOCV = (Fixed Actual Output/Fixed Standard Output X Standard Fixed Overhead) - Actual Fixed Overhead.

15.12.2.2 Fixed Overhead Expenditure Variance (FOExp.V): It is that portion of the fixed overhead which is incurred during a particular period due to the difference between the budgeted fixed overheads and the actual fixed overheads.

FOExp.V = Budgeted Fixed Overhead - Actual Fixed Overhead or BFO - AFO

15.12.2.3 Fixed Overhead Volume Variance (FOVV): This variance is the difference between the standard cost of overhead absorbed in actual output and the standard allowance for that output. This variance measures the over or under recovery of fixed overheads due to deviation of actual output from the budgeted output level.

FOVV = (Fixed Actual Output/Fixed Standard Output X Standard Fixed Overhead) - Budgeted Fixed Actual Overhead

15.12.2.3.1 Fixed Overhead Efficiency Variance (FOEff.V): The portion of the overhead variation which is due to the differences between the budgeted efficiency of production and the actual efficiency attained, is the efficiency variance.

FOEff.V = Standard Rate per hour (Standard hours for actual production - Actual Fixed Hours)

15.12.2.3.2 Fixed Overhead Calender Variance (FOCalV): It is the difference between the number of working days anticipated in the budget period and actual working days in the budget period. This may be the result of unexpected public holiday being declared, as such the work in the unit is stopped.

FOCal.V = (Standard Rate per Hour (day)) X (excess or deficit hours or days worked)

15.12.2.3.3 Fixed Overhead Capacity Variance FOCap.V): The variance which is related to the over and under utilisation of plant or equipment is known as capacity variance. This variance arises because of the working above or below standard capacity, strikes, idle time, lock-out etc. leads to over utilisation.

FOCap.V = Standard Rate Per Hour X (Actual Hours - Budgeted Hours)

Relationship or Verification

Total Overhead Cost Variance = VOCV + FOCV

VOCV = VOExp.V + VOEff.V

FOCV = FOExp.V + FOVV

FOVV = FOEff.V + FOCal.V + FOCap.V

Illustration:

Roshi Ltd. has furnished you the following data:

	Budget	Actual Dec.2011
No. of Working days	25	27
Production in Units	20000	22000
Fixed Overheads	Rs. 30000	Rs. 31000

Budgeted fixed overhead rate is Re. 1 per hour, In Dec. 2011, the actual hours worked were 31500.

Calculate the following variances i) Efficiency Variance ii) Capacity Variance iii) Volume Variance iv) Expenditure Variance and v) Total Overhead Variance.

Solution:

Recovered Overhead = Budgeted Overhead/Budgeted Output X Actual Output

= 30000/20000 X 22000 = 33000

Efficiency Variance = Standard Rate per hour X (Standard Hours for actual production - Actual Hours

= Re. 1 X (33000 - 31500) = Rs. 1500 (F)

Capacity Variance = Standard Rate per Hour X (Actual Hours - Budgeted Hours)

= Re. 1 X (31500 - 30000) = Rs. 1500 (F)

Volume Variance = Recovered Overhead - Budgeted Overhead

= Rs. 33000 - Rs. 30000 = Rs. 3000 (F)

Expenditure Variance = Budgeted Overhead - Actual Overhead

= Rs. 30000 - Rs. 31000 = Rs. 1000 (A)

Total Overhead Variance = Recovered Overhead - Actual Overhead

= Rs. 33000 - Rs. 31000 = Rs. 2000 (F)

Verification:

FOCV = FOExp.V + FOVV
Rs. 2000(F) = Rs. 1000 (A) + Rs. 3000(F)
FOVV = FOEff.V + FOCap.V
Rs. 3000 (F) = Rs. 1500 (F) + Rs. 1500 (F)

Illustration:

RVS Ltd. has furnished you the following information for the month of August 2011.

	Budget	Actual
Output (Units)	30000	32500
Hours	30000	33000
Fixed Overhead	Rs. 45000	Rs. 50000
Variable Overhead	Rs. 60000	Rs. 68000
Working days	25	26

Calculate the Variances

Solution:

Standard Hour per Unit = Budgeted Hours/ Budgeted Units

= 30000/30000 = 1 hour

Total standard overhead rate per hour = Budgeted Overheads/Budgeted Hours

= 105000/30000 = Rs. 3.50 per hour

Standard fixed overhead rate per hour = Budgeted fixed overhead/ Budgeted Hours

= 45000/30000 = Rs. 1.50

Standard Variable Overhead Rate per hour = Budgeted Variable Overheads/Budgeted Hours

= 60000/30000 = Rs.2

Overhead Cost Variance = Recovered Overheads - Actual Overheads

Recovered Overheads = Standard Rate per Unit X Actual Output

= 325,00 X Rs. 3.50 = Rs. 113750

Total Overhead Cost Variance = Rs. 113750 - Rs. 118000 = Rs. 4250 (A)

Variable Overhead Cost Variance = Rs. 65000 - Rs. 68000 = Rs. 3000 (A)

Fixed Overhead Cost Variance = Rs. 48750 - Rs. 50000 = Rs. 1250 (A)

Expenditure Variance = Budgeted Overheads - Actual Overheads

= Rs. 45000 - Rs. 50000 = Rs. 5000 (A)

Volume Variance = Recovered Overheads - Budgeted Overheads

= Rs. 48750 - Rs. 45000 = Rs. 3750 (F)

Efficiency Variance = Standard Rate X (Standard hours for actual Output - actual Hours)

= Rs. 1.50 X (32500 - 33000) = Rs. 750 (A)

Capacity Variance = Standard Rate X (Actual Hours - Budgeted Hours)

= Rs. 1.50 X (33000 - 30000) = Rs. 4500 (F)

Calender Variance = Extra/Deficit hours worked X Standard Rate

No. of extra hours worked = 30000/25 = 1200

Calender Variance = Rs. 1.50 X 1200 = Rs. 1800 (F)

Verification

Total Overhead Cost Variance = VOCV + FOCV

Rs. 4250 (A) = Rs. 1250 (A) + Rs. 3000 (A)

FOCV = FOExp.V + FOVV

Rs. 1250 (A) = Rs. 5000 (A) + Rs. 3750 (F)

FOVV = FOEff.V + FOCap.V

Rs. 3750 (F) = Rs. 750 (A) + Rs. 4500 (F)

Activity H:

1. You are engaged in a company where you come across with more indirect cost, hence you want to know the exact variances from the available data in order to take the remedial step. The available data is as below:

	Standard	Actual
Fixed overheads	Rs. 8,000	Rs. 8,500
Variable overheads	12,000	11,200
Output in units	4,000	3,800

15.13 Summary

Standard Cost is scientific tool, used for effective cost control and to take proper action to maximise efficiency. The variance analysis is important tool of cost control and cost reduction and it generate an atmosphere of cost consciousness in the organisation. The comparison of actual with standard cost which reveals the efficiency or inefficiency of performance. The inefficiency or unfavourable variance is analysed and immediate action is taken. Thus, variance is like a barometer. This can be used by the manage-

ment to apply the principle of management by exception and to maximise the profits by analysing the variances into controllable and uncontrollable; the controllable variances are further analysed so as to bring a cost reduction, indirectly more profit.

15.14 Self Assessment Questions

1. What do you know by the term 'Standard', 'Standard Cost' and 'Standard Costing'? Explain the advantages and disadvantages.
2. What is 'Variance Analysis'? Indicate its significance to the Management.
3. "Setting of standard is the most important mission of standard cost system. These should be set with the greatest care and sound judgement". Discuss the statement and show how standards are fixed for different elements of cost.
4. How controllable and uncontrollable variance is different?
5. Explain Favourable and Unfavourable Variance in detail.

15.15 Reference Books

- Management Accounting by I. M. Pandey
- Management Accounting by S.N. Maheswari
- Management Accounting I by M. R. Agarwal